AN ANALYSIS OF POLAND’S FOREIGN TRADE IN THE LIGHT OF THE LATEST THEORETICAL CONCEPTS

Implications for economic policy at a time of crisis

Edited by
Krystyna Gawlikowska-Hueckel and Stanisław Umiński
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While foreign trade is and long has been one of the key factors underpinning economic growth, in the present era of globalisation, international commerce is taking on entirely new features. Not only is trade increasing greatly, but far-reaching qualitative change is also in progress, not least as intra-sectoral trade expands, with all the consequences that entails, including the appearance and ongoing development of specialisation, growing economic interdependence between countries, and continuing enhancement of the role played by the transnational corporations.

All of the above processes have been ensuring a high level of recent interest in matters of international trade, as *inter alia* reflected in a mushrooming of both academic output of a theoretical nature and empirical research.

Against the background of the dynamic changes being made to the world market, the case of Poland may strike many as interesting. This is a country that only recently entered into world trade as a fully-fledged partner, yet it is noteworthy how dynamic the increase in Poland’s trade has been, given what this says about the ability of the country’s exporters to stand up to the competitive pressures present on the world market.

A key if familiar tenet to what has become known as the “new new trade theory” (NNTT), and the research associated with it, is that not all firms export. Some of them obviously do, but the remainder are geared to production meeting the needs of the market domestically. This new point of view as regards trade, centred around enterprises, rather than countries or sectors, is owing to Melitz, as the founder of the NNTT. The model he devised, inspired by Krugman’s earlier work, has contributed to the appearance of a rich new seam of research in economics.

The work presented here thus has as its aim the comprehensive analysis of Poland’s foreign trade from the point of view of different theories, with particular account taken of Melitz’s aforementioned theory; as well as the formulation of conclusions that could be of value to economic policy in a situation of ongoing uncertainty on the international markets. In particular, the work carried out has sought to verify hypotheses to the effect that:

- firms in Poland are heterogeneous, with only some of them engaging in export,
- entities with a share of foreign capital are engaged more fully in exporting than are indigenous ones,
- a change in the competitiveness of Poland’s exports has primarily been a feature of the post-2008 period, i.e. that following the appearance of a negative demand shock,
Poland is more and more a part of the trade developing within given branches or sectors of the economy, full use is not being made of the policy instruments available to support export, and this is true at both the national and regional levels, particularly in the context of a new wave of protectionism.

This book comprises three parts, of which the first focuses on the analysis of Poland's foreign trade in the face of processes of globalisation, and change on world markets. The causes, courses and consequences of the recent financial crisis are presented, as is the threat of protectionism potentially arising as regards trade, capital flows and the use of currencies. A further part of Chapter 1 is devoted to the rising wave of commercial protectionism characterising world markets (after 2008). This is a source of disquiet, given the way it distorts competitiveness on those markets and puts Polish enterprises at risk of facing producers that are less efficient than they are, but may still prove up to “winning” markets, thanks to restrictions imposed on imports, or state aid extended. In this it needs to be recalled that measures applied in these cases often fail to accord with international agreements.

In turn, a second chapter presents Poland's foreign trade, at the outset offering a description of the situation the Polish economy was in, in the early 1990s, in order to allow for a full indication of the scale, depths and proportions of changes that have taken place. Trends as regards trade are then analysed, from the points of view of both the volume of exports, and the structure characterising the export process, along with an indication of the significance different markets for Polish goods assumed (in the years 1999-2014). A matter of particular importance in assessing the competitiveness of Poland’s exports is the sale of high-tech products. It is therefore to trade in these goods that particular attention has been paid. Exports are here assessed with the aid of measures of competitiveness.

In a further part of Chapter 2, the competitiveness of Poland’s exports is presented in relation to an assessment falling within the conceptual approach provided for by traditional theories of trade, notably as regards the so-called “revealed comparative advantage”, in respect of different groups of countries that are traded with.

The next part makes a wide-ranging review of theories of trade, beginning with the so-called traditional theories. While some of the models here arose at times when conditions for trade were entirely different from those present today, they may still prove useful in researching the trade streams generated in countries with different structures to their economies, and on the basis of inter-industry specialisation. A further theory relating to contemporary trade is the gravity model taking its inspiration from Newton's equation. With a great deal of simplification, this considers the dependent relationship between the economic potentials of countries participating in trade, as well as the distance that separates them.

The last point in the chapter concentrates on the new new trade theories (NNTT), thanks to which a breakthrough in the perception of international trade has been achieved. As has been noted already, this innovative way of looking at trade entails the analysis – not of sectors, branches or countries, but of enterprises, among which only some are able to come on to foreign markets. This approach to trade has inspired
wide-ranging empirical research in response to questions arising on why some firms become exporters, while others limit their activity to the domestic market, notwithstanding the prospects for greater profits they are thus electing to ignore.

The results of empirical research have also been presented in Part 2. As is well-known, a fundamental difficulty this type of analysis faces in the case of Poland is a lack of appropriate, comparable and long-term statistical data. Apart from the incomplete nature of results, there is also the fact that data which are available frequently fail to achieve comprehensive status (in line with the so-called “statistical secrecy” provided for in law). Statistics for individual enterprises are not available either, with the effect being to effectively preclude all-inclusive research. To seek to overcome these obstacles, it was determined to obtain data from:

- the bases of InfoCredit, an institution gathering and transferring data from Poland for the purposes of Europe-wide reports on trade and Amadeus financial reports,
- questionnaire interviews run in the group of enterprises for which the InfoCredit database has information over 5-year financial reporting periods.

By applying these measures, it proved possible to found a single comprehensive dataset (obtained using the procedure detailed in Chapter 5), with this in turn allowing for many interesting analyses to be carried out, including in respect of the concept of the heterogeneity of firms.

That said, it needs to be recalled that those employing questionnaire research today encounter major difficulties arising first and foremost from a lack of willingness to answer on the part of firms, given that – in the view of respondents – this is a waste of time, and first and foremost an activity inevitably linked with the revealing of confidential information.

The assembling of a rich and comprehensive database (that also encompasses “sensitive” financial data) makes possible the multifaceted analysis of the determinants to Poland’s foreign trade. Econometric methods have thus been used to devise:

- an empirical model of overall intra-industry trade, as well as vertical and horizontal trade,
- a logit model serving to verify theses advanced by the NNTT (as regards the heterogeneity of firms),
- a gravity model applicable in assessing the real value of trade flows between partners (as well as the effects of preferential trade agreements concluded).

The final (3rd) part presents policy on trade and industry, which has at its disposal relatively the greatest number of instruments capable of being used in support of exporters. Analysis has here sought to determine whether the tools for the promotion of exports from Poland – as permitted by international agreements – are being applied, or if more use than hitherto might be made of them. Some of the instruments helping to promote exports may be mobilised at regional level, in accordance with the principle of subsidiarity, as well as by taking advantage of the possibilities afforded by cohesion policy. For this reason, the chapter also analyses foreign trade as conceptualised regionally, with an indication of support that might be extended within the framework of Operational Programmes.
Thus publication represents the result of work done in the years 2013-2015 by a team associated with the Institute for Development comprising: Tomasz Brodzicki, Dorota Ciołek, Tomasz Jurkiewicz, Sylwia Majkowska, Witold Orlowski, Katarzyna Śledziewska and Stanisław Umiński, as led by Krystyna Gawlikowska-Hueckel.

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Part One

Poland’s foreign trade in the face of globalisation and changes on global markets
Global determinants of Poland’s trade during and after the crisis

Witold M. Orłowski

Introduction

Starting from mid-2007 (or 2008, when the financial markets collapsed following the bankruptcy of Lehman Brothers), the global economy has been suffering (and is very likely to suffer throughout the present decade) from a deep financial and economic crisis, here referred to as the Global Financial Crisis (as opposed to the Great Depression of the 1930s\(^1\)). Put very simply, both these crises were precipitated by a similar cause, which was a fundamental divergence that appeared between the development curve of the real economy and that of the financial markets (Orłowski 2011a). This divergence – compared to what happened during the Great Depression – is shown in Fig. 1.

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\(^1\) The Polish literature mostly uses the term “The Great Crisis” (Wielki Krzyzys), which I purposely name here “The Great Depression” (Wielka Depresja) to make a distinction between it and the present crisis.
It should be noted that:

- Although both these crises had a similar underlying mechanism whereby the real economy curve and the financial market curve diverged sharply, to be rapidly realigned later, they had at their root different phenomena taking place on the financial market. These were primarily the rapid development of the stock exchange in the 1920s and the development of new financial instruments in the 1990s (Stiglitz 2006).
- The size of the speculative bubble that formed on the financial market in the 1920s was even greater than in the years preceding the Global Financial Crisis. As a consequence, the scale of collapse on the financial markets was also larger, and the rebound – much slower.
- The scale of collapse in the real economy was by all accounts larger during the Great Depression than during the Global Financial Crisis.

Both the outburst of the Global Financial Crisis itself, and how it progressed, affected Poland’s economy and its development considerably, at least in the medium term. Suffice it to say that over the past 7 years the crisis slashed the average rate of GDP growth by half (cf. Fig. 2) and caused far-reaching changes both in the GDP distribution structure and in the country’s balance of payments.

![Figure 2. Rate of growth of Poland's GDP by quarter, 2003-2013](source: GUS (Central Statistical Office of Poland)).

### 1.1. The Global Financial Crisis: causes

The analysis of the impact of the Global Financial Crisis on Poland’s development and trade should begin with a short recapitulation of its roots. These in particular included the following phenomena (Orłowski 2009):

- Rapid changes in the distribution of economic power between countries and the accompanying imbalances. In the years 1980-2007, the global GDP grew nearly 2.5-fold, but the GDP of China increased more than 7-fold, India’s – 4-fold, and that of the USA and Western Europe – only 2-fold. The rapid development of China and
the dwindling significance of the USA was accompanied by growing imbalances assuming enormous size: the USA had increasingly been financing its high standards of living from the capital borrowed abroad, whereas China maintained exceptionally high savings rates, which permitted it (along with other Far Eastern countries) to extend credit to the USA, which in effect was able to continue with its chronic consumption (Orłowski 2011a and Fig. 3).

- **Rapid globalisation processes**, which accelerated the process of relocating production between countries and continents and prompted the allocation of financial investments all over the globe. This, in turn, rapidly reduced oversight capability over financial institutions and their operations, hampered the assessment of investment risk, facilitated the emergence and persistence of long-term imbalances, and increased the risk of the financial crises being transmitted through “contagion” (Stiglitz 2006).

- **Demographic changes** and the rapid ageing of the population in the developed countries, which triggered a rapid growth of pension systems and boosted the demand for financial assets offered by pension and investment funds (Orłowski 2011a).

- **Rapid development of the derivatives market**, which helped to hide the risks arising from the mounting volume of debt (Reinhart & Rogoff 2011). Derivative instruments were in mass use as tools for hedging against risk (which is their primary function, Miller 1999), investment and speculation, and their sale virtually went through the roof in 2002-2007, a period when the value of the derivatives market nearly doubled every 2 years.
Emergence of a speculative bubble in the assets market, driven by the huge inflow of capital coming into the US market, inability to properly assess risk, creativity of financial institutions which constantly came up with novel derivative instruments, not least the wave of irrational exuberance (Shiller 2005, Greenspan 2008), which made people look too optimistically at the prospects of a continued increase in the prices of assets. This phenomenon is illustrated in Figs. 4 and 5, which show the trends in the stock and property markets in the United States from the mid-1990s onwards.

Recklessness and errors in managing the financial institutions, which considered overvalued assets, especially real property, as first-class collateral for new loans.
In effect, households in the USA and many other countries, particularly the UK, Ireland and Spain, were caught in the negative equity trap, the extent of which was not fully recognised until a slump in property prices occurred (Jorda, Schularick, Taylor 2013).

- **Errors in economic policy, especially in the USA.** First and foremost, the government failed in its role as regulator, particularly with regard to investment banking and the derivatives market. Secondly, the monetary policy failed completely, the fallacious policy of the Federal Reserve being its most glaring manifestation (with the inflation rate as its sole interest, the Fed did not take into account changes in asset prices), which in the years 2002-2005, a period when the speculative bubble in the property and stock markets was brewing, lowered the interest rates to levels unseen for decades (Fig. 6).

**Figure 6.** Interest rates and inflation in the USA, 1980-2014

Source: IMF.

In a nutshell, many factors were responsible for the divergence between the financial market and the real economy curves, notably the clash of the American credit-financed lifestyle with the extraordinary thriftiness of the Chinese and the Japanese, the criminal negligence of banks chasing easy profits, lack of appropriate regulations and, last but not least, human errors (such as those made by economic policymakers). All this led to the process of leveraging on an unprecedented scale, i.e. creating, from a limited pool of capital, a much greater pool of risky, interdependent financial assets, and the incurring of excessive debts by households, firms, banks and governments. The sudden collapse reduced the size of financial markets, which nevertheless remains huge in relation to GDP, meaning that the accumulated risk is still extremely high. Even more importantly,
however, the issue of gigantic debt has not been resolved, and this is what makes the present crisis continue so persistently.

1.2. The Global Financial Crisis: how it progressed

The Global Financial Crisis first led to the collapse of the financial market, which in turn triggered global economic downturn. This was followed by another wave of the fiscal crisis, accompanied by economic stagnation or a dawdling growth in the developed countries. While the speculative bubble had burst relatively fast, the burden of debt it produced has a long-term effect (Roxburgh et al. 2012), the volume and structure of which largely determined the course of the crisis.

The main problem in the initial phase of the crisis was the indebtedness of the private sector, including household and corporate debt, and the debt that was mutually owed by financial institutions, which propelled the spread of the crisis both to banks and countries alike. The declining stock markets, the falling property prices, and the resultant devaluation, or utter loss, of liquidity by some of the derivative instruments, soon crippled the liquidity and balance sheets of banking institutions, which in consequence led to an acute banking crisis in the autumn of 2008 (Orłowski 2009).

On top of that, the banking crisis, in accordance with well-known mechanisms (Iwanowicz-Drozdowicz 2002), brought violent recession effects across the global economy. The main channels through which the financial and banking crisis turned into recession were the following:

- The rapid devaluation of household assets, primarily in the most-developed countries (USA, Western Europe, Japan), caused a negative wealth effect that considerably reduced the volume of consumer purchases.
- The paralysed banking sector gave rise to a severe limitation of consumer credit and business loans. At the same time, the plummeting property prices brought to nil the activity in the construction sector, the extent of which was the greater, the stronger was the earlier boom.
- These phenomena led to reduced investment expenditure and higher unemployment, driving consumer sentiment even further down and reducing purchases.
- The aforementioned phenomena could be observed primarily in the developed countries. In most of the developing countries (emerging markets), the crisis spread to the real economy, mainly through contagion, via one of the several channels: trade (shrinking exports as a result of worsened economic performance suffered by main trade partners); investment (drop in direct and portfolio investment in the developing countries); finance (volatility in the currency market and reduced access to the capital market necessitating structural adjustment programmes).

The course of the Global Financial Crisis in 2008-09 did not differ in any significant aspects from the early phase of the Great Depression, characterised by a collapse of the stock market, banking crisis and GDP slump in the first year by 4-8%. This process is shown in Fig. 7.

Some significant differences did not appear until much later, and had at their root fundamental dissimilarities in the economic policy formulated in response to the crisis.
The first difference was the active policy aiming to save the banks from bankruptcy through the practically unlimited provision of emergency liquidity and equity during the Global Financial Crisis (partly in the form of bailout programmes). This made it possible to avoid spiralling into further bankruptcies that completely paralysed the banking sector in the subsequent years of the Great Depression and slashed the GDP of the USA by 30% (the erroneous policy of the Federal Reserve and the federal government is the first and foremost universally acknowledged explanation for the depth of that recession (Friedman & Schwartz 1963)).

Another difference was the flexibility of the fiscal policy, especially a drastic increase of budgetary deficits, caused by an unrestrained operation of automatic stabilisers on the one hand, and by the discretionary economic recovery programmes inspired by Keynesian ideas on the other (Orłowski 2011a and Fig. 8).

Figure 7. GDP levels during the Great Depression and the Global Financial Crisis
Source: IMF, Maddison.

Figure 8. Public debt, 2000-2014
Source: IMF.
The third difference was the flexibility of monetary policy, which could be pursued under the conditions of a universal use of fiat money (that is not convertible to any precious metal). When the Great Depression started, all major developed countries had their currencies based on the gold standard; and currency issue was dependent on their holdings of that metal. As the demand fell, it quickly precipitated huge deflation, which on the whole brought down the price levels by 24% in 1930-1933 (in the years that followed, many countries either abandoned the gold standard or considerably reduced it, a move which was coupled with considerable devaluation of the currencies relative to gold, Shiller 2005). By contrast, there was no deflation during the Global Financial Crisis, although, unsurprisingly, the level of inflation remained much below the inflation targets of the major global central banks.

Last but not least, the fourth important difference was the fact that although protectionist measures in global trade were resorted to during the Global Financial Crisis, it was done on a much smaller scale than during the Great Depression. In the case of the latter, such mechanisms were in common use, through attempts to burden other countries with the consequences of the recession (so-called beggar-thy-neighbour policies). Due to its widespread use, this policy proved ineffective but nevertheless managed to paralyse global trade (with trade shrinking by 29%; and prices by 46%).

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2 WTO pointed out, however, that post 2008 many countries introduced various forms of protectionism that affected free trade (Chapter 1.5).
As a result of these differences, in the two cases the crisis took a different course:

- During the Great Depression, the collapse of the financial market took on catastrophic proportions and resulted in a sweeping wave of bankruptcies of financial institutions, private investors and firms. The severe recession effects caused by the financial meltdown and paralysis of the banking market, combined with protectionist policies, had catastrophic consequences for industrial output globally. As a result, in a span of 4 years the NYSE index dropped by 86%, and the US GDP - by 30%. The solution of the problem in the form of excessive debt caused by the boom in the 1920s basically came in the form of mass bankruptcies of banks, firms and governments.

- During the Global Financial Crisis, mass-scale public intervention stopped the financial collapse, but this was achieved at the expense of leaving the debt problem unsolved. In reality, governments took over the burden of the riskiest parts of the private sector debt, such as toxic bank assets, in an attempt to stabilise the banking sector (Taylor 2009). A year after the global recession had begun, this allowed for a return to the path of growth both in the developed and developing countries, with the issue of debt left for resolution in the more distant future (Fig. 9).

![Figure 10. GDP levels during the Global Financial Crisis](source: IMF)

At the same time, these state-led efforts (by central banks and governments) proved to be extremely costly in financial terms (and different from the situation during the Great Depression, which was costly in social terms). All this had a number of consequences, viz.:

- Increasing the pool of the reserve currency many times over, as can be seen very clearly in the balance sheet changes of the central banks in the major countries of the world, especially the US Federal Reserve and the Bank of England (Fig. 10). Since the increased reserve currency holdings did not significantly increase the monetary supply, mainly due to the continuing unwillingness of commercial banks

...
to extend new loans, it brought no inflationary effects either (Caruana 2014, Yardeni 2015). One of its effects, however, was the considerable extent of speculation (e.g. in the raw material markets, Orłowski 2011a). It should be added that the ultimate economic effect of such an enormous increase of the reserve currency stock remains unknown (Taylor 2009).

![Figure 11. Changes in central bank balance sheets, 2008-2014](source:BIS)

- Significant increase of public debt in the developed countries, due to the forced financing of huge budget deficits from debt. The scale of public debt in the USA and the average debt in the European Union increased from c. 60% GDP in 2007 to, respectively, 105% and 95% GDP, and in Japan - from 183% to 245% GDP (Fig. 11). For countries with weaker economies and lower financial credibility, this shattered the trust of the financial markets and brought a threat of bankruptcy (especially in the southern EU countries, Balcerowicz 2014, Mayer 2011).

![Figure 12. Public debt levels, 2000-2014](source:IMF)
As a consequence of this policy, in the years 2010-14 the Global Financial Crisis was predominantly fiscal in character, which locally brought about new waves of recession, particularly within the Eurozone. It is not clear, however, what effects the unorthodox monetary policy of the major global players will have in the years to come; in theory, it should induce a period of stagflation (Orłowski 2011a, Taylor 2009).

1.3. Global debt issues and deleveraging prospects

As has been mentioned above, the main challenge that the global economy has yet to grapple with, and also the reason for the prolongation of the Global Financial Crisis, is the high level of debt of the most-developed countries, particularly the USA, Western Europe and Japan. Not only is public debt a problem, but so also is the debt run up by all sectors of the economy – governments, households, firms and financial institutions. In 2007 the aggregate global debt measured in this way represented c. 3.8 times the value of the global product (i.e. aggregate GDP of all the countries of the world that determines the size of the real economy) and, after a fall recorded in 2008, it returned to the level from before the crisis, to stabilise at a level of c. 3.2 times the value of the global GDP (Fig.12).

This proportion, however, was different for different countries. According to McKinsey Global Institute estimates, the ratio of total debt to GDP in 2011 was approx. 5 in the UK and Japan, 3.6 in Spain, approx. 3.1 in France, Italy and Korea, and 2.8 in the USA and Germany (Roxburgh et al. 2012). The structure of debt also differs from
country to country. In Japan and Italy, public debt represents a lion’s share of the total debt, in the United Kingdom and Germany it is the debt of financial institutions; in Spain, France and Korea – of firms, and in the USA – of households.

Since excessive debt is the major problem of the developed world, the crisis will not come to an end without a large-scale deleveraging process whereby the ratio of public and private debt to the GDP will be reduced. This can be done in the following ways (Orłowski 2011a):

- **By way of mass bankruptcies** (of governments, banks, firms, consumers). This is a fast and effective way to reduce debt, but one that involves huge costs for the economy, such as severe GDP contraction, that are suffered by creditors and debtors alike. This is the reason why, so far at least, governments have made every effort to avoid such a measure.

- **By way of drastic cuts** that will help to secure the funds for debt repayment. In such a scenario, the debtors bear the brunt of the cuts, but one result of this process is slow but steady economic growth.

- **By way of inflation**, the unexpected rise of which, not reflected in the rising nominal interest rates, devours a bulk of the real value of the debt. In such a scenario, it is primarily the creditors who suffer the costs of the crisis in the form of the so-called haircuts. This leads to stagflation, i.e. slow economic growth accompanying inflation.

The future course of the crisis, its volatility and distribution of the costs between various countries will depend on what combination of the above three possible ways of reducing debt will ultimately be used. In all probability, the choice of these measures will not be a conscious process but rather a result of a test of economic strength between the creditors and the debtors (Orłowski 2011a). The world’s largest creditor, the USA, being the issuer of the world’s main reserve currency, has tools that will certainly enable it to largely impose on other countries the inflationary solution advantageous to itself. The likely losers would then primarily be Far Eastern countries, particularly China and Japan, and countries which are producers of raw materials would emerge as the winners. Since the deleveraging process has only started (in 2011, the first effects could be seen in the USA, but no deleveraging measures have as yet taken place either in Western Europe or in Japan; Roxburgh et al. 2012), there can be little doubt that crisis phenomena will continue for many years to come, and the ultimate consequences of the Global Financial Crisis for the economy - its volatility and division of costs between individual countries – are only now coming to be known.

The economic outlook for the coming years varies from region to region. The situation of the USA is relatively good. In the past, the USA did commit severe mistakes but it has a flexible and efficient economy (OECD 2003), fully uses its position as the issuer of the global reserve currency to resolve its problems, and takes anti-crisis measures quickly and effectively. The much bigger troubles of Europe have little to do with the balancing of its finances, since both the Eurozone and the European Community as a whole have a zero or positive current account balance, which means that its capital stock is sufficient to cover its own needs (such stock is insufficient in the USA, and excessive in the Far East). However, the prospects for the European Union are exacerbated by such factors as: heavy public and private sector debt in most Eurozone
countries and in the EU as a whole; inability to take decisions and solve financial crises despite the issue of a global reserve currency; slow economic growth and inability to deal effectively with globalisation processes, observable also before the crisis (Pisani-Ferry 2012). The situation in Japan is even worse as the country has not been able to solve its structural problem of excessive debt for the past 25 years. In parallel, the other Far Eastern giants, China and India, are steadily gaining in significance, with two basic strengths, industriousness and frugality, lying at the heart of their success (Landes 2005). The rapid development dynamic observable in these two Far Eastern countries during the past decades suggests that this process will continue into the future and will make China and India the world’s biggest economies by 2050 (Hawksworth, Tiwari 2011). Both these huge countries, and a number of other developing countries tagging along, are assuming anew the role of economic and political powers that they used to play in the global economy in the past (Orłowski 2011b, Kennedy 1989).

1.4. Threat of protectionism during the Global Financial Crisis

As has been mentioned above, one indisputable achievement that has, to date at least, helped the world steer through the Global Financial Crisis much more effectively than was the case during the Great Depression, was refraining from the mass use of protectionist tools by individual countries. On the one hand, this may be the effect of several decades of liberalisation in trade, which served to create an institutional framework for a relatively liberal system of global trade and global capital flows, and on the other, it can be viewed as evidence that the economic lessons from the experiences of the Great Depression have been duly learnt. Despite the exceptional scale and range of applied instruments – compared to the Great Depression – many institutions, including the WTO, have warned that post 2008 the wave of trade protectionism has been on the rise. The data on the types and the range of measures affecting free trade are presented in Chapter 1.5 (by K. Gawlikowska-Hueckel).

Trade protectionism

During the Great Depression, the adoption of protectionist tools, which the USA was the first country to do (Hawley–Smoot Tariff Act, 1930), is considered as one of the main causes underlying the heavy slump in global trade and production.

Since the currencies of the major world powers were at that time based on the gold standard, meaning that their exchange rates could not change, in the 1930s customs tariffs were raised in a protectionist attempt to support US manufacturers by blocking imports. In response, other countries raised their own tariffs. When it became clear that the customs duties did not work, one country after another resolved to suspend the convertibility of their currencies to gold, and either artificially weaken their currency (e.g. the USA) or impose administrative controls of imports (e.g. Germany).

As a consequence of these measures, the value of global trade fell dramatically (by 60% over a 3-year period), this as a result of the slump in the volume of trade by 29% and in prices 46%. In contrast, during the Global Financial Crisis world trade suffered only
a small downturn during the 2009 recession (by 11%), caused by a diminished demand, with the volume of trade rebounding in the following year (Fig. 13).

The fiduciary currency system that was in place during the Global Financial Crisis did not cause any drastic drop in prices. As shown in Fig. 14, during the Great Depression commodity prices fell by 35%, and those of raw materials – by 57%. In contrast, during the Global Financial Crisis the prices of industrial goods in global trade dropped only slightly and temporarily, while the prices of raw materials quickly rebounded after the initial fall.

Figure 14. Global trade volume during the Great Depression and the Global Financial Crisis
Source: IMF, UN.

Figure 15. Prices of industrial goods during the Great Depression and the Global Financial Crisis (%)
Source: IMF, UN.
Does this mean that during the Global Financial Crisis the world did avoid an outburst of trade protectionism? It is too early to give any definitive answer to such a question. The US Congress put on hold legislation stipulating tariffs for imports from a China allegedly “manipulating its currency rates”, and so far this has been endorsed by neither the White House nor the parliamentary majority (Wall Street Journal 2011). The developments associated with the Ukrainian crisis can be regarded as a considerable departure, mainly politically motivated, from free trade principles; some attempts have also been made to restrain the freedom of trade, for example in relation to certain services and goods (measures affecting trade are discussed in Chapter 5.1).

Nevertheless, and despite no breakthrough having been achieved in the Doha Development Round, global liberalisation of trade has not been reversed, and the pending negotiations on the Transatlantic Trade and Investment Partnership (TTIP) conducted between the USA and the European Union may largely offset the lack of any progress globally in the WTO forum. Arguably, therefore, the Global Financial Crisis neither has caused nor is likely to cause any significant changes in the globalisation trends leading to increased trade exchange worldwide, although quite obviously the development of the pace of trade may be moderate for several years to come, and certainly slower than in the decade that led up to the outbreak of the crisis (Fig. 16).

**Figure 16. Volume of global trade, 1990-2014**

*Source: IMF.*

**Protectionism in capital flows**

Quite understandably, the Global Financial Crisis in its initial phase caused financial havoc, and drastically curtailed access of many developing countries (emerging markets) to international capital markets (Orłowski 2011a).

In terms of portfolio investments, some “flight to safety” phenomena were visible; an increased demand for assets from developed markets and countries regarded as absolutely safe, and especially the wide-scale investment in US Treasury bonds (where an increased demand met an increased supply due to the huge budgetary deficit of the
USA, Roxburgh et al. 2012). Despite the momentary, very strong stream of short-term capital flows (particularly in moments of panic), and despite some cases of sovereign insolvency, there was no marked increase in the restrictions imposed by individual countries on capital flows, either de jure or de facto (IMF 2014).

The scale of direct investment was clearly reduced in relation to the pre-crisis boom, visible mainly in the developed countries both with regard to inflow and outflow of FDI. In the developing countries, such a reduction could be witnessed only in 2009 (Figs. 17-18).

![Figure 17. Global FDI outflows, 1990-2013](Source: UNCTAD)

![Figure 18. Global FDI inflows, 1990-2013](Source: UNCTAD)
I. Global determinants of Poland’s trade during and after the crisis

All in all, it can be concluded from the above that despite the occasional information on attempts to use “soft protectionist” tools (such as pressure exerted by the government on firms, as was the case with Fiat’s decision to relocate some of the manufacturing processes from Poland to Italy), and despite the redefinition of industrial policies that took place in some developed countries, currently more geared to “reindustrialisation”, during the Global Financial Crisis we did not witness any serious reversal of trends regarding direct investment flows, especially from the developed to the developing countries (as documented by the scale of net FDI flows between the former and the latter, shown in Fig. 19). Therefore, the threat of such phenomena occurring on a wider scale in the future seems limited.

Protectionism relating to currency use

Separate attention should be paid to the extent to which monetary and exchange rate policies were used as instruments of protectionism during the Global Financial Crisis. As before, it seems expedient to illustrate these phenomena by comparing the present situation to that of the Great Depression.

The period of the Great Depression saw fully-fledged currency wars caused by monetary policy strategies employed by individual countries. When the financial collapse pushed even more countries into severe recession, the beggar-thy-neighbour policy became the order of the day. The first step was to impose protectionist customs duties, followed by attempts to depreciate the country’s own currency in relation to others. To this end, individual countries, one by one, suspended the convertibility of

![Figure 19. Global FDI net inflows, 1990-2014](source: UNCTAD.)
their currencies to gold as it made these measures difficult, and either depreciated them by considerable changes in the gold standard (USA, UK), or completely abandoned convertibility and imposed administrative control of imports (Germany). It goes without saying that the outcome of these activities proved extremely costly for global trade, but it should also be noted that the countries which adhered the longest to the gold currency (France) suffered the severest losses on that account (Orłowski 2011a).

During the Global Financial Crisis many countries used monetary policy to alleviate its consequences for their own economies. From a formal perspective, however, it should be concluded that nowhere did these efforts assume genuinely acute forms typical of protectionism, such as suspension of convertibility or exchange rate intervention (IMF 2014).

Nevertheless, some countries made attempts to affect the exchange rate in two ways. One was direct market intervention through which countries tried to depreciate their currency. The best-known example of such measures is the policy pursued for three years by the Swiss central bank, which tried to protect the exchange rate of the Swiss franc against the euro from appreciation until early 2015. Another example of a policy pursued for many years, long before the onset of the crisis, was the policy to increase currency reserves pursued by the central banks of Far Eastern countries, China in particular.

The second mode of action, indirect in character, was the rapid expansion of the central bank balance sheets and increased issue of the reserve currency, which should bring about higher inflation and currency depreciation in the long term (Fig. 10). The most extensive operations of this kind were conducted by the central banks of the USA (three subsequent quantitative easing programmes), the UK and Japan. In the first years of the crisis, the European Central Bank exercised much more caution in such activities; this situation will probably change as the asset purchase programmes commence in 2015 (Caruana 2014, Yardeni 2015).

All these activities coincided with natural currency demand and supply fluctuations arising from the market pressures and leading to marked changes in exchange rates, as shown in Fig. 20.

As we can see, in the years 2008-2014, as a result of such measures the exchange rates of the euro, British pound and the emerging market currency basket (except China) depreciated in relation to the dollar, whereas the Swiss franc and the Chinese yuan appreciated. The exchange rate of the yen which fell after the initial appreciation was probably the only example of success of a monetary policy intended to depreciate the currency in this sample. At the same time, Switzerland was forced to abandon this policy in 2015. In the remaining cases, there are grounds to believe that the exchange rate changes were mainly produced by fundamental market forces.

All this indicates that even if currency depreciation was the aim of the banks’ activities, this strategy usually proved ineffective. It is not clear, however, whether the radical steps taken by the central banks in the form of increased reserve currency will affect the exchange rates in the future (Balcerowicz 2014, Taylor 2007).
Even though the current wave of protectionism cannot be compared to the one observable during the Great Depression, the years post-2008 nevertheless saw a widespread return to protectionist practices. They were revived in an attempt to protect domestic manufacturers, and the simplest way to achieve this was to restrict free trade through various obstructions, restrictions or aid that breached the rules of free competition. Even though at the 2009 meeting of the G20 leaders in Saint Petersburg\(^3\) (Saint Petersburg Summit) some concerns were raised about the increasing wave of protectionism, “the protectionism clock is ticking” (Evenett 2014). The adopted rules of trade are being violated, and the actions of individual countries belie their declarations. After the Summit, G20 countries launched new market protection measures at a remarkable pace, with one such tool restricting free trade being introduced every 23 hours on average. This could be viewed as proof of protectionism growing worldwide. In 2010 and 2011, the number of documented, newly introduced measures against free trade increased by 45% as compared with the two preceding years. In effect,

\(^3\) The aim of the St. Petersburg Summit was to work out proposals for fighting the crisis.
in the years 2012-2013 the number of instruments was 95% higher than that at the time of the Saint Petersburg Summit.\(^4\)

According to the report published by the Global Trade Alert (GTA) (Evenett 2014), between September 2013 and November 2014 the number of measures affecting trade grew by 1383 (including other than unfair trade and safeguard measures – by 1023).

As a result of these activities, 79 2-digit sectors were affected by certainly discriminatory measures, and 1154 4-digit tariff lines were affected by almost certainly discriminatory measures.

The implemented measures vary considerably in character and range from bailout and public aid packages, market protection measures, to tariff and non-tariff barriers. Figure 21 shows the most frequently used trade discrimination measures and introduced post the G20 summit.

As we can see, despite the improving business climate worldwide, the pace at which various restrictions are being introduced is not abated. They violate not only the regulations governing rules of trade negotiated earlier, but above all harm the interests of exporters, whose position on sales markets becomes reliant on external conditions beyond their control.

\(^4\) The Report emphasises that the WTO reports have identified a mere one third of trade violations in comparison to the GTA.
Table 1. Ten most used state trade discrimination measures, implemented after the first G20 anti-crisis meeting (November 2008) – by number of measures

<table>
<thead>
<tr>
<th>Type of measure</th>
<th>Number of measures implemented between Sept 2008 and Nov 2014</th>
<th>Increase (as of Sept 2013)</th>
<th>Number of regulations implementing trade discriminating measures</th>
<th>Number of jurisdictions harmed by these discriminatory measures</th>
<th>November 2014</th>
<th>Increase from 2013</th>
<th>November 2014</th>
<th>Increase from 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade defence measures</td>
<td>1,020</td>
<td>503</td>
<td>70</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bailout, state aid</td>
<td>764</td>
<td>247</td>
<td>56</td>
<td>201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tariff measures</td>
<td>480</td>
<td>217</td>
<td>76</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local content requirements</td>
<td>226</td>
<td>262</td>
<td>32</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade finance</td>
<td>195</td>
<td>117</td>
<td>24</td>
<td>198</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export taxes or restrictions</td>
<td>187</td>
<td>64</td>
<td>70</td>
<td>189</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment measures</td>
<td>153</td>
<td>41</td>
<td>48</td>
<td>127</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public procurement</td>
<td>124</td>
<td>72</td>
<td>26</td>
<td>146</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-tariff barriers (not classified elsewhere)</td>
<td>117</td>
<td>-56</td>
<td>63</td>
<td>191</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migration measures</td>
<td>114</td>
<td>20</td>
<td>44</td>
<td>155</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Evenett (2014).
### Table 2. Top 10 targets of protectionist measures

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of discriminatory measures imposed on the country between November 2008 and November 2014</th>
<th>Increase from September 2013 until November 2014</th>
<th>Number of trading partners imposing discriminating measures</th>
<th>Increase from September 2013 until November 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1,595</td>
<td>643</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td>EU27</td>
<td>1,399</td>
<td>507</td>
<td>110</td>
<td>9</td>
</tr>
<tr>
<td>USA</td>
<td>1,104</td>
<td>354</td>
<td>96</td>
<td>11</td>
</tr>
<tr>
<td>Germany</td>
<td>957</td>
<td>334</td>
<td>83</td>
<td>12</td>
</tr>
<tr>
<td>France</td>
<td>841</td>
<td>296</td>
<td>77</td>
<td>6</td>
</tr>
<tr>
<td>Italy</td>
<td>832</td>
<td>291</td>
<td>76</td>
<td>7</td>
</tr>
<tr>
<td>UK</td>
<td>819</td>
<td>289</td>
<td>82</td>
<td>9</td>
</tr>
<tr>
<td>Korea</td>
<td>785</td>
<td>290</td>
<td>82</td>
<td>12</td>
</tr>
<tr>
<td>Japan</td>
<td>744</td>
<td>255</td>
<td>86</td>
<td>10</td>
</tr>
<tr>
<td>Spain</td>
<td>716</td>
<td>242</td>
<td>73</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Evenett (2014).
I. Global determinants of Poland’s trade during and after the crisis

Table 2 lists 9 countries and the EU which were most affected by the introduction of trade discriminatory measures. China comes first, as can i.a. be explained by its being the largest exporter, while competing with Chinese products is extremely difficult. Therefore, the number of sanctions imposed on this country is in proportion to the competitive threat posed by Chinese goods to the international markets. Another reason for China’s being listed first in this ranking is that sanctions are frequently imposed as retaliatory measures, and China is the leader in providing supports to its manufacturers using a whole gamut of activities that are harmful to its trade partners.

The yuan depreciation policy is one such example. In addition to low production costs, this was one of the main reasons for the high price competitiveness of Chinese products. Furthermore, the government policy offers much more space for intervention than is possible in market economies. The involvement of Chinese banks in offering support to enterprises can serve as an example here: the state banking sector was obliged to continue providing credit for the economy at an adequate level.\(^5\) Another tool was the decision to increase export subsidies by 25%. One important factor driving the demand was the Buy China campaign that proved particularly effective, given consumer subordination of the citizens of this country.\(^6\)

Table 3. 20 sectors (by CPC codes) most affected by sanctions

<table>
<thead>
<tr>
<th>Sector (CPC code)</th>
<th>Number of discriminatory measures affecting commercial interest in this sector</th>
<th>Number of discriminatory measures (red) affecting the sector and still in force</th>
</tr>
</thead>
<tbody>
<tr>
<td>(34) Basic chemicals</td>
<td>356</td>
<td>298</td>
</tr>
<tr>
<td>(41) Basic metals</td>
<td>340</td>
<td>302</td>
</tr>
<tr>
<td>(01) Products of agriculture, horticulture and market gardening</td>
<td>325</td>
<td>219</td>
</tr>
<tr>
<td>(44) Special-purpose machinery</td>
<td>306</td>
<td>265</td>
</tr>
<tr>
<td>(49) Transport equipment</td>
<td>286</td>
<td>238</td>
</tr>
<tr>
<td>(43) General-purpose machinery</td>
<td>231</td>
<td>204</td>
</tr>
<tr>
<td>(42) Fabricated metal products, except machinery and equipment</td>
<td>225</td>
<td>196</td>
</tr>
<tr>
<td>(21) Meat, fish, fruit, vegetables, oils and fats</td>
<td>221</td>
<td>163</td>
</tr>
<tr>
<td>(35) Other chemical products; man-made fibres</td>
<td>200</td>
<td>171</td>
</tr>
</tbody>
</table>

\(^5\) Measures to support bank liquidity were also adopted by some EU countries; for instance, Germany offered aid to Commerzbank through a special fund, with €8.2bn for recapitalisation and €15bn for guarantees.

Table 3 – continued

<table>
<thead>
<tr>
<th>Sector (CPC code)</th>
<th>Number of discriminatory measures affecting commercial interest in this sector</th>
<th>Number of discriminatory measures (red) affecting the sector and still in force</th>
</tr>
</thead>
<tbody>
<tr>
<td>(81) Financial intermediation, insurance and auxiliary services</td>
<td>200</td>
<td>129</td>
</tr>
<tr>
<td>(37) Glass and glass products and other non-metallic products</td>
<td>186</td>
<td>157</td>
</tr>
<tr>
<td>(46) Electrical machinery and apparatus</td>
<td>185</td>
<td>168</td>
</tr>
<tr>
<td>(02) Live animals and animal products</td>
<td>181</td>
<td>116</td>
</tr>
<tr>
<td>(36) Rubber and plastics products</td>
<td>172</td>
<td>155</td>
</tr>
<tr>
<td>(23) Grain mill products, starches and starch products</td>
<td>165</td>
<td>116</td>
</tr>
<tr>
<td>(26) Yarn and thread</td>
<td>163</td>
<td>130</td>
</tr>
<tr>
<td>(47) Radio, television and communication equipment and apparatus</td>
<td>152</td>
<td>135</td>
</tr>
<tr>
<td>(38) Furniture, other transportable goods</td>
<td>149</td>
<td>128</td>
</tr>
<tr>
<td>(48) Medical appliances, precision and optical instruments, watches and clocks</td>
<td>145</td>
<td>129</td>
</tr>
<tr>
<td>(28) Knitted or crocheted fabric; wearing apparel</td>
<td>135</td>
<td>112</td>
</tr>
</tbody>
</table>

Source: Evenett (2014).

Table 4 lists sectors which were most hurt by the introduction of sanctions. The following sectors are at the top of this list: chemicals (356), basic metals (340), products of agriculture, horticulture and market gardening (325). There are also two sectors which can be regarded as high-tech industries: radio, television and communication equipment and apparatus, and medical appliances, precision and optical instruments, watches and clocks, plus one service sector: financial intermediation services and auxiliary services therefor.

Quite alarming is the fact that the imposition of sanctions is a process that is not only ongoing but also gaining momentum. According to the WTO, the aim of these new measures is not to provide short-term weapons to combat the consequences of the global crisis (as was the case in 2008), but to stimulate business performance, which may nonetheless result in their preservation instead.

The most popular measures include: customs duties increases, import licences and customs checks. In addition to trade measures proper, tax concessions and state subsidies are being implemented; they all breach the fair competition principle.
Interestingly, in addition to the implementation of trade discriminating measures, some countries offer incentives for substituting imports. Such practices may prove particularly dangerous because – in comparison to market protection measures – they are not easily abandoned. The WTO warns that international organisations are helpless in the face of this wave of protectionism. Not all countries are using market protection measures to a similar degree; some are dropping those already in place. Nevertheless, the overall trend does raise concerns.

The European Union is in the group of countries that have introduced market protection measures. The information published in the *Global Trade Alert* indicates that the EU has implemented as many as 302 protectionist measures of various kinds.

It should be noted that the WTO is also monitoring the process of implementation of trade discriminating measures, but the number quoted by this organisation is smaller than that provided by the GTA. The data compiled by the WTO come from the information submitted by members and observers of the World Trade Organisation, not all of whom answered the questions provided.

![Figure 22. Total number of “trade restrictive” measures found by the WTO and the GTA in semiannual reports in 2011-2014 (the data collection period is shown on the vertical axis, e.g. May 2014-October 2014).](image)

Source: Evenett (2014).

No matter what source we look at, the number of measures being implemented is quite substantial. As part of its monitoring of the situation in G20 countries, the WTO revealed that between October 2014 and May 2015 the number of adopted restrictions on trade decreased for the first time since 2013. From mid-October 2014 onwards, G20 countries implemented 119 new measures harmful to trade, which means that
the pace of their introduction was slightly slower, at a level of 17 new measures being implemented per month (as compared to 19 in 2009). The number of investigations launched due to an alleged breach of the rules of trade has also diminished.

![Figure 23. Number of measures introduced by G20 countries (mid-May 2015)](Source: WTO OMC (2015), Report on G20 Trade Measures (mid-October 2014 to mid-May 2015)).

The ranking of countries which implemented the highest numbers of trade discrimination measures in the period between 2008 and 2015 is led by India, with 504 measures, followed by Russia (478) and the USA (377).

In the context of Poland’s interests, special attention should be paid to difficulties in trade with Russia, which were exacerbated following the annexation of Crimea and the ensuing conflict in Ukraine. The EU imposed sanctions on Russia, and Russia responded by placing an embargo on a number of products, including goods from Poland.

<table>
<thead>
<tr>
<th>Product</th>
<th>% of exports to Russia in domestic production</th>
<th>% in food exports to Russia</th>
<th>Product</th>
<th>% of exports to Russia in domestic production</th>
<th>% in food exports to Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pears</td>
<td>35.3</td>
<td>1.5</td>
<td>Strawberries, raspberries and blackberries</td>
<td>4.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Apples</td>
<td>22.1</td>
<td>21.8</td>
<td>Cheese</td>
<td>3.9</td>
<td>9.2</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>6.7</td>
<td>3.6</td>
<td>Beef</td>
<td>3.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Cabbage and related crops</td>
<td>5.3</td>
<td>2.0</td>
<td>Apricots, sour cherries, peaches, tangerines</td>
<td>3.6</td>
<td>1.7</td>
</tr>
</tbody>
</table>


This poses a serious problem for food producers because the bulk of the produce generated by the sector was sold on the Russian market (24%).
I. Global determinants of Poland’s trade during and after the crisis

The loss of the Russian market means heavy losses for exporters. It should be noted, however, that 2014 saw a dynamic growth of exports to such countries as: Algeria (over a 2-fold increase), United Arab Emirates (by 48%), Saudi Arabia (36.7%), Hong Kong (17.1%), Singapore (12%), and India (11.3%).

Concluding remarks

The global financial crisis was caused by a number of factors, such as: changes in the distribution of economic power globally and the resultant imbalances; powerful globalisation processes; demographic problems; rapid development of the derivatives market which allowed to obscure the risk associated with the growing volume of debt; emergence of a speculative bubble on the asset market; errors in the management of financial institutions, in addition to errors in economic policy. All this led to leveraging on an unprecedented scale, i.e. creation of a huge pool of risky, interdependent financial assets which bore no relation to the limited pool of capital.

The financial market was the first to collapse, which in turn triggered a global recession. While the speculative bubble had burnt out relatively fast, what proved a tangible threat was the burden of debt, especially in the private sector (both households and firms), and mutual indebtedness of financial institutions, which produced a “contagion” effect, spreading from bank to bank and from country to country. The rapid devaluation of derivatives inevitably crippled the liquidity and balance sheets of banking institutions, which in consequence led to an acute banking crisis in the autumn of 2008.

The main consequences of the financial and banking crises included: shrinking consumer purchases; massive drop in consumer and corporate loans; reduced investment expenditure, and increased unemployment. The main transmission channels that facilitated the spread of the two crises were: trade (falling exports as a result of deteriorating economic performance); investment (drop in direct and portfolio investment in the developing countries); and finance (volatility on the currency

Figure 24. Main exporters of Polish agricultural and food products (%)
market and reduced access to the capital market necessitating structural adjustment programmes).

Despite the huge scale of collapse, how the crisis has progressed so far reveals considerable differences in comparison to the Great Depression. This has been partly due to the application of economic policy measures such as bank bailouts or flexible fiscal and monetary policies. Another major difference lies in the scale of trade, capital and currency protectionism. Even though the number, scope and penetration of measures affecting free trade is much smaller than was the case during the Great Depression, the data provided by the WTO and other organisations point to their alarming increase.
Chapter 2

Poland’s trade following the country’s EU accession, with particular emphasis on high-technology goods

Krystyna Gawlikowska-Hueckel, Katarzyna Śledziewska

Introduction: The status of the Polish economy on the eve of the transformation

Any analysis of trends for Polish trade must first entail some reflections on the “point of entry” Poland began with in 1990. A brief characterisation of the previous system will allow for a better evaluation of progress with the “internationalisation” of the Polish economy.

As a large part of Europe first took the decision to build a Single Market (with a view to trade liberalisation extending both more widely and more deeply, through the successive elimination of barriers), Poland was still lumbered with central planning and a command system that had nothing whatever to do with a market economy. Among the features of this system was top-down decisionmaking as regards the allocation of resources, the level of production and its structure, and the distribution of goods. The centralised apparatus also imposed a pricing system entirely divorced from actual costs of production. This effectively left enterprises disenfranchised, neutered, and deprived of any freedom to manage their own supplies, means of production and distribution, or staffing. Effectively, all they could do was passively implement plans imposed from above.

This all denoted an economy lacking competition, in which enterprises’ effectiveness was assessed through checks on whether or not indicator values in the aforesaid plans handed down from on high were being reached, or better still exceeded.

A further paradox of that era was the approach to monetary policy, given that the money supply was not subject to the restrictions applying in a market economy, with the result that interest rates did not constitute an instrument by which to influence the macroeconomic balance. The banking system had no independence whatever.

It is also impossible to refrain from allusions to the quality of institutions that were entirely subordinated to the political apparatus. The legal system sanctioned the communist regime, with civil rights curtailed and limited, and no freedom of expression in existence.

In that world, foreign trade was dominated by the quasi-integrated or integrating grouping known in the West as Comecon, but in Poland by the entirely different
abbreviation RWPG, which is to say the Council for Mutual Economic Assistance. This was in effect: “a protectionist system of international trade that distanced the grouping from the rest of the world and forged links of an administrative and bureaucratic, rather than economic, nature” (Sobell 1984).

To sum up, the 35 years following the end of World War II (which had of course left Poland with simply gigantic losses of every possible kind) saw the country distancing itself effectively and consistently from the extension of market and economic freedoms that free Europe was both pursuing and witnessing; heading instead in a completely different direction that isolated it from the world economy to an ever-greater extent.

The emergence of the “Solidarity” (Solidarność) movement, and later linked changes in the international arena like the collapse of the Soviet Union and fall of the Berlin Wall ensured the end of the aforementioned system, but also necessitated a root-and-branch remodelling of Poland’s political and economic order. The first years of renewed independence after 1989 made it clear to what extent the “degraded heritage” that had been identified represented a burden requiring many years of effort to overturn and overcome. The makeover of a totalitarian regime, move away from central planning, creation of new structures, and overcoming of endemic passivity of attitude were all aspects achievable in the longer term only, given that: “progress with democracy requires law, liberty, a development of trade and finance, pluralistic attitudes and parties, and a truly open society” (Popov 1992).

However, it was necessary to begin somewhere, and the stabilisation programme did so – in the macroeconomic sphere – making the assumption that a tackling of hyperinflation and restrictive monetary policy would be essential if a stable base upon which enterprises might act was ever going to be put in place.1 However, all the reforms were preceded by the introduction of convertibility internally, with this being regarded as the best available stimulus by which transformation processes might be brought into operation, given that:

- it engendered a feeling of stability and created a single point of reference for all business entities,
- it made possible the real comparison of domestic and world prices, in this way offering a painful but necessary insight into Polish enterprises’ levels of efficiency (i.e. lack of efficiency).

The introduction and pursuit of a package of reforms also denoted a return to full competition on world markets (without any permanent support for exports), and hence also a disintegration of (what had become) traditional trade linkages. The process of privatisation was inevitably propelled along by the fall of many an enterprise unable to face up to real-world competition. Thanks to the introduction of a convertible zloty internally,2 Poland gained a conversion factor that exposed with dramatic precision the weakness of the country’s business sector, and indeed its entire economy. All the

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1 It should of course be recalled how this programme was implemented at a time when state ownership continued to prevail.

2 Under communism, several exchange rates had been in force simultaneously – there was one for exporters, another for importers in different parts of the economy, as well as a black-market one that was closest to reality.
tales praising success in building a strong economy that had been so carefully nurtured during the communist era proved to be nothing more than one huge myth.

The consequences of the measures taken, for good reason dubbed “shock therapy”, proved severe enough: 1990 brought a fall in industrial output of around 25%, and a 15% fall in the level of real household incomes. In 1991, there was a further 20% fall in production, while national income went down by about 8% (Gawlikowska-Hueckel 1993). The dramatic contraction of domestic production sucked in more imports, most especially of consumer goods.

2.1. Trends in Poland’s foreign trade

In 2014, the value of exports in the world as a whole amounted to $18.427tn, while imports were worth $18.574tn. These figures represented a 1% rise in comparison with 2013 (Ministry of the Economy 2015). The level of trade as seen in these value terms was being influenced by 3 factors not linked directly with the demand for Polish products manifested abroad, i.e.:

- a marked fall in raw-material prices, especially those paid for energy,
- the impacts of sanctions imposed on the Russian Federation following the annexation of Crimea and intervention elsewhere in Ukraine,
- a change in exchange rates (i.e. a c. 10% appreciation of the dollar, a relatively stable rate for the yuan, a weakening of the yen and the euro (by about 7% vis-à-vis the dollar); and a fall in the value of the currencies of oil-exporting countries, with the rouble depreciating by about 30% and the Norwegian krone by about 7%).

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3 This chapter applies abbreviations concerning groups of countries and groups of products described in detail in the Annex.

**Figure 25.** The value of Poland’s exports and imports and balance of trade, 2000-2014

In 2014, the value of exports from Poland was at a level equivalent to $198.6bn, as compared with imports at $210.5bn. This situation reflected a steady increase in Poland’s trade with the world from 2000 onwards that was only interrupted in the years 2009 and 2012. The former year brought an interruption in the growth of the country’s economy reflecting the economic crisis, while 2012 witnessed only a more limited fall-back in trade (only in comparison with the previous year – 2011). Both exports and imports were rising again in 2013 and 2014.

The value of imports to Poland exceeded that of exports from Poland through the entire 2000-2013 period, ensuring a negative balance of trade. However, in 2013, exports and imports came more or less into balance.

![Figure 26](wits.worldbank.org)

**Figure 26.** Poland’s 2014 share of the EU25’s exports and imports and share in trade with the USA and the world as a whole, with the percentage changes characterising these in the years 2014-2004


It is worth stressing that the shares of trade with the world, with the EU25 and with the USA accounted for by Poland have all increased in the period, even if only slightly. The above notwithstanding, the USA was included in the analysis owing to its economic potential, its share in the global trade and the potential opportunities offered by its market.

As Fig. 26 makes clear, Poland’s role is most noticeable in relation to the trade engaged in by the EU25, in that it accounted for 2.79% of the bloc’s exports and 2.60% of its imports in 2014. At the same time, Poland’s share of overall world trade was 1.32% where exports were concerned, and 1.14% as regards imports.

In turn, the decade up to 2014 (beginning 2004) brought a proportionally greater increase in Poland’s engagement in trade (i.e. imports and exports) with the EU than
with the world in general. Poland’s participation in total exports from the EU rose by 1.1 percentage points, that in imports by 1.15 points. The corresponding increases for the participation in world trade were of 0.40 and 0.42 percentage points respectively (with it needing to be recalled how these indicators assume their proper proportions when set against the volume of trade with the EU25 and the world).

It is clear that Poland’s significance as a trading partner for the USA is relatively limited. As of 2014, Poland accounted for 0.22% of import into and exports from the United States. Things had not been very different across the whole 2004-2014 period, in which shares rose by just 0.10 percentage points in the case of exports, and 0.09 in the case of imports. These are low values, and all the more so when it is recalled that the USA is the world’s largest importer of products, and its second greatest exporter, after China.

The fact that Poland is of varied significance as a trading partner is confirmed by the country’s position in rankings of exporters of different groups of goods, in line with the Central Product Classification nomenclature (1996). Where exports to the EU in the agriculture, forestry and fisheries category are concerned, Poland took 13th place in 2000 and 8th in 2014. Likewise, in regard to food, drink and tobacco products, a 17th place in 2000 compared with 9th in 2014. The respective rankings for industrial goods or raw materials and minerals were in turn 14th and 11th, as well as 13th and 12th.

Table 5. Poland’s 2000 and 2014 placings in trade with the EU and USA (in line with the 1996 CPC classification)

<table>
<thead>
<tr>
<th>Group (in line with the 1996 CPC nomenclature)</th>
<th>Trading partner</th>
<th>Place as regards exports taken by Poland in 2000</th>
<th>Place as regards exports taken by Poland in 2014</th>
<th>Place as regards imports taken by Poland in 2000</th>
<th>Place as regards imports taken by Poland in 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry and fishery products</td>
<td>EU</td>
<td>13</td>
<td>8</td>
<td>38</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>92</td>
<td>63</td>
<td>100</td>
<td>55</td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>EU</td>
<td>17</td>
<td>9</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>63</td>
<td>54</td>
<td>58</td>
<td>47</td>
</tr>
<tr>
<td>Industrial goods</td>
<td>EU</td>
<td>14</td>
<td>11</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>52</td>
<td>45</td>
<td>43</td>
<td>32</td>
</tr>
<tr>
<td>Raw materials and minerals</td>
<td>EU</td>
<td>24</td>
<td>18</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>74</td>
<td>25</td>
<td>87</td>
<td>93</td>
</tr>
<tr>
<td>Other</td>
<td>EU</td>
<td>13</td>
<td>10</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>55</td>
<td>55</td>
<td>49</td>
<td>43</td>
</tr>
<tr>
<td>Overall</td>
<td>EU</td>
<td>13</td>
<td>11</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>57</td>
<td>49</td>
<td>60</td>
<td>44</td>
</tr>
</tbody>
</table>

As analysis of the data presented in Table 5 makes clear, the period 2000-2014 saw Poland improve its position in the hierarchy of both exporters and importers trading with the EU and USA. Only in the case of the minerals category did Poland’s significance on the list of importers fall – vis-à-vis both the EU and the USA (in the former case from 29\textsuperscript{th} to 44\textsuperscript{th} place, and in the latter from 87\textsuperscript{th} to 93\textsuperscript{rd}). The place of Poland as regards US exports in the “other” category remained unchanged over the period.

More marked advances are those relating to industrial goods and food and beverages. This means that Polish goods are in a position to compete on what is in fact a particularly competitive world market.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{export_import_bar_chart.png}
\caption{Percentage changes in Poland’s exports and imports (2004-2014)}
\label{fig:export_import}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{percentage_change_bar_chart.png}
\caption{Percentage changes characterising the 2004-2014 period}
\label{fig:percentage_change}
\end{figure}
Analysis of product structure where Poland’s trade with the world is concerned shows that it is industrial goods that are of greatest significance to both exports and imports. These represent about 31.6% of the country’s exports and 48.4% of its imports. In turn, a relatively less important role is played by food, beverages and tobacco products (with a 15.3% share of exports and an 11.8% share of imports).

The changes over the 2000-2014 period in the shares accounted for by the different groups of products modify the above picture somewhat, by showing how the importance of industrial goods has declined a little (by 1 percentage point in the case of exports, and by 3.7 in the case of imports). A decline (of 1.7 percentage points) has also been noted as regards exports. In turn, the largest increase in share (of 2.31 p.p.) characterised exports of food, beverages and tobacco products. This confirms how Polish exporters of food found new markets for their products, notwithstanding the sanctions on this group imposed by Russia. In turn, the most marked decline in the share of exports – accounted for by the aforementioned raw materials and minerals, has been accompanied by an increase in the role Poland plays in their importation.

![Figure 29](wits.worldbank.org).

![Figure 30](wits.worldbank.org).
Irrespective of the group of products considered, analysis of the shares accounted for by partners for Poland’s exports points to the dominance of the EU25, which accounts for 61.6% of the exports of agricultural, forestry and fishery products; as well as 78% of the foods, beverages and tobacco products and 72.7% of the industrial goods. Where the USA is concerned, the corresponding shares are just 2.4, 0.9 and 3.2%, while those applying to China are 0.2, 0.7 and 1.4%.

Table 6. 2004-2014 (percentage-point) changes in the shares selected partners accounted for in Poland’s exports by different groups of product (according to the 1996 CPC classification)

<table>
<thead>
<tr>
<th>Group of products</th>
<th>EU25</th>
<th>USA</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry and fisheries</td>
<td>-15.2</td>
<td>-1.2</td>
<td>-0.2</td>
</tr>
<tr>
<td>Food, beverages and tobacco products</td>
<td>-0.7</td>
<td>-0.1</td>
<td>-0.6</td>
</tr>
<tr>
<td>Industrial goods</td>
<td>-7.1</td>
<td>-0.2</td>
<td>-0.4</td>
</tr>
<tr>
<td>Raw materials and minerals</td>
<td>-7.3</td>
<td>2.7</td>
<td>-3.2</td>
</tr>
<tr>
<td>Other</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.03</td>
</tr>
</tbody>
</table>


The role of different partners for Poland’s exports changed over the 2004-2014 period. The EU remains the key recipient of Poland’s products, though the share the EU market accounts for in Poland’s exports has declined overall. At -15.2, the percentage-point decrease was greatest in the group of agricultural, forestry and fishery products, with this comparing with -7.3 in the case of raw materials and minerals and -7.1 where industrial goods are concerned. In regard to the USA, the decline in the share taken of Poland’s exports first and foremost concerned the products of agriculture, forestry and fisheries (-1.2 p.p.). In contrast, in the case of the raw materials and minerals group the share increased (by 2.7 p.p.).
It is symptomatic that the share accounted for by China has increased in relation to all of the exported groups of product except “other”.

Similar changes have characterised Poland’s imports. It is goods originating from the EU25 that make up the largest shares of imports. Where imports of the products of agriculture, forestry and fisheries are concerned, the EU25 account for the greatest share – 54.1%. In turn, 55.1% of imported foods, beverages and tobacco products come from the same source, 59.6% of the industrial goods and 65% of the raw materials and minerals. The next most important partner where imports are concerned is China, whose shares in the different categories are respectively: 2.1%, 15.3%, 15.0% and 0.2%. The USA accounts for the smallest shares of Poland’s imports.

The situation as regards imports in the years 2004-2014 resembled that with exports, inasmuch as that the share accounted for by the EU declined in respect of products of the food, beverage and tobacco products group (-10.6 p.p.) as well as industrial products (-13.0 p.p.). Where China is concerned, the situation was the reverse, with the role played growing as regards imported food, beverages and tobacco products (up 5.7 p.p.), and still more so when it came to industrial products (up 9.9 p.p.).

In general, the changes concerning shares in overall trade confirm that the role and rank of different markets is not stable as regards either demand or supply.

Industrial products form the group accounting for the largest shares of both exports from Poland and imports into the country. This is true for the trade relationship with the EU, China and the USA. The second-placed group comprises “other” goods, while the third takes in food, beverages and tobacco products. It is in turn the raw materials and minerals that account for the smallest shares of both exports and imports, where Poland is concerned.

**Figure 31.** Product structure of Poland’s 2014 exports to different partners (left panel) and imports from them (right panel), as expressed in percentage terms, and in line with the 1996 CPC Classification

The product structure to Poland’s imports has been changing, though the dynamics where different partners are concerned have not assumed any more significant dimensions. Nevertheless, it is perhaps worth noting the countries in relation to which the structural changes were largest in the years 2004-2014. Over that time there was:

- an increase in the share of industrial products among imports from China (9.1 p.p.),
- a decline in the share of industrial products among imports from the EU25 (-5.1 p.p.),
- a decline in the share among imports from China accounted for by food, beverages and tobacco products (-5 p.p.).

The EU25 states together constitute the key recipient of products exported from Poland, accounting for 74.4% of the total in 2014. Nevertheless, the 2004-2014 period saw the importance of this group of importers decline by 4.6 percentage points in terms of the share of Poland’s exports they took.
Poland’s trade following the country’s EU accession, with particular emphasis on trade with the EU25 and with the 5 main trading partners within the EU in 2014 (in mn EUR)

Source: author’s own calculations based on data from the Central Statistical Office (GUS).

Germany is Poland’s most important trading partner, its market accounting for 33.9% by value of the Poland’s exports to the EU25. The country is in turn the source of 37.3% of Poland’s imports from the EU25. Germany is followed in second place by the Czech Republic, in relation to which the corresponding percentages are 6.1 and 4.6%; and then by the UK (8.2 and 4.3%), France (7.2 and 6.3%) and Italy (5.8 and 9.5%).

As of 2014, 57.2% of Poland’s imports originated within the EU25. However, this figure was 10.9 percentage points lower than in 2004.

Trade with Russia is worth mentioning here. Recently there has been no dynamic development in trade with this country, which is both Poland’s immediate neighbour

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4 In goods.
and a potentially huge market, there has been no dynamic development. Where the value of exports is concerned, Russia is Poland’s 6th largest market. While the years 2004-2014 brought more than a threefold rise in the value of exports the level remains relatively low when set against the number of consumers in Russia (comparable with the level in the case of Italy). Imports were at a much higher level (worth €17.4bn as of 2014), which ensured a still-greater negative balance of trade with Russia – at the level of –€10.4bn.

An improvement in Poland’s position as regards world trade is attested to by the changes in the balance of trade recorded. A negative balance for Poland’s trade with the world at the level of -$16.8bn in 2000 improved to just -$0.7bn in 2014. It is of course clear that the size of any deficit is influenced, not only by levels of exports and imports, but also by changing price levels and exchange rates, as well as types of trade agreement.
The reduction of the size of the trade deficit needs to be considered a positive phenomenon.

Poland’s largest negative balance of trade in 2014 was that with China (at -$20.74bn). Except in 2009 (when it was at -$12.32 bn) and in 2012 (when it fell in comparison with the previous year to -$15.51bn), the deficit in Poland’s trade with China has been growing steadily. In contrast, the best results (where surpluses are concerned) involve the EU25. As of 2014, the balance for this trade was positive to the tune of $35.6bn. It is worth noting that the change in this direction with the EU (i.e. to exports exceeding imports) was noted in 2004. Since then, 2008 and 2011 have been the only years breaking the trend for the positive balance of trade with the EU to go on growing steadily.

2.2. Poland’s trade in high-technology goods

2.2.1. A review of research on export competitiveness

Research to date on technological competitiveness has mainly focused on the analysis of Poland’s position in international competitiveness rankings (Pangsy-Kania 2004, Szamrej-Baran 2012), or else on macroeconomic indicators associated with innovation (Pangsy-Kania 2004, Pilarska 2010, Koziół 2007). Moreover, most of the work was carried out in relation to the country’s pre-accession period vis-à-vis the European Union (Tendera-Właszczuk 2000, Turowski 2002, Mińska 2000, Maślak 2000, Wysokińska 2002). A noteworthy study was Turowski (2002), offering a wider analysis of the structure of trade where the degree of technological advancement of exported products was concerned. That author emphasised the importance of the high-technology sector being developed as a fundamental condition for an improvement in the competitiveness of the Polish economy. By the same token, a consistently low level of competitiveness is seen as a sign that, in comparison with other states, Poland long continued to achieve only a lower level of national income, lower level of employment and lower standard of living for its citizens. Turowski (2002) stresses that the high-tech sector would represent a huge chance to boost output, not least given an unsatisfied demand domestically for highly-processed and or technologically-advanced goods that is made clear by the high level of imports of these goods from abroad. An improvement in this sector, and hence fuller utilisation by Polish producers of the huge market potential, would allow for an increase in the level of employment, further growth in consumer and investment demand and an increase in national income, as well as raised competitiveness of the economy, first and foremost thanks to an improved situation as regards the balance of payments. Turowski also draws attention to the way in which a change of trade specialisation in the direction of high-tech goods would allow for stabilisation of the level of trade against fluctuations in economic conditions (given the way that raw materials and other goods subject to limited processing prove unfavourable for the economy on account of their great vulnerability to more or less abrupt changes in overall trading conditions).

The issue of Poland’s competitiveness as regards the international trade in high-technology goods was taken up most recently by Pera (2013). That author’s analysis
made it clear that high-tech goods were not playing any more considerable role in Polish exports. Pera was able to point to the existence of a technology gap, and to the presence of distance separating the level of economic development in Poland and that in the wider European Union. However, the analysis in question could not be said to offer more than an outline of the relevant situation regarding Poland, making it essential that more detailed and penetrating analysis of the relationships be carried out.

Michalski (2014) also recently studied Poland’s competitiveness in exporting technologically advanced goods. His was an empirical analysis of structural change characterising the country’s exports to the EU27 over the 2001-2011 period, by means of verification of change in the relative comparative advantage (RCA) index, as well as in the export of industrial goods falling within the so-called mid-tech or high-tech categories. The work was able to confirm the growing significance of exports of goods in these categories as set against Poland’s overall exports to other EU Member States (while at the same time stressing that Polish exports are very much concentrated on these said European markets, with all the consequences this has for dynamics of growth and economic development). Furthermore, it was unfortunately possible to note a downward trend for the export of more advanced goods at the end of the study period.

Specifically, the analysis of comparative advantage points to favourable changes in the structure of exports from Poland when it comes to both the mid-tech goods segment (other than in the motor industry as broadly conceived) and the high-tech (albeit with the aforementioned downturn at the end of the study period). In all of this it needs to be recalled that the research by the author in question made use of the Harmonized System for the classification of goods (HS), as well as the fourth (or at times the sixth) level of disaggregation of the data. The present report adopts a different method of conceptualising data where level of technological advancement is concerned.

A further issue which was taken up at the 9th (2013) Congress of Polish Economists by Mińska-Struzik concerns the phenomenon of “learning-by-exporting” in high-tech enterprises. The author in question stresses that, in connection with Poland’s limited participation in world trade in HT goods, as well as the limited share of Poland’s exports accounted for by them, there is a technology gap in comparison with abroad. Bearing in mind the “spillover effect” by which knowledge is imbued, as well as the presence of this gap, engagement in – and the intensification of – export should allow for the mobilisation of technology-related learning mechanisms. Development as regards technology and innovation is made possible in this way. It results from the research carried out by Mińska-Struzik that engagement in export by an enterprise relating to high technology provides for the clear stimulation of innovative activity. Emphasised in this way is the importance of economic policy activity that seeks to stimulate exports, in relation to the way in which technological permeation effects can be induced.

The European Commission’s 2013 report points to an improvement in Poland’s situation concerning investment in research activity in the years 2000-2011 (albeit to an extent remaining below the EU average). Moreover, Poland’s competitiveness on the world scale is seen to have improved to a greater degree than is average for the European Union. The report also makes it clear that the value of exports from Poland rose in the years 2000-2010, with the country’s participation in the export of
goods that are advanced technologically rising by 2% annually. Analysis of the balance of trade revealing a positive value points to a degree of comparative advantage, and a structural surplus, as regards the trade in goods that are advanced or moderately advanced technologically. This creates opportunities for structural change. In addition, it was possible to point to 4 main areas in which production based around technology achieves its highest levels, i.e. food, agriculture and fisheries; energy; ICT and materials. At the same time, however, Poland has unused potential for the commercialisation of knowledge, making it essential that innovation capacity be strengthened, in order for knowledge possessed to translate more fully into product innovation. The Commission Report also points to Poland’s main strong points in the manufacturing sector, from which the exports of goods technologically advanced or moderately advanced makes a positive contribution to the balance of trade.

The aim of the work described in this part of the report has been to study Poland’s level of export competitiveness as regards high-technology goods. However, account is taken of periods both before and after Poland’s accession to the EU.

2.2.2. The trade in high-technology products

As has already been noted, one of the criteria by which to assess a country’s competitiveness relates to the shares of products traded in that represent differing degrees of technological advancement. Figure 31 presents this structure, with a division of traded goods into those that are high-technology (HT), medium-high technology (MHT), medium-low technology (MLT) or low-technology (LT).

**Figure 37.** Percentage structure to 1999, 2004, 2009 and 2013 exports of industrial products by the EU28 and by Poland, with a categorisation by level of technological advancement, as well as changes to these shares since 2004 (expressed in percentage-point terms)

Source: authors’ own elaboration based on Eurostat data.
Among exports from Poland there is a prevalence of medium- or low-technology goods. Only in 2009 was the share of exports accounted for by high- or medium-high technology goods greater than that for products with a medium-low or low technological inputs, and even then the level was back below 50% by 2013. However, it is worth noting that a similar change has also occurred in exports from the EU28, in which – in 2013 as compared with 2009 – there was a structural deterioration, in the sense of a decline in the shares of exports accounted for by HT or MHT goods.

The years 1999-2013 brought favourable changes where Poland’s exports were concerned (as the 2013 European Commission Report confirms). The share of exported goods with a high technological input increased by more than 4 p.p. (while the EU28 experienced a contraction of more than 2 p.p. in the same period). In both the EU28 and Poland, there was a decline in the share of medium- and high-technology goods, albeit with the decline greater in the case of Poland (3.4 p.p.) than the European Union (1 p.p.). A significant difference is also appearing in the export of medium-low technology goods. In the years 1999-2013 their share in Poland’s exports increased by more than 3 p.p., as compared with 0.2 p.p. in the case of the EU28.

The general conclusion from the above analysis is that Poland is achieving slow if favourable change in the structure of its exports. This entails a reduction in the gap separating the country from the EU28 where the export of high-technology goods is concerned. This is not a steady trend, however; given that no significant changes were noted in 2009 and 2013. There was also a reduction in the distance separating Poland from the EU28 as regards MHT goods, albeit with these differences not achieving special significance, and with fluctuations observable from year to year. It was in 2004 and 2009 that Poland enjoyed a minimal advantage over the EU28, but by 2013 the share of Poland’s exports accounted for by these goods was again minimally below that achieved by the EU28. A further favourable change is that the “advantage” that Poland possessed as regards the export of MLT and LT goods has declined.

**Figure 38.** Differences (between Poland and the EU28 in selected years) in shares in the export of products of different levels of technological advancement

Source: authors’ own elaboration based on Eurostat data.
Observations of changes in shares in different time periods (1999/2004, 2004/2009 and 2009/2013) point to varied dynamics. The most far-reaching change characterised the 1999/2004 period (perhaps because this lasted 5 years). During this time, there was a marked (9 p.p.) fall in the share accounted for by low-technology goods, as well as the largest increase in the share of medium-high technology products. At the same time, the decline in the share of high-technology goods was minimal, and there was also an increase noted for medium-low technology goods.

As comparisons of the shares in the different periods make clear, the share accounted for by HT goods is unstable. The most marked increase in the share they took of all exports was the more than 6 p.p. increase noted for 2004/2009. However, the subsequent 2009/2013 period witnessed a decline of more than 2 p.p. in the share they accounted for. This decline for HT goods was associated with a reverse trend for MLT goods (whose share fell in 2004/2009 but grew in 2009/2013). Poland-EU comparisons show that it was the changes characterising the structure of Poland’s exports that were more marked.

Transformations in the structure characterising exports can be analysed in terms of change in the shares accounted for by products of different degrees of technological advancement within the overall export of these products achieved by the EU28. The years 2004-2013 saw Poland increase its share of EU exports in all of the groups considered, albeit with the most marked increase in share (of rather more than 2 p.p.) characterising LT products. The greatest growth where HT products were concerned had to wait until 2004/2009, but was followed by the most limited increase (in fact virtually no change) in the years 2009/2013. Poland’s winning of increased shares of export accounted for by technologically advanced goods was thus mainly achieved in the years immediately following the country’s EU accession.
In fact, in the immediate post-accession period, it was exports from Poland to the remaining states within the so-called Visegrad Group (the Czech Republic, Slovakia, Hungary and Poland) that changed most, while 2004/2013 witnessed a more than 13 p.p. increase in Poland’s share of the export of HT products in the Visegrad Group as a whole. In this case, it was the years 2004/2009 that proved most favourable, with the share of Polish HT goods in Visegrad Group exports increasing by more than 13 percentage points. The effect in the years 2004/2009 was most probably caused by Poland’s EU accession, which denoted entry into the internal market, the introduction of the Four Freedoms and the need to adjust to quality and technical standards. The especially dynamic increase in the share accounted for by HT goods at this point might also have resulted from a growing influx of foreign direct investment into Poland. Given the realities of the investment cycle, entities with a share of foreign capital only began to produce and export after a certain time delay.

**Figure 40.** Changes in the Polish share of all exports from the EU28 or from the Visegrad Group countries in selected periods (in the case of each group of products, Poland’s exports are compared with those of the EU28 or VIS, e.g. with the HT exports from Poland compared with the HT exports from the EU28)

Source: author’s own elaboration based on Eurostat data.
In the 1999-2013 period, the value of EU exports of high-technology products grew from €657bn to 1160bn. In the same period, imports increased from €667bn to 1110bn. The trade in these products was characterised by an upward trend (leaving aside small falls in the years 2003, 2007 and 2008, as well as a somewhat more major reversal of the trend in 2009). The overall results for the balance of trade fluctuated somewhat, with recent years bringing surpluses (€40bn in 2012 and €50bn in 2013).

In Poland’s case, the years 1999-2013 were associated with increases in the value of trade (both exports and imports) where high-technology products were concerned. A small fall was noted in 2009 (as with the EU28 overall). On the other hand, 2010 was a record year, with the totals for both exports and imports reaching their highest ever values.
<table>
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<tr>
<th>Year</th>
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<th>Imports</th>
<th>Balance</th>
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<td>2013</td>
<td>300.00</td>
<td>700.00</td>
<td>-700.00</td>
</tr>
</tbody>
</table>

All values are in euros.
Figure 42. Exports, imports and the balance of exchange for HT goods in the cases of the EU28 (upper figure) and Poland (lower figure).

Source: authors’ own elaboration based on Eurostat data.
Throughout the analysed period, Poland’s balance of trade as regards HT goods was negative. The largest deficit was the -€10.1bn noted in 2008.

Within the EU there are geographical differences in the demand for Polish HT products. Likewise, there has also been a change over time in the importance of different groups of countries where the export of these goods is concerned. Thus, as of 1999, the largest share of these goods (over 60%) went to the EU12. Of secondary significance as recipients were the countries of the PIGS grouping or else the EU15_n_EZ grouping. Around 8% of the value of exports was accounted for by the new member states (i.e. the NMS_n_Vis grouping), while the countries of the Visegrad Group (other than Poland) came bottom of the hierarchy.

Analysis of the shares different countries account for in the export of HT goods points to the dynamic nature of the situation, with changes taking place in regard to different customers’ significances (as measured by the share taken among exports).

![Diagram showing the structure of exports of high-technology goods from Poland to selected groups of EU states in the years 1999, 2004, 2009 and 2013 (left panel), as well as changes in selected periods (right panel). Source: authors’ own elaboration based on Eurostat data.]

2.2.3. Comparative advantage in high-technology trade

Benefits achieved in trade are most often measured using the index of comparative advantage (as calculated using the methodology presented in the Annex). Reference

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5 Austria, Belgium, Finland, France, The Netherlands, Luxembourg, Germany, Italy.
6 Denmark, Sweden, United Kingdom.
7 Bulgaria, Croatia, Cyprus, Estonia, Lithuania, Latvia, Malta, Romania, Slovenia.
to the level of the index provides for an assessment of the relative export position of a selected state and selected group of products in relation to a group of other states (in our research this being the EU).

The index assumes values over 0, but where it exceeds 1 this denotes a comparative advantage in exports of country R in the given sector, in comparison with the exports of remaining countries, indicating that country R is specialised in the export of the given goods. On the other hand, if the RCA (Revealed Comparative Advantage) index is below 1, then country R does not have such an advantage, being relatively non-specialised in the export of the given goods, and in this way failing to achieve competitiveness where that export is concerned.

The study makes use of various indices. The main abbreviations used in index equations are:

- \( X \) – the value of exports,
- \( M \) – the value of imports,
- \( R \) – the reporting country or group of countries,
- \( P \) – the partner country or group of partner countries,
- \( W \) – world,
- \( ROW \) – remaining countries (i.e. rest of the world),
- \( i \) – group of products

It is HT (high-technology) products that are of interest to us in the research.

While the share of all Poland’s exports accounted for by HT products increased throughout the study period, the analogous index in the case of the EU28 assumed higher values. Thus the overall index of comparative advantage (in the HT goods group) over the 1999-2013 period shows that Poland then failed to achieve comparative advantage in its trade with partners in the EU28.

![Figure 44. Index of comparative advantage for Poland and EU Member States in regard to the trade in HT goods over the 1999-2013 period. The value of the RCA index for the EU28 = 1*](image)

* The analysis is based on the assumption that 1 is the level of the index for the EU28. The aim of the procedure was to show differences in the shaping of RCA in the case of Poland, as set against the EU28.

Source: authors’ own elaboration based on Eurostat data.
Observation of how the trend for the index took shape over time confirms a relative improvement in the position achieved by Polish products. While the value of the index was 0.3 in 1999, by 2013 it had reached the level of 0.6. However, relatively the most favourable situation characterised 2009, when the index in the case of Poland attained a peak value of 0.72. Nevertheless, the overall conclusion has to be that Poland has not achieved specialisation where HT goods are concerned, ensuring that its competitive position in comparison with other EU partners remains an unfavourable one.

Poland maintained its comparative advantage in regard to the export of HT goods to the PIGS countries (except in 2004). And, notwithstanding the crisis, in 2009 it is possible to note an advantage in exports to the EU15_n_EZ (even if this had reduced markedly by 2013).

**Figure 45.** Index of comparative advantage for selected groups of EU states in relation to the export of HT products in the years 1999-2013

*Source: authors’ own elaboration based on Eurostat data.*

**Figure 46.** Index showing Poland’s comparative advantage in the 1999-2013 trade in HT goods with the EU15 and NMS groupings, as well as those covered by the Free Trade Area regime, Customs Union or Economic Integration Agreements

*Source: authors’ own elaboration based on Eurostat data.*
In general, the comparison with 1999 reveals improve values for the index, notwithstanding Poland’s failure to achieve comparative advantage where exports of HT goods are concerned (as indicated by a level below 1 for the RCA index).

Changes in the RCA index over selected time periods confirm that it was only in the 2004-2009 period that a rise as set against all groups of states could be noted, with the index reaching its highest level in 2009.

It is worth looking at the relative comparative advantage achieved in the trade in goods categorised within the HT sector. A group of products with which Poland possessed RCA over the 1999-2013 period embraced electronic equipment in widespread use. However, the index in this case peaked in 2009, though it remained higher in 2013 than in 1999 and 2004.

A second group for which the value of the index in 2013 was higher than one (at 1.04) was telecommunications equipment. It is worth noting that the relative competitive position where these goods are concerned has been improving steadily. The years 1999-2013 revealed a positive trend for the production of computers and peripherals (albeit with the index down below 1 in 2013). In the case of all remaining groups, values of indices are below 0.5, and – if increasing at all – are only doing so to a limited extent (right side of diagram).

The most positive changes (increases in values for the index) took place in regard to the manufacture of instruments and appliances for measuring, testing and navigation, and the manufacture of watches and clocks (in the years 1999 and 2009);
Figure 48. Index of comparative advantage for Poland’s exports in HT goods to the EU28, by categories of product in selected years

Source: author’s own elaboration based on Eurostat data.
in the manufacture of magnetic and optical media (in 1999 and 2009), as well as in the manufacture of irradiation, electromedical and electrotherapeutic equipment (in 1999 and 2009), with a decline in the value of the index (in the years 2004 and 2013).

The fluctuations in RCA are such as to suggest that changes do not reflect a steady increase in competitiveness, in line with improved quality and modernity of products, but are rather influenced by the changing situation on the world market.

Poland specialises in the export of electronic equipment in widespread use, and it is worth noting that the advantage enjoyed as regards this product group was present in the trade with all groups of countries as well as the EU28, with the index rising in all of the years analysed.

Further groups of goods in which Poland enjoys an advantage are telecommunications equipment – in comparison with the New Member States, and optical instruments and equipment (as regards the PIGS grouping).

As the presented analysis makes clear, the relative competitive position of Poland as regards the trade in HT goods worsened for 6 groups of products, though this was the case of certain groups of countries only, not the entirety of trade with the EU28.

The most favourable conditions for Poland are those arising from trade with countries linked with us via Customs Union (CU) agreements. The value for the RCA index is found to be greater than 1 in the case of 3 groups of goods. The highest figure (over 10) is achieved where the production of electronic equipment in widespread use is concerned. Then there is a figure greater than 2 for the production of electronic elements and printed circuits, as well as 1.5 noted in the case of telecommunications equipment.

Countries included within Economic Integration Agreements (EIAs) represent a further group with which the RCA indices are at around the level of 1 where the production of electronic equipment in widespread use is concerned, and/or slightly above 1 in regard to the manufacture of magnetic and optical media and of telecommunications equipment.

In the case of FTAs, benefits are indicated by the levels attained by the RCA index in the case of the production of electronic goods in widespread use (RCA >2), as well as the production of telecommunications equipment.

The decade 2004/2013 brought minimal improvement in RCA indicators, albeit with 4 exceptions. There was a slight worsening in the case of the production of optical instruments and photographic equipment, as regards countries embraced by economic integration agreements, in the production of basic pharmaceutical substances in the case of both free trade and economic integration agreements (FTAs and EIAs), and in the production of irradiation, electromedical and electrotherapy equipment in the case of the Customs Union. In contrast, a very marked reduction in comparative advantage occurred in the case of the production of electronic elements and printed circuits. In spite of that, the RCA index in 2013 was still at a level over 2.
Figure 49. Index of comparative advantage for Poland’s exports in HT goods with selected groups of EU Member States in 2013 (left panel), as well as changes after 2004 (right panel).

Source: authors’ own elaboration based on Eurostat data.
2. Poland’s trade following the country’s EU accession, with particular emphasis on...
Concluding remarks

The political changes taking place in Poland in 1990 and subsequent years allowed for an opening-up of the country’s economy to foreign trade. However, trade remained at a low level in the first years of transformation, only to commence with a sustained steady increase from 2000 onwards, the only interruptions to this trend being in 2009 and 2012, when there were small decreases, if only in comparison with the previous year.

Industrial products have continued to be of major significance to both exports from Poland (among which they take a 51.8% share) and imports into Poland (48.3%). Poland has improved its position as an exporter of agricultural products, however.

The most important trading partner is the European Union, whose Member States took more than 74% of Poland's exports (by value) in 2014. Nevertheless, the significance of the EU for Poland's exports has declined slightly. The most important individual country receiving Poland's exports is Germany.

Poland's balance of trade remained in deficit through the studied period, though 1999-2014 did witness a marked improvement (from a deficit of $16.8bn in 2000 to one of just $0.7bn in 2014).

Analysis of Poland's comparative advantage when it comes to the trade in HT goods shows that the country is not specialised in this area, leaving the competitive position unfavourable. The value for the RCA index in 2012 as compared with 1999 was up, but not to the extent that any comparative advantage could be referred to. However, the level of the RCA differs in relation to the countries traded with.

Nevertheless, the last 15 years have brought slow if positive change where the trade in high-technology goods is concerned. While it is medium or low technologies that still prevail among exports, the share of goods with a high share of technological components has increased. The shares of different groups of HT products among Poland's exports are not found to be stable, while the balance in the trade of HT is goods is negative.
Part Two

International exchange in the light of theory and empirical research
Chapter 3

A review of trade theories

Krystyna Gawlikowska-Hueckel

3.1. Theoretical framework of international trade theories

3.1.1. Traditional trade theories

The seam of research in economics dealing with international trade has a long history; trade has been, and is, an activity that brings many benefits: it increases the quantity and range of available goods and boosts the profits of the trading entities. At the country level, trade has a bearing on the balance of payments, economic growth and wealth of a society.

Trade has existed and flourished for centuries, doing quite well without theories that would analyse it or identify it as a significant factor of economic growth. This fact alone serves as the best proof of its utility. However, international trade played such an important role that economic theory gave it a lot of attention.

Mercantilism is widely regarded as the first theory of trade (Stankiewicz 2007). According to mercantilists, accumulation of precious metals was the essence of wealth. One of the methods used to expand the stock of gold and silver was to promote exports and discourage imports; the resultant balance (surplus) supported the state treasury. The unique feature of the mercantilist approach was the belief that it is a zero-sum game: the gain of one trade partner had to mean the loss of another.

Mercantilists promoted not only “peaceful” methods of acquiring precious metals; they claimed that, in addition to protectionism favouring domestic manufacturers, all other forms supporting the strategies for accumulating “treasures” were permissible, including monopolies in the economy or foreign conquests.

Adam Smith, the “father” of classical economics, pointed to the existence of the so-called “absolute advantage” which underpins the creation of streams of exports. Such an advantage is manifested by the manufacture of different quantities of goods in two different countries, based on the same pool of labour.

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1 Skousen (2012) claimed that encouraging exports and discouraging imports represented two powerful drivers that promoted the mercantilist system whereby countries were supposed to increase their wealth.

2 It means that one country has the absolute advantage in the production of one good, and another country has such an advantage in the production of another good; it can also refer to a situation when a given country has an advantage in the production of more than one good, and nevertheless trade is taking place.
Another important aspect of Smith’s thought which pertains to international trade is his “discovery” concerning specialisation. Smith believed that the division of labour is limited by the number of potential buyers (market size), and that specialisation is advantageous when it guarantees not only reimbursement of costs but also earning a profit (Skousen, 2012).

In analysing trade, Smith’s attitude to competition should not be passed over. In his view, free competition fosters growth, both in domestic and international trade. The concept of *laissez-faire* also has an international dimension. Notably, in Smith’s opinion (contrary to what mercantilists believed), free trade brings benefits to all the trading countries.

Another economist who studied the theory of international trade was Ricardo, author of the comparative costs theory which holds that countries with a relative, and not absolute, advantage in the production of certain goods, derive benefits from trade. Ricardo introduced some restrictive assumptions: perfect competition (highest effectiveness and full use of factors of production), with labour as the sole factor of production which is mobile domestically but immobile between countries. Certain prerequisites need also to be met to make the exchange profitable: costs of transport should not be high, and barriers to trade should be as low as possible.

Most valuable was Ricardo’s observation that not absolute, but comparative costs define benefits from trade, and a sufficient condition for engaging in the exchange is when the comparative edge pertains to just one industry or branch.

For many years, Ricardo’s theory has provided arguments in favour of free trade. Even though the present conditions have undergone fundamental changes such as a free flow of production factors, hidden barriers to trade, lack of full employment or limited possibilities for changing jobs, i.e. no flexibility in the labour market, it is emphasised that the category of comparative advantage still remains a key and fundamental economic concept which shows that activity directed outward can bring benefits, an important view especially in an era of globalisation.

Although Ricardo’s theory provided inspiration for many scholars, some of its shortcomings were also pointed out. It did answer the question on the expediency of trade, but failed to address the underlying question: if the dissimilar levels of efficiency are the source of differences in the benefits derived from trade (different labour inputs needed to produce the same unit of a given commodity in two different countries), what are these inequalities caused by?

The theoretician who made substantial changes to Ricardo’s model was Haberler (1936, 1950). His notable achievement is that he modified Ricardo’s traditional argument which focused on the number of labour units needed to produce different commodities (two in Ricardo’s theory) to an approach that analyses benefits in terms of opportunity costs. Haberler also concluded that a country does not have to concentrate on the production of a specific commodity, but can manufacture different quantities of products, in different configurations. Identification of products that should be manufactured provides rational grounds for specialisation based on the lower opportunity costs of manufacturing one commodity, or a combination of commodities.
3.1.2. Neoclassical trade theories

Mill (1807-1873) was another theoretician who made a contribution to the development of the trade theory. To the investigations on the profitability of exchange, Mill added the category of demand, a concept that was omitted in the theory of comparative costs (Barber 1970). Mill also indicated certain shortcomings in Ricardo's reasoning, as he identified the exact proportions in which goods should be exchanged but limited himself to indicating the level to which manufacturing for export was worthwhile so as to receive an adequate volume of imports in return.

According to Mill, the desirable state is one in which a country’s exports equal its imports. He assumed that the greater and the more flexible the foreign demand (Mill did not use the notion of price elasticity of demand4) the better the situation of the exporting country. The benefits derived mutually by the trading countries depend on the size of the demand.

Mill was a proponent of free competition which, in his view, best “regulates” the international division of labour.

One interesting aspect of Mill’s theory was that he emphasised the costs of transport which affect the initial price relationships. Increased transport costs lead to increased prices of the exported commodities and therefore affect the terms of trade.

Marshall (1842-1924) (Skousen 2012), a representative of the neoclassical school, shared Mill’s view on the role of demand in international trade, but did not limit his analysis to two commodities, instead introducing the so-called basket of representative goods, which become the objects of exchange between the trade partners. Marshall represented mutual demand in the form of curves (so-called offer curves), which show the dependency of trade on the size of exports and imports.

The theory that has substantially changed the approach to trade and has for many years been a source of inspiration for scholars was one proposed by Heckscher, Ohlin and Samuelson5 (the factors proportion theory). Its first version was published in 1919, and was later expanded by Ohlin.

The originality that Heckscher and Ohlin’s theory offered was that, unlike in the Ricardian model, it identified the reasons which may explain the differences in comparative costs.

The H-O-S model highlights the fact that each country is endowed with different proportions of the factors of production (capital and labour). The abundance or scarcity of resources (in relation to another country) may be evaluated from two points of view, namely:

- The relationship between the price of capital and the price of labour (P_k/P_l), which takes into consideration both supply and demand;

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3 Zielińska-Głębocka (1996) holds the view that the theory of trade has developed in two directions: the first focused on modifications and alterations of the assumptions defined in the classical theories, whereas the second questioned if not outright rejected some of the neoclassical tenets.

4 Blaug claimed that Mill nearly introduced the notion of price elasticity of demand into economics; this was ultimately done by Marshall (Blaug 1994, p. 219).

5 Heckscher and Ohlin (Heckscher’s disciple) developed their model in the 1920s, while Samuelson made his contribution to the model after World War II.
The relationship between total capital resources and labour (K/L), which takes the supply side into consideration. The abundant factor is cheaper, which is a rational reason for specialisation in the production of goods that use this particular factor, or resource, more intensively; on the other hand, import should include products based on the scarce (more expensive) factor.

Specialisation in the production of goods relying on the abundant factor may lead to an increase in its price. In this way, through adjustment, international trade leads to the equalisation of the prices of production factors.

Ohlin pointed out several aspects that can offer a fuller explanation of international trade. The starting point for this new approach was the conclusion that not under any conditions does the same input of labour bring the same result, which is a consequence of dissimilar conditions of production. This observation, which is relatively easily to verify statistically, provided the ground for refuting the assumption that the function of production is the same in all countries. One of the reasons underpinning the differences is that countries are not equally endowed with factors of production (capital and labour).

Ohlin extended the analysis and looked at whether trade is rational in a situation if the participating countries are characterised by the same level of factor endowment, or in other words, that the proportion of labour and capital is the same. He came up with the conclusion that even with a similar level of endowment, there can be differences in prices and costs due to the different level and distribution of the national income and, as a result, of different consumer preferences and tastes.

Yet, even if we assume that the demand structure is the same, trade will be profitable, and profits will be derived from the increasing income associated with the economies to scale.

The H-O theory inspired many theoreticians dealing with international trade and, according to many, remains valid even today. It was modified many times by adding new aspects that had not been considered before. The major theories drawing on the original concept include:

- Samuelson’s theory, according to which international trade leads to the equalisation of production factor prices (FPE theorem). A reduction in the abundant factor through its transfer to a country with scarce resources of such a factor leads to the equalisation of income (both relative and absolute) generated by that factor of production. Samuelson’s findings were incorporated into Heckscher and Ohlin’s earlier studies; currently, this theory is frequently referred to as the Heckscher-Ohlin-Samuelson (H-O-S) model.
- The Stolper-Samuelson (S-S) theorem, which acknowledges the relationship and impact that changes in the prices of goods have on the prices of production factors, and in effect on the profits of their owners. Since some resources are used more intensively, which is a process accompanied by falling prices of the factor which is

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7 For more on this topic see: Misala (2000).
less intensively used; the relative increase in the prices of labour-intensive products leads to a rise in wages, and an increase in the price of capital-intensive goods will increase the price of capital. This can lead to the redistribution of income earned by the owners of production factors: the income of the owners of the abundant factor will rise and the income of the owners of the scarce factor will fall.

- The Rybczyński theorem, which shows the correlation that can exist between different branches of manufacturing. The increased production of goods which uses abundant resources (under the assumption that the prices are stable) takes place at the expense of an absolute reduction of output in the sector based on the scarce factors (Bowen, Hollander, Viaene 1998, p. 146).\(^8\)

- In addition to its proponents, the H-O model also had many opponents. More doubts arose when the H-O-S was tested empirically by Leontief (Leontief, 1954). Leontief analysed the economy of the United States broken down into 142 sectors shown in the form of inputs and outputs. Leontief estimated the correlation between the capital inputs and the number of employees in the export sectors.

Using the example of US international trade, Leontief demonstrated that this theory was not consistent with the actual structure of resources (capital is the abundant factor in the USA, whereas labour-intensive goods prevail in exports to a higher degree that is the case with imports).

Thus, the conclusions of the H-O-S model were undermined and the Leontief paradox was introduced into the literature. The resultant doubts concerning the model’s validity encouraged other economists to test it.

Bowen, Leamer and Sveikauskas (1987) conducted research for the year 1967, and 12 production factors in 27 countries. They pointed out that the structure of the exchange only slightly corresponded to the Heckscher-Ohlin theorem relating to the structure of trade.

Leontief’s study was repeated also for other years; the findings resulting from the research covering the years 1951 and 1962 corroborated Leontief’s findings, and those for 1972 contradicted them, corroborating the H-O-S model instead (Świerkocki 2004).

The criticism that was voiced concerned the fact that the H-O-S model could not be used to explain the so-called missing trade phenomenon (Fisher, May 2006, Umiński 2012). Another serious problem was the difficulty with the empirical verification of the model (Czarny 2001).

The above controversy certainly encouraged reflection on the usefulness of the H-O-S theory for the study of contemporary streams of international trade. The critics claim that the standard H-O-S model has a series of restrictive assumptions which fail to reflect the current situation on international markets. The flaws of

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\(^8\) This theorem was formulated in relation to processes observable in countries where one sector of production has started to develop rapidly, as a rule based on newly found deposits of natural resources. Changes in the economic structure caused by a robust growth of one of the sectors are termed in the literature “the resource curse” or “the Dutch disease”, cf. Sala-i Martin, Subramanian (2003), Gierczyńska (2010).
the model\textsuperscript{9} were of such a calibre that for all intents and purposes it ceased to be useful in the interpretation of global trade flows and trade profitability. The view of the contemporarily “trading” countries strongly diverges from the ideal conditions described by Heckscher-Ohlin.\textsuperscript{10}

Notwithstanding the above, the H-O theory still has its followers. Wood (1997) considers it useful for analysing trade. In his opinion, its misunderstanding is due to the fact that a bulk of the theory looks at capital in the way it looks at land, whereas nowadays it is a mobile factor and, as such, no longer capable of generating specific trade flows, unique for individual countries. Wood conducted his research on the exchange of goods between the North (developed countries) and the South (developing countries), that is regions characterised by dissimilar factor endowments, which, in his view, well captures the meaning of the tenets of the H-O model.

Haberler made an attempt to update the H-O model by adapting it to the changing conditions, and expressed it using a new, neoclassical framework. He also replaced the labour cost theory with opportunity costs. This offered a new perspective on the benefits derived from trade, which are not limited to one product only but to a combination of goods in the manufacturing of which a given country has relatively lower opportunity costs. This in turn allows more freedom regarding the selection of the manufactured goods and a greater flexibility in adapting to international market conditions.

Zielińska-Głębocka (2012) emphasised that the H-O model is appropriate for those trade flows which result from the exchange based on inter-industry specialisation developed by countries with dissimilar economic structures.

3.1.3. A new approach to international trade (post 1970)

A new approach to international trade and its profitability addressed the changes taking place in the international environment, as a result of which the H-O-S theory had lost its ability to explain the determinants of trade flows and how they evolved. According to Zielińska-Głębocka (2004, p. 39), the debate that affected the formulation of a new trade paradigm tackled two issues: incorporation of technology as a specific type of input into the knowledge paradigm and the international mobility of production factors.

There can be little doubt that technological progress was one of the major developments in the second half of the twentieth century as it brought about revolutionary changes in industry, primarily in the developed countries. This was manifested by the addition of new aspects to the trade theory.

\textsuperscript{9} These assumptions are as follows: there are two countries, two factors of production (labour and capital), and perfect competition in all the markets; the production factors are mobile within the country and immobile internationally; the manufacturers can choose the mode of production: if capital is relatively cheaper than labour, they can choose a capital-intensive mode of production, and if labour is cheaper, they can choose a labour-intensive option instead. Each country has the same technology. The consumers’ tastes and preferences are the same (Zielińska-Głębocka, p. 35).

\textsuperscript{10} Some possible ways of analysing trade using the H-O theory were briefly discussed by Umiński (2012).
Generally speaking, in new models of trade – compared to the previous generations of theory – new features were added and the analysis was taken to a new level. The basic changes were as follows:

1. Perfect competition was replaced by imperfect competition.
2. With the assumed existence of comparative costs, new sources of benefits were suggested, such as: economies of scale, product differentiation, innovations and pace at which they are absorbed.
3. Differentiation of certain factors (economies of scale, level of technological progress and technology, product differentiation, similarities of preferences, level of income, production structure) can affect the volumes and directions of trade flows between groups of countries (highly and less developed countries).
4. Intra-industry trade and its characteristic features (emphasis on trade based on the scale and differentiation of products).
5. Role of economic policy; justification and application of measures to promote exports.
6. The new theories “went down” to the level of firms, emphasising the role played by innovators and propensity for risk, and suggesting that decisions on whether to start exporting are made by firms themselves.

Due to the fact that these theories emphasised different aspects, took into account different conditions and focused on one or several sectors (intra- and inter-industry trade), they are usually divided into the following groups: neotechnological theories, supply and demand theories, theories stressing the new factors, intra-industry trade theories (Misala 2000).

Neotechnological theories include the technology gap theory, product lifecycle, and economies of scale that all stress the significance of technological progress, which largely determines the directions of specialisation that individual countries pursue in trade relations.

Some new elements were introduced into the trade theory by Kravis (1956). His view on trade revolved around the issue of the availability of goods on the domestic market. Available goods are those whose production is the outcome of the activity of manufacturers and innovators, characterised by a relatively high flexibility of supply.

The deficit of products sought on the market generates trade flows. Therefore, the shortage of goods is a factor encouraging trade, the intensity of which depends on the demand and supply forces. Trade mostly comprises goods that are manufactured in one country and are not commonly available. Such conditions create an “infinite comparative advantage”. In practice, however, such a situation relates only to those goods whose production is limited to the place they originate in (such as champagne or Scotch whisky). The exclusivity of such goods lies in the fact that their unique characteristics are associated with the limited area of their production (Champagne, Scotland). However, this does not preclude products with similar characteristics appearing on the market.

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12 Such as e.g. the Spanish Cava, Italian Prosecco, or American Bourbon.
A slightly different approach, involving a different set of factors affecting trade, was proposed by Posner (1961), the author of the technology gap theory. Posner underscored the impact of technology on trade. Since technological change is a continuous process, its influence on trade is not incidental. Posner assumed that the trading countries are characterised by the same factor endowments and that their production functions are the same.

The differences observed between countries are in the level of knowledge, technological progress and technological advancement. What has far-reaching consequences is the fact that knowledge does not constitute a public good (as is the case in contemporary theories) and that knowledge dissemination effects do not occur, which restricts if not precludes the possibility for domestic and foreign competitors to become “stakeholders” of progress in a short period.

The source of the advantage, which is maintained over a limited period, is the level of technological knowledge and technological progress of the innovator. We can speak of the domestic reaction lag, which refers to the time needed for the imitation effect to occur between the leading entity and the remaining ones, and the foreign reaction lag. Innovative manufacturing methods create an advantage which is absolute until such methods are popularised in other countries.\(^{13}\) The competitor’s delay is due to the so-called demand lag and the imitation lag.\(^{14}\) The demand lag is measured by the length of time that consumers need to accept a given product and make a decision on its purchase. As a matter of course, the shorter the period of product acceptance, the greater the possibilities for increasing its exports.

In turn, the imitation lag is the time that elapses until manufacturers from other countries are capable of creating and launching an imitation. The faster that happens, the shorter the period in which the absolute advantages are sustained. At the moment when the competitors complete their so-called “learning period” needed to master new production methods and start sales on the domestic market, the period of expanding production begins and may result in a commencement of export to technologically advanced countries.

The period of “closing” the gap is characterised by particularly favourable trading conditions for the pioneer country, which has a quasi-monopolist position.

The assimilation of the manufacturing technology by the imitating country may lead to changes in the intensity of export and import flows. One reason for such changes is the lower manufacturing cost than that of the leader.

Posner’s new perspective took into account the technology gap existing between countries. It should be pointed out that the issue of technology differentiation was also present in the earlier theories, although it was termed differently (in the Ricardian model, it pertained to the labour intensity of goods).

\(^{13}\) There is a clear analogy to Schumpeter’s line of reasoning, who pointed to the lead-time advantage of the innovative entrepreneur (Schumpeter 2009).

\(^{14}\) Posner discussed the gap in three aspects: foreign reaction lag, domestic reaction lag and the learning period. In this context, the patent regulations of the innovating and the imitating country are of particular importance.
Vernon's product life cycle model (1966) takes account of the strong impact of technical progress both on production and on trade. It also gives considerable weight to the analysis of the size and depth of sales markets and knowledge of such markets (contacts with buyers), in addition to the flexibility of demand and supply in terms of prices and income. Similarly to the technology gap theory, the model assumes that the potential dissemination of knowledge and technology has its limitations, posed mainly by patent law. Every product has its specific lifecycle, composed of three phases: innovation, maturity, and standardisation. In the initial phase, the product has all the hallmarks of a novelty and can undergo certain modifications, while still being verified by the market. At this stage, goods are manufactured on a small scale and vary because every company manufactures them using their own “formula” and their specific technology. This manufacturing phase is experimental in character.

As the demand grows, the process of adapting the best available technology takes place. In the early stages, it is the leading companies headquartered in the developed countries that derive benefits from the production and trade. As time passes, however, the underlying technology may be assimilated by less experienced enterprises located in less affluent countries, which will start both manufacturing and export. In the maturity phase, standardisation of the product takes place. The process has specific consequences: the scale of production is increased while the requirements imposed on the manufacturing personnel are reduced and, as other manufacturers also engage in production, the market essentially acquires the features of an oligopoly. This in turn can change the nature of competition to price competition.

One consequence of a given product becoming popular or even commonplace may be the decision of the leader who brought it to the market to terminate its production.

With time, Vernon expanded his theory to include issues associated with oligopolistic competition. Oligopolies themselves develop in stages: at the first stage, a given enterprise is in possession of unique knowledge of the technology, which gives it a competitive advantage over its competitors. Inevitably, however, this technology will be copied, imitated and later disseminated. One way of “making a breakaway” is to seek new locations in the form of FDI which can produce benefits originating from an extensive scale of production. In the process, however, the nature of the company will change and assume the features of a mature oligopoly.

At the next stage, as manufacturing becomes widespread (mass imitation), enterprises begin to seek ways to reduce manufacturing costs. Favourable conditions for this can be found in the markets of less developed countries. Vernon (1979) emphasised the fact that such countries do not become the targets of corporate expansion until the last stage of the product lifecycle.

The modified version of the theory indicates the benefits that arise from enterprises operating globally, which it would not be possible to gain if enterprise activity was restricted only to the domestic market.

Vernon's theory was later modified by Hirsch (1975) and Sohns (1976). Each of the product life stages relies on the available resources and is consistent with the level of knowledge and technological advancement. The propensity for export increases as the level of innovation becomes higher, which is when products in the initial stages of their
lifecycle are exported. Typically, countries at a lower level of economic development will tend to manufacture goods in the final lifecycle stage, which corresponds to the economic structure dominated by standardised industries.

Sohns emphasised the interdependence between the location of production and the product lifecycle. The first phase, owing to its specific characteristics, requires certain conditions that can be found in well-developed countries which have at their disposal adequate material resources and highly-qualified labour. At this stage, the small distance between the trading partners plays an important role as it allows for the gaining of additional benefits thanks to reduced costs of transport and a similar demand structure.

According to the logic of the product lifecycle, manufacturing in the second and third phase does not require sophisticated technology or personnel with some outstanding qualifications and therefore can be undertaken by countries at a lower level of development. In his analysis, Sohns included the issue of foreign direct investments that act as vehicles for transferring both production and technology to other countries.

To sum up, both Posner’s and Vernon’s theories look at the trade flows in time, taking into account changes in the terms of trade, work processes, improved production methods, and adaptation. Changes in the production technologies produce dynamic benefits, whereas more advanced technology increases the production potential.

Supply and demand models represent another group of theories; they focus on the impact that supply and demand have on trade. The mutual demand theory argues that the trade flow structure depends not only on the level of relative costs, but also on the size of the demand for the traded products. Its conclusions are as follows: highly developed countries with a higher technological level are capable of offering a broader range of goods, which leads to reduced imports; the range of goods offered in the domestic market is sufficient in terms of quantity, and diversified in terms of quality.

On the other hand, less developed countries report a high demand for goods manufactured abroad since they are not capable of supplying them in required quantities. In this way, they are forced to import and in effect gain smaller benefits from international trade.

In turn, Linder’s preference similarity theory (homogeneous demand structure) (1961) proposed a somewhat different approach, which was consistent with Leontief’s studies. The theory is based on the demand, and not supply, approach, and as such ignores the significance of factor endowment. The Linder model tackles the issue of trading in industrial goods, with a major conclusion that nations with a similar demand tend to develop similar industries.

Linder’s first observation was that the creation of export flows is preceded by the occurrence of internal demand for potentially exportable goods. High demand for certain goods reduces manufacturing costs and offers a desirable starting point in relation to foreign competitors. Therefore export, which invariably involves risk, is undertaken when a given product has a well-established position in the internal market on which it has already been verified for quality.15

15 Even though this theory refers to trade in industrial goods, Linder claimed that gaining experience on the domestic market is desirable even if natural resources are exported; Burensstam Linder (1961), pp. 92, 93.
Linder’s second observation was that reasonably operating manufacturers seek markets that are similar to the domestic market in terms of demand. Such similarities open up new opportunities for increasing the scale of production based on their earlier experiences. Practice shows that these are typically markets which are not far off geographically. The conclusion from this analysis is that the intensity of trade flows in industrial goods is the greater, the more similar the structure of demand in the countries engaging in trade.

Another important factor stimulating trade is the comparable level of per capita income in the countries which are trade partners. Owing to the similar level of buyers’ disposable income, their needs and consumer preferences gradually become similar. Therefore, Linder argues, differences in the per capita income levels can pose an obstacle to trade (p. 101). This regularity is especially visible in the international trade of highly developed countries.

Drawing on Linder’s theory, Markusen (1986) proposed a model concerning the trade of the eastern and western regions with the north, i.e. countries with a similarly high level of income per capita, and between the north and the south, i.e. countries with high and low per capita income levels. The analysed trade comprised various types of products: highly capital-intensive and heterogeneous goods characterised by considerable demand flexibility, and labour-intensive goods, typified by low price flexibility. The volume of trade between east and west (north and north) turned out to be greater than that between the north and the south. This means that countries with higher standards of living engage in trade more heavily than those with dissimilar income levels.

In another study, Markusen (2010) applied a variant of the Stone-Geary preference to the H-O model. He assumed that labour factor endowment is in proportion to the number of households and that capital-intensive goods are characterised by high income. The results of the model provide an explanation (strictly in demand-side terms) for many phenomena that were disregarded in the previous models, such as bias in the domestic market consumption model; the issue of missing trade; the widening salary gap in the conditions of increasing productivity or the role of income distribution that confirmed the conclusions from previous research (higher income differentiation, greater demand for luxury goods).

The model suggests the following conclusions: margins and prices are higher in countries at a higher level of development, and greater trade flows can be observed between countries with higher per capita income levels (with a fixed aggregate income). The effects of growth vary both in the conditions of perfect and of imperfect competition, and depend on whether there is a rise in productivity, or if the accumulation is neutral in character.

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16 They refer to the dynamic demand models, which take into account the utility function.
17 Markusen adopted the assumptions which are typical of new theories of trade and theories on strategic trade policies. He assumed the presence of increasing returns to scale in capital-intensive sectors of industry, high demand elasticity, freedom of firms’ entry to and exit from the market, and Cournot competition.
18 According to Markusen, this feature can be verified empirically.
In neoclassical theories, international trade involves homogeneous goods. The starting point for the product differentiation theory (Armington 1969, Umiński 2012) is the observation that the share of differentiated products that meet the same needs (i.e. are substitutes) in the trade volume increases.

Products can be differentiated horizontally – they are distinguished by such attributes as quality, country of origin, functional qualities, taste, colour, brand, etc. Such features can determine consumer choices and therefore, in the conditions of monopolistic competition, will become a significant factor in winning clients.

While horizontally differentiated products vary in specific attributes, neither their production costs nor their prices show significant dissimilarities, which are typical features of imperfect competition. It should be emphasised that this kind of product differentiation is an important issue for consumers since it is they who make choices by identifying product features that are of interest to them.

Consumer preferences are not fixed – they change as income grows. The typical correlation here is that the higher the income, the more diversified the preferences. For this reason, trade in differentiated products usually takes place between countries with higher levels of income. Higher standards of living and greater demand lead to changes in preferences, and this encourages manufacturers to produce new generations of differentiated goods.

On the other hand, vertically differentiated products mainly differ in the mode of production and applied technology, and are close substitutes. They also differ in price, and decisions on their purchase depend on the consumers’ level of affluence.

Another group of theories, so-called neo-factor theories based on the H-O-S model, take into account the fact that a third factor - natural resources - is a significant aspect in international trade, and that neither capital nor labour are heterogeneous (Vanek 1963).

We can speak of simple and complex labour, whereas the notion of capital includes both a physical and human component, the latter also having a qualitative element as it comprises the stock of knowledge and competencies. Therefore, we can say that natural resources are an example of a simple resource, while physical and human capital are complex resources.

Generally speaking, however, and as with the H-O-S theory, the application of factors which are abundant in a given country is a source of gains from trade.

This theory was later developed by other economists, who believed that the main reason for expanding international trade is the relatively dissimilar endowment of individual countries with natural resources, physical and human capital. It is this differentiation that affects how comparative costs are created.

The Dornbusch, Fischer, Samuelson (DFS) model (1977) draws on Ricardo’s theory, but takes into consideration trade in an infinite quantity of goods whose production is in progress, but in the circumstances of trade partners using different technologies, which in effect means that the number of units of labour needed to manufacture one unit of a product differ from country to country. The differences in

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19 For more on this issue see e.g. Czarny (2002), p. 37.
20 Human capital is tantamount to complex labour (Misala 1996).
technology are manifested by the number of units of labour needed to manufacture a unit of a product.

With a continuum of goods, a product at the boundary between a country’s export and import has a negligible impact on the labour market as it requires an insignificant input of labour. This eliminates the need to consider whether a given good is manufactured in both countries and allows analysis of the range of goods to be exported or imported by the country concerned, a situation that could not be examined using the model with two products.

The DFS model expands the analysis into a number of directions and sheds light on issues which were not tackled in the models involving a limited quantity of goods. Significantly, the model includes the costs of transport, which adds weight to the analysis of product groups whose prices in two countries are so negligibly different that the costs of transport are too high to justify their trading. Additionally, if the relative productivity grows, certain goods that previously were imported are no longer brought into the country (become nontraded), but their export may be commenced with instead.

The model takes into account wage levels in the trading countries, in addition to the level of the currency rate as it affects international trade. Including wages into the equation is important especially because remuneration, as a component of overall costs, has a bearing on the prices of goods offered on international markets. The limits of profitability in both export and import are determined by the productivity-to-wages ratio in the trading countries.

The limitations of the DFS model are due to the fact that it comprises only two countries, and therefore the analysed correlations cannot be easily expanded into other contexts.\footnote{This model was extended by Eaton and Kortum (2002) to include any number of countries under the assumption that the productivity of every commodity and of every country is randomly determined.}

Tomasz Brodzicki

3.2. Intra-industry trade theories

From the theoretical, empirical and trade policy perspective, the trade structure broken down into both inter-industry trade and intra-industry trade (IIT), and the resultant system of specialisation in trade and production, play a significant role. To explain the product-based structure of trade, a whole gamut of economic theories, from classical, to neoclassical, new and new new trade theory (NNTT), needs to be considered. There is no single theoretical model to elucidate the whole spectrum of aspects to trade, even if we only take bilateral exchange into account.

There are several reasons why the study of intra-industry trade is important. Firstly, the development of IIT is a major indicator of real income convergence. A higher share of intra-industry trade is also a significant prerequisite for a higher level of economic integration, diversification of the economy and development of industry. Secondly, a higher share of IIT, especially with partners from highly developed countries, is an
effect of a higher development level. Thirdly, it has been observed that a higher share of IIT leads to the synchronisation of business cycles and a lower frequency of asymmetric shocks between the trade partners.

Over time, a gradual convergence of per capita incomes between trade partners should foster trade in variety, involving an exchange of goods which are close substitutes from the client perspective. Simultaneously, intra-industry trade comprises the exports and imports of differentiated products from the same branch of production or one sector, which are close substitutes either in manufacturing or in consumption (or both), and therefore are characterised by a high cross-elasticity of demand. These products are similar in terms of production factor inputs or their function. Therefore, we often speak of the overlapping export and import flows (Finger 1975, Czarny 2000) or of overlapping export and import vectors (Zielińska-Głębocka 1996).

In the long term, at least in a group of relatively homogeneous countries, an increasing share of intra-industry trade should be observed, accompanied by a falling share of inter-industry trade.

Intra-industry trade was empirically identified in the studies by Balassa (1965, 1966), Grubel (1961, 1967), and Grubel and Lloyd (1975) in the 1960s and 1970s. The findings showed an important role of such trade, at least in the group of highly industrialised countries, in particular the European Economic Community (EEC), which could not be explained by the earlier, theoretical models that drew upon the concepts of comparative advantage and inter-industry specialisation.

The increasing significance of IIT flows is mainly associated with technological progress and structural changes taking place in the field of production and consumption, particularly defragmentation of manufacturing processes accompanied by the decreasing costs of transport and other costs of trade, liberalisation of trade globally, and in effect a growing tendency to establish global chains of added value and gradual uniformisation of consumer preferences.

In terms of theory, the main determinants of intra-industry trade are the following (Zielińska-Głębocka 1996, Misala, Pluciński 2000):

- increasing differentiation of final and producer goods,
- increasing diversification of demand,
- gradual convergence of consumer preferences, also regarding preference for variety,
- gradual liberalisation of global trade within multilateral, bilateral and regional integration arrangements,
- falling transport costs and emergence of new means of transport,
- gradual factor price equalisation (FPE),
- diffusion and spatial defragmentation of manufacturing processes,
- an increasing scale of the global economy and of individual national markets as a result of economic growth.

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22 The demand-side approach to IIT is prevalent in the literature of the subject. However, Bhagwati and Davis (1994) emphasised that IIT could equally well be defined as a two-way trade in heterogeneous goods which are characterised by similar production factor inputs in the manufacturing process.

23 According to Cieślik (2008; p. 1), “defragmentation means the decomposition of an earlier integrated production process into stages which can be located at a distance from one another”.
equalisation in the levels of development within homogeneous groups of countries – conditional beta-convergence or the so-called club convergence. For end consumers and the economy as a whole, increased intensity of IIT may bring a number of gains. These include in particular:

- increased availability of diverse categories of goods for consumers – a growing range of products offered on the market helps to widen the choice and satisfy different expectations, thereby increasing total utility in a situation of preference for variety,
- reducing production costs – IIT allows for the extension of production series within individual manufacturing plants, and thereby for use to be made of static and dynamic internal economies of scale,
- as unit costs of production fall, the price levels for specific varieties of the final product can be lowered while an unchanged level of profitability is maintained by the manufacturer (monopolistic quasi-rent in the case of specific varieties), which extends the consumers’ choice at lower costs,
- increased size of the market – a growing product diversity leads to the emergence of micro-markets and expands the sales markets in all the trading countries,
- lessened impact of international trade on the distribution of income between basic production factors; gains from IIT may be obtained by all the factors, both those more and those less abundant.

**Theoretical underpinnings of intra-industry trade**

The determinants of intra-industry trade were expounded in detail in the so-called new trade theory models which were developed in the 1980s. Interesting and pertinent contributions in this regard were made in the studies by e.g. Krugman (1979, 1980), Lancaster (1980) and Helpman (1981). When the Brander model was expanded (1981), an alternative IIT model was formulated, the so-called reciprocal dumping model developed by Brander and Krugman (1983). Significant contributions to theory development were also provided by Helpman and Krugman (1985), Falvey and Kierzkowski (1987), and Flam and Helpman (1987). The first valuable review of new trade theories was published by Helpman and Krugman (1985). Other studies include *inter alia* Greenaway and Milner (1987), Leamer (1992) and, last but not least, Leamer and Levinsohn (1995).

Models of new trade theories invoking the concept of monopolistic competition in the conditions of increasing returns to scale (internal or external) and allowing space for diversified products can explain the appearance of intra-industry trade under the conditions of open trade and homogeneity of firms (the representative firm models). Products may be horizontally or vertically diversified in terms of quality, and thereby of price, which is correlated with quality (for more on this topic see e.g. Zielińska-Głębocka 1996).

The emergence of IIT is largely determined by the occurrence of the increasing returns to scale (IRS), the nature of consumer preferences (showing the love for variety)

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24 It should be emphasised that in the early 1990s the NTT models, supplemented by interregional or international flows of production factors, laid down the foundations of the so-called new economic geography (NEG). Simultaneously, the NTT models made it possible to theoretically develop the basic specification for the gravity model of trade (Feenstra 2004).
and a concentrated market structure within which entities have market power, i.e. the ability to impose prices above the marginal cost. Love for variety means that consumers prefer wider choices, that is, in other words, their total utility increases in the quantity of available varieties of (final) consumer goods.

The monopolistic competition model devised by Dixit and Stiglitz (1977), which took into account the love for variety, was of key significance for the emergence of new trade theory models. This model includes a relatively high number of market entities, which leaves out the issue of potential strategic interactions, and each entity, having symmetrical attributes, manufactures one of the potential varieties of a differentiated product. Homogenous labour is the sole production factor. Each such entity has an identical linear production function (lack of differences in technology) with a fixed cost, i.e. independent of the size of the output, and a variable cost, which depends on size of the output. The non-zero fixed cost generates increasing internal returns to scale.

Each of the firms (allocative equilibrium) would like to manufacture at the point which minimises the long-term average cost AC (minimum efficient scale of production – MES). The interaction between this volume and the size of the market determines the number of firms in equilibrium.

At the same time, the more importance consumers attach to variety (that is, the less perfect substitutes the specific varieties of goods are), the lower the price elasticity of demand and the greater the monopolistic power of firms (reflected in the mark-up). An increase in the number of competitors drives the mark-up down. In a perfectly competitive market, when the product is homogeneous and the number of entities tends to infinity, the mark-up, and thereby the market power of each such firm, is zero.

Due to the assumption of free entry to and exit from the market, the appearance of positive profits ($P>AC$) will attract new manufacturers – i.e. the number of market entities will grow. Manufacturers will enter the market as long as the profit does not fall to zero, when, in accordance with the break-even condition, the price will be equal to the average cost. This will determine the number of market entities in the long run.

At the point of long-term equilibrium, the size of the output of every firm, and therefore of every product variety, is the same and does not depend on the size of the market. At the same time, however, the size of the market determines the number of firms on the market. Therefore, the potential integration of two symmetric economies will increase the number of available varieties of a differentiated good, which in turn will increase the total utility of clients showing a love for variety. Other factors that can affect the number of firms on the market include the size of fixed costs and the parameter of the price elasticity of demand, the rise in which leads to a reduction in the number of entities (and thus varieties of goods).

Krugman extended the Dixit-Stiglitz model to international trade by adding a second symmetrical market (1979, 1980); in the early 1980s, this produced the first theoretical model that fully explained the occurrence of IIT. The model explains the reasons for trade creation and trade diversion due to the existence of differentiated goods. The model assumes that firms in each country have different cost structures, which leads to a specialization in the production of goods that can be traded, thereby increasing overall welfare.

\begin{footnote}
\footnotesize Departure from the assumption on the firms’ symmetry and taking their real heterogeneity into account led Melitz (2003) to formulate the first model of the new new trade theory (NNTH). Seen from contemporary perspective, Krugman’s model is a special version of a broader category of models for the context involving homogeneous firms on the market.
\end{footnote}
underpinning the emergence of intra-industry trade but is not capable of anticipating the structure of intra-industry specialisation, i.e. predict which partner country will manufacture a specific variety of a diversified product.

Intra-industry trade may also take place if strategic interactions occur, which allows the use of game theory. In game theory, actions undertaken by every market participant affect the decisions of the remaining market participants; also, in making decisions on their strategy, firms tend to take these interactions into account (the so-called response functions are therefore devised). This issue was studied e.g. by Bernhoffen (1999). In his model, firms compete by quantity according to the concept of Cournot’s duopoly – by deciding on the size of sales that maximises profits, they take the competitors’ supplies as given. Under certain conditions concerning the demand function, the so-called response curves of both firms will be negatively skewed. This ensures attainment of a stable Nash equilibrium.

It should also be emphasised that Davis (1995) was among those who proved that the occurrence of IIT may be explained using the classic H-O-S model, at a fixed level of economies of scale.

To sum up, according to Zielińska-Głębocka (1996), the reasons underpinning the emergence of IIT include product differentiation, diverse consumer preferences, presence of economies of scale and imperfect competition in which firms have market power.

Both the structure and directions of IIT are highly unpredictable. The theoretical models being analysed here fail to answer the question as to which country will launch the manufacturing of a specific variety of a differentiated product. One thing that is clear, however, is that a two-way trade in varieties of a differentiated product will appear.

Theoretical studies and their empirical verifications clearly indicate that, generally, the intensity of intra-industry trade is a function of the similarity between the trade partners both on the supply and the demand side. The share of intra-industry trade is particularly large in the group of highly developed countries. According to standard IIT models, its share in the total trade between two partners is the greater, the smaller the difference in factor endowment, with the assumed similar size of their economies. Therefore, if the differences in the relative factor endowment decrease, the share of IIT in overall trade should increase. Helpman (1985) further demonstrated that two countries of different size do not engage in trade with each other as heavily as two countries of similar size, given the same aggregate volume of GDP, a process known as size similarity.

As in the case with overall trade, the intensity of IIT should be negatively correlated with the geographical distance between the partners, which both directly and indirectly reflects the costs of transport or, more broadly speaking, of the exchange as such. Ever-greater geographical distance also increases the probability of significant differences occurring in the structural determinants of the trading countries, whether hard or soft, such as geographical, institutional, cultural or social factors.

It should at the same time be stressed that intra-industry trade is often decomposed into two main components: vertical and horizontal. The main reason for distinguishing these two types of trade relates to the features of differentiated goods in two-way trade.
Therefore, the following categories can be defined: *horizontal intra-industry trade* referring to the exchange of horizontally differentiated goods, the so-called HIIT, and *vertical intra-industry trade*, or VIIT, which refers to the trade in differentiated products with considerable vertical differences in respect of value that is therefore reflected in their prices.

Many theoretical studies and empirical analyses have shown that the determinants of vertical and horizontal intra-industry at least partly differ (Greenaway 1994, 1995). Let us look at this issue in more detail. Horizontal intra-industry trade (HIIT) is defined as a mutual exchange of products having a similar quality, manufacturing technology and costs, but with unique characteristics or certain attributes, given a similar level of product quality. HIIT occurs when goods of one category in e.g. technological or qualitative terms, but regarded as different by the buyers, are being traded. The consumer has his or her diverse preferences and wishes to buy various goods from among a whole array of differentiated products. Such aggregated demand for various types of products is the reason for the existence of industries manufacturing differentiated goods. The higher the level of society aggregation the greater the demand for all differentiated products, and in effect the greater the trade comprising these products.

The theoretical foundations for this type of trade were developed by Dixit and Stiglitz (1977), Lancaster (1980), Krugman (1979; 1981) and Helpman (1981; 1987). Standard theoretical models suggest that the level of IIT is higher if there is a greater similarity of countries’ capital endowment. Therefore, horizontal intra-industry trade is found mainly between similar countries, especially highly developed (industrialised) ones.

Vertical intra-industry trade (VIIT) refers to trade in varieties of products which are differentiated in terms of quality, technology and costs – and thereby, of prices. The theoretical basis for defining this type of trade was proposed by Falvey (1981), Shaked and Sutton (1984), Falvey and Kierzkowski (1987), and Flam and Helpman (1997). These models assume that there is a positive correlation between the intensity of vertical IIT and the difference in the factors of production or technology endowment, in addition to different income distribution structures. It is commonly divided into trade in which a country exports superior-quality varieties of a specific product and imports inferior-quality ones, and *vice versa*. Trade in varieties of qualitatively differentiated goods fosters the development of specialisation in the production of goods having a specific quality. Such specialisation will evolve mainly between countries at different levels of per capita income.

To sum up, significant country-level determinants of vertical intra-industry trade include both demand factors such as income distribution, market size and similarity in preferences, and supply factors such as proportions of production factors or technological differences. Generally, according to Helpman and Krugman, it can be said that the wider the difference in the relative factor endowments, the smaller (greater) the range of horizontal (vertical) IIT should be.

Furthermore, in line with Linder’s hypothesis (1961), countries with a similar income level, and thereby with similar consumer preferences, should develop similar industries, and therefore trade in similar but differentiated goods. The intensity of intra-industry trade should, therefore, be the greatest for homogeneous partners: it
rises along with the structural similarities between the trading partners. At the same time, according to Linder's theory of overlapping demand, it can be concluded that the wider the difference in the income level, the higher the share of vertical IIT (and the smaller the role of horizontal IIT).

In other words, economic divergence boosts the significance of VIIT, whereas the growing similarity between countries and comparable factor or technology endowments reinforce HIIT.

Countries with a lower average per capita income should specialise in exporting inferior-quality varieties of differentiated products (so-called *down-market* specialisation), whereas more developed countries with higher average per capita levels should specialise in exporting superior-quality varieties of differentiated goods (so-called *up-market* specialisation).

We also know that the growing disparities in the size (scale) of the markets should increase the intensity of VIIT and reduce the intensity of HIIT.

Other factors determining the intensity of intra-industry trade include geographical proximity, level of mutual economic integration and thereby the incidence of barriers to trade (negative correlation). Intra-industry trade, whether vertical or horizontal, should be more intensive between partners that are spatially closer to one another, are bound by economic integration agreements and in effect have better access to national markets.

Empirical analyses indicate furthermore that sectoral factors such as the opportunity for product differentiation, extent of the economies of scale, market structure or product lifecycle, are as a rule less important in determining intra-industry flows.

### Stanisław Umiński

#### 3.3. Applications of the gravity model in the study of international trade

One argument in favour of including the concept of gravity in the review of literature is that it is highly useful for empirical analyses of trade flow modelling, implications of trade agreements, barriers to trade and non-trade international relations (FDI and migration). If other “flagship” theories help to determine the so-called trade base, i.e. causes and directions of specialisation, they can be applied with lesser effect to interpret and predict the volume of actual trade flows. The gravity models have undergone a serious evolution since their first applications in economics. The concept itself is superficially understood as one rooted in the Newtonian physics. However, a more serious analysis of the applications of the gravity equations in the study of international trade, and of well-proven theoretical foundations, indicates that such a superficial understanding is not justified today. Due to their “absorption” of many other theoretical topics, the gravity models have become fully-fledged and useful analytical tools.

We will start the investigation of gravity unconventionally, with a graphic presentation of the correlation between the value of trade with Germany of firms having their seats in specific provinces of Poland, and the distance between the provincial
capital and the capital of Germany. There is little doubt that such an approach has its weaknesses, for a number of reasons. Ideally, we would wish to show the distances from individual cities (in Poland and Germany) between which the supply of goods takes place. Furthermore, information based on the exporter’s principal place of business offers only an approximate picture of the actual trading relations in spatial or territorial terms. These objections notwithstanding, there is a visible negative correlation between the distance and the value of exports. This regularity is also confirmed by trade relations taking place in other territorial systems, but it does not show a full picture of relations that are modelled in the context of the gravity theory since GDP is the other major determinant here (i.e. the size of the market, that is the equivalent of mass in physical terms).

In their textbook of international economics, Head and Mayer (2014, pp. 132 and 133) quoted the trade between Japan and the EU as an example corroborating the correlation between the volume of trade and the size of the market (GDP). From Japan’s perspective, the EU market is sufficiently small and considerably remote; the EU is also a customs union, which means that each of the Member States uses the same customs regime in its relations with Japan, which only allows the impact of GDP on trade to be captured. The EU countries are markedly distant from Japan in terms of culture, religion, currency, etc. What the authors set out to do was to provide the best

![Figure 51. Correlation between the distance from Germany (Berlin) and the value of exports (EUR) for enterprises from Poland’s NUTS-2 regions in 2008](image-url)

Source: author’s own elaboration based on the Customs Chamber data.
possible illustration of the correlation between GDP and the trade volume. The one they identified is nearly linear.\textsuperscript{26}

\section*{3.3.1. The origin of gravity in economic analyses}

Some of the economic literature propounds the view that the gravity equations were authored by Tinbergen (1962) and Linneman (1966). However, such a view is questioned by representatives of geographical sciences, who date back the origin of the gravity concept in socio-economic studies to a much earlier period. An extensive review of the early references to the gravity model in the spatial study of economic phenomena was provided by Chojnicki (2011, p. 7), who summarised the research done by such scholars as: Carey (1858-1859), Ravenstein (1885 and 1889), Janowski (1908), Reilly (1929 and 1931) and Converse (1949). Some modifications were made in the way the category of explanatory variables was perceived, and in addition to physical distance also potential accessibility, economic and social distance were included into the analysed categories. Likewise, the interpretation of mass was not uniform. For instance, Dodd (1950) demonstrated that the impact of one population on another depends on a number of features such as income structure, sex, age, education, etc. The authors of the early works on gravitational forces underlined their empirical basis as being primary to theoretical considerations – which in fact later led to criticism levelled at gravity models.

In the Polish literature, a broad presentation of various definitions and formulas for the physical (gravitational) and geographical potential can be found in the works by Ratajczak (2011a and 2011b), who pointed out that two approaches can be distinguished: one drawing on the Newtonian theory and another on Wilson’s theorem. Ratajczak (2011b, p. 100) emphasised that drawing directly on Newton’s work is not correct in social sciences, owing to the dissimilar features of physical and social space.

To prove that the concept of gravity was used for analysing interdependence in the economic and social space relatively early, we should recall the monumental work edited by Isard: \textit{Methods of Regional Analysis: Introduction to Regional Science} (published in English in 1960, in Polish in 1965). Chapter 8 offers a thorough explanation of gravity models, potential and mutual relations in space. The author discusses \textit{inter alia} the Stewart-Zipf hypotheses, which refer to such notions as demographic power, demographic energy and demographic potential, and numerous issues relating to passenger transport and relative income potential. It should be noted that the law of gravity used in relation to regional analyses is mentioned in Isard's book in many different contexts, including export and import (Isard, 1965, p. 450), although export at that time was not discussed in the international context, but was rather considered as flow of goods between regions.

\subsection*{26} Head and Mayer (2014, p. 134) also examined the “second part” of the empirical relationship embodied in the gravity equations. Using the example of France, they illustrated the relationship between the share of exports (and imports) in GDP and the distance – in relation to the EU and Eurozone countries, former colonies and French-speaking countries. The authors used the vivid term of the “spirit” of gravity, which can be observed for example in the strong commercial ties between France and its former colonies (of which many are also Francophone countries).
Trefler’s reflections are regarded as a step on the path leading to the concept of gravity being solidly established (1995). While criticising the concept of relative factor endowment (the Heckscher-Ohlin-Vanek model, a modification of the H-O-S model) as having little use for empirical analyses, he argued that the model typically envisages more intensive trade than actually takes place. Lower exchange than could be anticipated from the differences in factor endowment was dubbed the “missing trade” phenomenon. Trefler’s observations which did not directly pertain to issues of a geographical nature (distances) highlighted the occurrence of barriers to trade. The same year saw the publication of McCallum’s findings (1995), counted among the most inspiring works on the applications of the concept of gravity in economics, particularly in terms of trade analysed from the regional perspective. As the starting point for his analysis, McCallum cited the discussion on the role of national borders in international trade. In this, he relates to, or rather challenges, the propositions and tenets claiming that borders between countries have become largely insignificant and have “effectively disappeared”. McCallum refers here to the rather strong assertions formulated by Ohmae in his book *The Borderless World. Power and Strategy in the Interlinked Economy*, according to which national borders are less and less important for the actual flows of capital, products, information and knowledge (Ohmae 1990, p.193). If borders have a bearing on trade between both countries and regions in such similar countries as the USA and Canada – as was proved by McCallum – they can be expected to play an even greater role in countries less similar than those two as a factor hampering trade. According to Head and Mayer (2014, p. 136), this was the first stage on the path leading to the contemporary understanding of gravity in international trade. It was, quite vividly, received as an admission that the concept of gravity can prove useful for analyses of international trade, particularly for the interpretation of the so-called missing trade.

3.3.2. “Facts without theory”

For a long time, the concept of gravity was not sufficiently widely discussed in international economics textbooks, mainly because of its alleged lack of solid theoretical foundations. Anderson (2011) argued that gravity, as a concept, a theory with its applications in economics, first appeared in Feenstra’s work in 2004 (2004). In his discussion of the studies by Tinbergen and Pyöhönen (1963), Deardorff (1998) concluded that they had used the concept of gravity without making any serious attempts at providing the theoretical background, being driven rather by an intuitive belief that it would prove useful and expedient in the modelling of trade. Later, scholars developed the original version of the model by adding variables derived from economic theory. Linneman (1966) referred to Walras’ concept of general equilibrium, while Leamer and Stern (1970) drew on the concept of probability in trade flows. In contrast, Leamer (1974) used both the H-O model and the gravity concept for analysing trade interactions but made no attempt to integrate these two theories.

A notable contribution to the discussion of the theoretical foundations for the gravity concept in the modelling of international trade was made by Anderson (1979 and 2011), who introduced the concept of product differentiation, drawing on Armington’s
A review of trade theories

Type preferences, according to which the attributes of products differ depending on their place of origin. According to Helpman (1987), the concept of gravity is a valuable complement to the traditional H-O model because this particular model, one of the pillars of international trade theory and a relatively good indicator of trade directions, does not produce valid results in the modelling of trade volumes. The H-O model leaves out what is actually an important piece of information, that is differences in the sizes of the economies of the trading countries. Carrère (2006) took a broader approach to the formal, theoretical underpinnings of the gravity models, and proved that the gravity equations could be developed not only on the basis of heterogeneous features of products but also by invoking the concepts of imperfect competition, increasing returns to scale and differentiated productivity levels.

Anderson (2011) also offered an in-depth review of theoretical aspects of gravity in international trade.\footnote{The paper in question is in fact a commentary on many disputable issues related to the gravity models, such as: nonlinear cost function (Arkolakis 2008), membership of integration groupings, common cultural heritage (traditions), common language, etc. (Anderson and Wincoop, 2004), demand structure, and varied productivity levels (Anderson and Yotov, 2010a, 2010b).} In his opinion, if we take into account additional variables depicting e.g. political barriers or use of a common language, the model accurately (with 80-90% accuracy) reflects the disparities in the volume of trade between countries. However, in order to precisely capture the nature of specific bilateral relations, they should be made relative to the remaining bilateral relations. In addition, the author tackles the issue of similarities between countries in terms of their economies measured by the size of their GDP, and the question of their openness. Anderson (2011, p. 7) proposes the equation:

\[ X_{ij} = s_i^j s_j^i \left( \frac{Y_i + Y_j}{Y} \right)^2, \]

where:

- \( s_i^j \) means the share of country \( i \) in the aggregate GDP of countries \( i \) and \( j \),
- \( Y \) means GDP,
- \( X_{ij} \) is the value of the bilateral trade between country \( i \) and country \( j \).

The expression \( s_i^j s_j^i \) assumes the maximum value when \( s_i^j = s_j^i = 0,5 \).

Head and Mayer (2014, pp. 137-139) proposed 3 fundamental yet different approaches to the gravity equation: general, structural and naive.

3.3.3. Multilateral trade resistance

Relativisation vis-à-vis the remaining trade partners is known in the literature as multilateral trade resistance (MTR). It was discussed among others by Anderson and Wincoop (2003, p. 176), who emphasised that the research should take into account the overall level of protection in trade. This is particularly pertinent in the context of selecting the estimation method for panel models. MTR is regarded as a feature of the...
so-called new gravity models, which go beyond the strictly literal understanding of the Newtonian approach to gravity. MTR was also studied by Baier and Bergstrand (2009), who identified the strengths and weaknesses of different estimation techniques, whereas Baldwin (2006, p. 14) pointed out that failing to take into account the location of a pair of countries in relation to the rest of the world may lead to errors in the gravity models. He exemplified this with the cases of Australia and New Zealand. In absolute terms, both these countries are situated at a considerable distance from each other, but, when compared to the “rest of the world”, these two countries are not very distant from each other. The omission of this fact in the modelling may produce an error underestimating the volume of trade between Australia and New Zealand.

Including MTR in the gravity models was a significant modification of the traditional approach. With such a perspective, international trade gains a wider dimension, while theoretical considerations tackle a context that is broader than analysing pairs of countries. It is, therefore, a “transposition” of inquiry to the level of analysis concerning alternative costs associated with a whole gamut of potential trade relations in the context of general equilibrium. According to Head and Mayer (2014, p. 136), this was the second stage on the path leading to the contemporary perception of gravity in international trade, known as the multilateral resistance and fixed effects revolution, the introduction of which basically made it possible to include MTR into the picture.

3.3.4. Non-typical applications of the gravity models

The literature also cites the so-called disaggregated approach to gravity modelling, which looks at regions as small, open economies engaging in trade. The selection of variables is determined by the specific nature of a given research. This means that not only trade-related but also regional development-related variables can be taken into account. For instance, Coughlin and Wall (2003) examined the issue of exports by the US states, drawing on the interdependencies described in the literature on international trade (including the trade creation and trade diversion effects, discussed in the theory of consequences of trade integration via customs unions). Many specific conditions were also incorporated in the gravity model proposed by Cassey (2010) on the basis of trade between Texas and Mexico.

Gravity is used in the modelling not only of trade but also of migration and FDI. Anderson (2011, p. 35) suggests that although the concept of gravity can be successfully used in empirical studies of FDI flows, it is extremely difficult to provide a comprehensive theoretical framework since a large number of factors that determine location decisions should be considered. The studies by Keller and Yeaple (2009) deal with vertical interactions; their IIT models take into account costs of trade and telecommunication costs, which are an increasing function of the level of technological advancement of a given firm’s operations. According to these authors, even seemingly weightless technology is governed by the law of gravity: as the distance between the headquarters and the branch offices increases, so do the costs of trading. Kleinert and Toubal (2010) derived the gravity equation by referring to the models of an international enterprise. They emphasise that the linkages between the multinational enterprise
theory and the concept of gravity, which is mostly empirical in character, have not as yet been identified, and the estimated coefficients in the econometric models are hard to interpret. The concept of gravity was used for discussing FDI in the EU Member States by Kamińska and Babula (2014). Head, Mayer and Ries (2009) applied the gravity theory to model the international exchange of services and attempted to answer the question as to how liberalisation and falling telecommunication costs affect market provision e.g. in the developed countries by service providers from countries offering low costs of labour, such as India. Based on the gravity model, De Sousa and Lochard (2011) found that monetary integration within the Eurozone had a positive effect on FDI inflows. Gravity-related models are also used to analyse portfolio investment flows, as demonstrated in the works by Martin and Rey (2004), Portes, Rey and Oh (2001), and Okawa and Wincoop (2012).

3.3.5. Selection of variables for the gravity models

A review of empirical analyses based on the gravity theory leads to the conclusion that the authors take a rather flexible approach to the selection of variables, especially explanatory variables. This allows for alignment of the model to the context of the analysis at hand. In addition to standard variables relating to mass and distance, a set of dummy variables is also included, while their actual choice depends on the nature of a given inquiry. In relation to international trade, these can include for example membership of integration groupings, monetary unions, access to the sea in general and harbour infrastructure in particular, historical factors such as for example the unique ties between the former colonies and their metropolises, a shared language, etc. An extensive review of potential variables was offered by Cieśluk, Michałek and Mycielski (2009). Umiński (2012, p. 297) concluded that, in an ideal situation, statistical information would be available for single trade transactions, and each such transaction could be treated as unique in the sense that it would be placed in the so-called seamless world posited by Krugman and Venables (1995). Such a world would be built around the spontaneous/endogenous division of what originally was homogeneous space, into areas with different specialisations. Such a specialisation, therefore, diverges from the traditional approach in which the “inherited” primary factors determine in advance what will be manufactured (and exported) and where. Naturally, such information is not available, and therefore the models are based on “ordinary” information provided by the statistical services.

A broad review of issues associated with the modelling of international trade and consequences of free trade agreements was offered by Kepaptsoglou, Karlaftis and Tsamboulas (2010). These authors point to the diversity of the methodological approaches, problems with the selection of variables, objectives of the gravity models and possible estimation methods. Although a considerable flexibility in the choice of variables is an advantage of the gravity models, it can nevertheless cause some interpretation problems.

As mentioned above, the selection of variables in the gravity models is largely determined by the context of the research. Nevertheless, some most commonly used
variables, representing a canon of sorts, can be identified. These include: bilateral imports; GDP; GDP per capita, size of population; distance between the capital cities; shared land border; access to the sea; infrastructure index; multilateral trade resistance; bilateral, real exchange rate of a given currency against the USD; share in a (regional) free trade grouping; nature of trade (industrial or other products); a shared language; and presence of trade offices (promotional activity). Egger and Nigai (2014) also take into account the common legal heritage (on the basis of the CEPII database), the level of corruption, and political stability, while Martínez-Zarzoso, Nowak-Lehmann and Horsewood (2009) also look at trade creation and trade diversion effects.

Filippini and Molini, (2003) introduced the “technological distance” variable to reflect the technology gap and the value of trade from the previous year, in the form of an explanatory variable. Its aim is to take into account the permanence of trade relations in the modelling process. Martínez-Zarzoso, Nowak-Lehmann and Horsewood (2009) used the Generalised Method of Moments (GMM) estimators in an attempt to eliminate some of the problems related to the endogenisation of the explanatory variable in the estimation of dynamic panel models. Carrère (2006) put forward the hypothesis that the volume of mutual trade tends to increase several years before the formal conclusion of a free trade agreement, a phenomenon he dubbed the “anticipation effect” (Carrère 2006, p. 230). The issues of anticipation and insecurity in trade policies were also tackled by Lakatos and Nilsson (2014) who studied the trade relations in the conditions of a free trade agreement signed between the European Union and South Korea.

Interesting variables were applied by De Benedictis and Pinna (2014) in the modelling of the impact of “insularity” on the so-called bad geography as a factor constraining trade and economic development. From the CAPII (BACI) database, the authors retrieved the data on trade costs, whereas Licio and Pinna’s dataset (2013) came to serve as a stock of information on the degree of insularity of individual countries. In turn, Puga’s database (Nunn, Puga 2012 and http://diegopuga.org/data/rugged) is a source of information on the topographic land heterogeneity, known as ruggedness. The authors also included information on the distance from the border, the extent to which the climate is tropical and the distance from the seaside, average temperatures and intensity of precipitation. De Benedictis and Pinna (2014, p. 13) interestingly set the (increasing) value of global trade against the index of (decreasing) trade costs (see Fig. 52).

Kleinert and Toubal (2010) suggested including “FDI openness” as a variable to model trade volumes. Kren (2014) combined the two theories, of intra-industry trade and gravity, and concluded that (increasing) distance has a considerable negative impact on the intensity of intra-industry trade. Markus (2014) used the gravity model to investigate the effect of the border on trade relations between the Visegrad Group countries. Milet (2014) pointed out that the structure of exports also depends on the so-called linguistic proximity. In the case of exporters from France, their entry into new markets largely depends on whether they have positive experiences from the existing markets and, as directions of their further expansion, they tend to choose

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28 See also Nictita, Olarreaga (2006), and the World Bank database useful for the gravity models: http://go.worldbank.org/EQW3W5UTP0.
countries which show a linguistic proximity to those that they have exported to before. The preference of markets which are both geographically and linguistically close is the stronger, the greater the number of foreign markets a given firm sells to. Hofstede (2001) proposed a set of variables that reflect the cultural differences relating to norms and values across countries. These include: masculinity/femininity, uncertainty avoidance (propensity for risk), individualism/collectivism and power distance. Each of these variables has been formulated following the Principal Component Analysis (PCA). The issue of measuring the institutional distance was investigated by Kaufmann, Kraay and Mastruzzi (2005 and 2010). The authors proposed 6 indicators to measure the quality of governance, grouped into 3 areas: the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies, and the respect of citizens and the state for the institutions that govern economic and social interactions between them.

Figure 52. Volume of global exports and trade costs in 1995-2010 according to De Benedictis and Pinna

Helpman, Melitz and Rubinstein (2008) included religion as a variable, while Milet (2014) – linguistic proximity, drawing on Melitz and Toubal’s dataset (2012). Bresslein and Burgard (2014) used the finite mixture modelling approach, whereas Besedes and Cole (2013) employed two models to determine the value of customs tariffs: (i) tariffs in commodity trade, and (ii) at the firm level, the ratio of customs duties paid to the value of the actual imports received. The authors used the information from the World Bank database, Cost of Doing Business, as the proxy for production costs. Lankhuizen, de Graaff and de Groot (2012) analysed the usefulness of various concepts of distance in the gravity models. They began by pointing out that contrary to allegations of the “death of distance”, the question of distance is still valid in the literature. What is more, new dimensions of distance are being sought, other than perceiving distance only as the category of economic distance. These are among others: the so-called hidden barriers to trade such as the quality of governance and institutions or cultural differences. Other
trade barriers (or, more broadly speaking, barriers to international economic relations, including FDI) include for example visa restrictions (Cristea 2011 and Poole 2010).

3.3.6. Estimation methods in the gravity models

The choice of the estimation method for the gravity models is an important issue. Olanike Kareem, Martínez-Zarzaso and Bruemmer (2014) provided an extensive review of such estimation techniques, placing special emphasis on the issue of zero trade flows. The authors, in reference to the research by: Flowerdew and Aitkin (1982), Eichengreen and Irwin (1998), Linders and de Groot (2006) and Burger, van Oort and Linders (2009), argued that the method of replacing observation pairs with zero values of trade flows with a low number (e.g. 1) is an incorrect procedure, mainly owing to its arbitrariness, lack of theoretical grounds and likelihood of estimation errors. In a situation when zero values occur non-randomly, removing the observation pairs from the set of the dependent (explained) variables will lead to a substantial loss of information, estimation errors and selection bias (Helpman, Melitz, Rubinstein, 2008).

Santos Silva, Tenreyro, (2006, 2008, 2009 and 2011) proposed to use non-linear estimation methods (such as the Poisson Pseudo Maximum Likelihood – PPML) in case of zero trade flows. One advantage of such methods is the result in the form of an unbiased estimation, resistant to the heteroscedasticity of the random factor. Other proposed methods, alternative to PPML, include the Negative Binomial Pseudo Maximum Likelihood (NBPML), Zero-inflated Pseudo Maximum Likelihood (ZIPML) and Zero-inflated Binomial Pseudo Maximum Likelihood (ZIBPML). It should be added that in specific situations and areas of research, the issue of zero trade flows may characterise a significant number of observations.29 According to Head and Mayer (2014), the Multinomial Pseudo Maximum Likelihood (MPML) is an even better estimation method.

The issue of zero trade flows is the evidence that the application of gravity, a concept derived from physics, poses a serious problem in economics: the Newtonian theory does not allow for zero gravity, while zero trade flows can occur in the world of real economic phenomena.

The discussion also cites the concept of heterogeneous firms in the interpretation of zero trade flows. Therefore, the gravity model takes into account monopolistic competition in which businesses are characterised by a dissimilar level of costs and productivity (Cadot 2008), as posited by the Melitz model (2003), according to which not all firms can engage in export. What is more, not all of those firms which are sufficiently highly productive can supply their products/services to all potential markets because the fixed costs associated with foreign market entry differ from country to country, and not all firms can meet them. Therefore, the presence of zero values of trade between pairs of countries is essential for the interpretation of the gravity forces. There can be situations in specific examples of two countries when no firm is productive enough

29 For instance, the gravity model proposed by Olanike Kareem, Martinez-Zarzaso and Bruemmer (2014) is based on fish exports from Africa to the EU, where 60% of observations were zero trade flows. Their correct interpretation plays an important part in the accurate estimation of the model.
to engage in exports. In addition, Helpman, Melitz and Rubinstein (2008) anticipate a situation of so-called asymmetric trade, whereby country A exports to country B, but there are no imports from A to B.

The theoretical model of gravity proposed by Helpman, Melitz and Rubinstein (2008) takes into account the heterogeneity of business entities, although the data for individual businesses are not needed to estimate the gravity equations. The authors used the datasets compiled by Djankov, La Porta, Lopez-de-Silanes and Shleifer (2002), containing information on the scope of regulation/control of business activity, mainly concerning the administrative procedures and startup costs (as a percentage of GDP). These will affect the costs (fixed costs in particular) associated with exports “to” and “from” a given country. If such costs are high for both countries in the analysed pair, their impact on the volume of trade will be even more negative. The inclusion of such costs allows the modelling of non-symmetrical situations: one-way trade and zero trade flows. Heterogeneity also means that a considerable share of businesses will export to the so-called attractive markets, which as a rule are large countries. According to Head and Mayer (2014, p. 136), convergence with the heterogeneity concept is the third stage in the evolution of the gravity models, mainly because it addresses the question on how to interpret the parameters of the models’ estimations.

Martínez-Zarzoso, Nowak-Lehmann and Horsewood (2009) used such methods as GMM, system-GMM, two-step GMM and first differences GMM (FDGMM), due to their application of a lagged endogenous variable.

Egger and Staub (2014) used the Generalised Linear Models method (GLM), whereby they applied different, “competitive” estimators, dividing them into quasi-differences estimators and fixed effects estimators. They left out the OLS estimator as having little use in the estimation of the gravity models (because it offers inconsistent estimates of the gravity equation parameters). On the other hand, Baier and Bergstrand (2009) used the OLS and NLS estimators in addition to the Monte Carlo method. The OLS was also employed by Cassey (2010), while Carrère (2006) used the GLS and the Hausman-Taylor estimator. In contrast, Egger and Nigai (2014) proposed a rather unusual approach since they based their model solely on dummy variables. Its advantage is that it allows the use of easily available statistical data; the procedure may also be applied for sector-level and product-level data. Information on the distance between countries is also taken into account as binary variables, in the form of distance intervals.

Tomasz Brodzicki

3.4. New new trade theory

The new new trade theory (NNTT) is a new and dynamically developing trend in the empirical and theoretical trade literature that highlights the unique role of firms in the explanation of the intensity and structure of international trade (Ottaviano 2010). Classical analysis of both countries (the macro-level) and sectors (the meso-level), which argues that all businesses will become exporters if they have a comparative advantage,
has been discarded. Currently, the NNTT is the only trade theory that can explain the reasons for the simultaneous presence of exporters and non-exporters within the same sector (WTO 2008).

Micro-level evidence, i.e. at the level of individual enterprises, showed their considerable heterogeneity. In effect, on theoretical grounds, this led to the repudiation of the principal assumptions of the new trade theory (Dixit, Stiglitz 1977, Krugman 1979, 1980, Krugman and Helpman 1985) of the so-called representative firm, i.e. characterised by typical attributes of a given sector. Instead, the focus was placed on real differences between firms or, in other words, the heterogeneity of business entities in many analysed dimensions.

In reality, only a small fraction of enterprises trade beyond the domestic market and bring their products to one or several foreign markets. At the same time, the export potential in individual countries is strongly concentrated in the group of biggest firms (Mayer, Ottaviano, 2008), and the degree of concentration varies from country to country.

Bernard et al. (2003) demonstrated that despite the differences between individual states, comparative analysis could reveal certain regularities in the behaviour of firms/production plants located in various countries.

Empirical research has found that the majority of firms do not export at all and operate solely on the domestic market. Of those entities that engage in exports, only a small number sell the bulk of their output abroad, being focused first and foremost on the domestic market. The share of exporting firms in a given sector is an increasing function of the sector's comparative advantage. Exporters differ from non-exporters in size: they are bigger. They are also characterised by higher productivity, higher remuneration levels correlated with higher productivity, and higher return on capital and qualified labour (WTO 2008).

According to NNTT theoreticians, a higher initial productivity of a given firm, and therefore a greater competitive edge facilitating effective competition on more demanding international markets, is the key to its becoming an exporter. The inclusion of the actual distribution of the productivity of firms, strongly skewed to the right (the so-called Pareto distribution), is an essential feature of the original NNTT model developed by Melitz in 2003 (Melitz 2003).

Bernard and Jensen (1999) clearly demonstrated that commencing export activity alone will not increase a firm's productivity (higher productivity precedes expansion to foreign markets - the selection effect; absence of the learning-from-exporting effect). Nevertheless, foreign market entry opens up possibilities for expansion for those domestic enterprises which are the most effective in individual sectors. The ongoing reallocation of assets to effective firms that takes place over time may enhance the allocative effectiveness of the entire economy. This may result in higher and more stable employment in more robust enterprises (i.e. with a higher survival rate). Better allocation may also produce positive dynamic effects and increase the overall rate of economic growth.

If they resolve to enter foreign markets, firms do incur the sunk costs of their decisions. The process of internationalising operations does not come without costs.
According to the research done by Bernard and Wagner (2001) for German manufacturing plants, incurring of sunk costs associated with the export entry today increases the probability that they will remain in a given market in the following year by 50%. This advantage will however quickly disappear and fall by as much as two-thirds in a year.

Sunk costs are the costs of entry to a given market, and include, among others, costs associated with obtaining permits and licences; personnel training; analyses of the new market; changes in contractual ties with the environment; finding new partners; identification of new distribution channels; product adaptation or, last but not least, costs of other necessary investment with a low economic or technological level of divisibility. In economic theory, sunk costs are those that cannot be recovered and therefore should not be considered in making decisions on future production. Such decisions should be taken while excluding sunk costs from the picture and given variable costs of operations.

It should be added that, in the context of spatial analyses, the inclusion of the NNTT proposals also led to the formulation of new new economic geography (NNEG).

Expanding business operations and transition from operating only locally to operating concurrently on one or more foreign markets may take place in stages (waterfall strategy – penetration of one foreign market before entering another) or over a short time (sprinkler strategy – simultaneous entry to many foreign markets) and may assume many forms, e.g. direct or indirect exports. Exporting may be done via a foreign agent, an external foreign distributor and its distribution network, a process known as piggybacking, or partly internalised via the firm’s representative offices or its own distribution network. In the case of subsidiaries of a multinational corporation, this can also mean intra-corporate exports (according to WTO reports, intra-corporate trade accounts for about one-third of contemporary global trade). Other forms of internationalisation and foreign market supply/service provision include: licensing, franchising, and concluding strategic alliances. As part of global added value chains (GVC), and due to the fragmentation of production or functional specialisation, firms are increasingly becoming subcontractors of components or certain types of services (outsourcing, offshoring or its variety known as nearshoring). The highest forms of internationalisation are those which allow the internalisation of management and the wielding of direct control through the setting up of branches or subsidiaries, often via greenfield or brownfield investments.

Exports to foreign markets are often preceded by imports from abroad, a process termed as learning from importing (e.g. Vogel and Wagner 2010). The bulk of research conducted to date, however, fails to provide evidence for the learning-from-exporting effect whereby firms would improve their productivity following foreign market entry (e.g. Bernard et al. 2007).

Why do only some firms start selling abroad? According to Melitz (2003), only those companies that achieve a certain productivity threshold can both enter and successfully compete on foreign markets. Since productivity (measured e.g. by labour productivity or total factor productivity, TFP) does not have a normal distribution but one strongly skewed to the right (many firms with a low productivity level, few highly productive firms), only a small percentage of firms are actually able to enter foreign markets. We
can speak of a natural, Darwinian even, selection effect. Most firms operate solely on the
domestic market, and those with insufficiently high productivity levels are eliminated
even from the domestic market (the “market crowding out effect”).

Porter (2001) also regards productivity as a key factor that determines the inter-
national competitiveness of businesses, understood as the ability to compete.

Operating on a foreign market involves a greater degree of risk. In addition, costs of
foreign market entry (so-called sunk costs) are higher, as indicated much earlier e.g. by
Roberts and Tybout (1997). This implies that a certain minimum level of productivity
must be achieved to make export activity profitable.

The majority of firms are not exporters but operate only on the local or national
market. Analyses from more than a dozen countries indicate that only some 20% of
operating firms are exporters, while a vast majority sell goods only in the domestic
market (Michałek 2010). In his analysis of the findings from the World Bank’s BEEPS
survey (2010), Michałek concluded that in the sample from Poland, firms directly
exported 7.8% of the value of their sales, while 1.5% of sales were indirect exports. This
means a total of 9.3%, while 90.7% of the output is wholly earmarked for the domestic
market. The export intensity of Polish firms is lower than that of other countries covered
by the World Bank survey.

Among exporters, only a small fraction of firms export the bulk of their production
sold. The share of exporting firms in a given sector is largely a function of the compara-
tive advantage of firms in a given sector relative to foreign firms. The research findings
also point out that exporters differ from non-exporters in many aspects (WTO 2008,
Bernard and Jensen 2004): they are bigger, more productive, have higher physical
capital and qualified labour intensity, and typically pay higher salaries. It was found,
for Poland and other countries, that the probability of engaging in exports increases
with the size and age of the firm, the productivity of labour and the share of foreign
ownership. Moreover, both the probability and volume of a firm’s exports depend
almost entirely on the specific features of a given enterprise, and not on the features of
the country it originates from (Michałek 2010).

The survey conducted by Hagemejer and Kolasa of the National Bank of Poland
(2008) on the level of internationalisation of Poland’s large and medium-sized enterprises
in the period 1996-2005, based on microdata from the Central Statistical Office (GUS),
showed a strong concentration of export activity among the largest manufacturing firms
and corroborated the key findings from the WTO report. Compared to the overall pool
of Polish firms, exporters were larger in terms of employment and sales, had access to
more capital, generated higher added value and paid higher wages per worker owing
to their higher productivity.

In addition, Mayer and Ottaviano (2008) demonstrated that the export potential
measured by the volume of exports is strongly concentrated in the group of largest
businesses, the group of the so-called super-star firms. In 2008, 1% of the top exporters
accounted for 77% of exports in Hungary, 59% in Germany and 48% in Belgium. As
regards the biggest firms, the top 5% accounted for 91%, 81% and 73% of the export
potential, respectively. A more detailed analysis for France indicates that 29.6% exporters
sell one product abroad, but they account for a mere 0.7% of French exports. On the
other hand, 10.7% of all exporters are firms that sell more than 10 products to 10 or more countries and generate 76.3% of the value of French exports.

Analyses for Belgium indicate that international competitive pressure triggers a selection process whereby highly productive companies replace less productive ones, which corroborates the theoretical claims made by Melitz. Firms participating in the international market achieve better results; a greater number or percentage of such firms in the population is transposed into overall productivity, wages and the country’s GDP more than proportionally. This is an issue that also has a bearing at the regional level. It is clearly visible that in order to explain the increased aggregate value of Belgian exports, the number of exporters, the so-called extensive margin, is of greater significance than the growth in exports sales per exporting firm, the so-called intensive margin.

In their analysis of Belgian SMEs engaging in trade in 1998-2005, Sleuwaegen and Onkelinx distinguished 4 basic categories in terms of the scale of exports and time of starting export operations: born internationals, i.e. enterprises which were established less than 5 years before starting their export activity and which export to fewer than 5 countries in the same region (regional markets); born globals - new firms but with more internationalised and diversified export portfolios; born again globals – firms similar to those in the previous category but with export experience longer than 5 years; and traditions – firms that had been in operation for over 5 years before their first export experiences, characterised by a narrow geographical scope of their exports. In the total population of businesses, traditional firms prevailed (47%), followed by “born internationals” (30%) and “born globals” (21%). In 1998-2005, 60% of the entire export increase in the Belgian SME sector was generated by firms from the category of “born globals”. According to Sleuwaegen and Onkelinx (2010), these firms proved more efficient, had higher R&D expenditures, recorded a higher rate of export growth and a greater involvement in the export markets, and were more willing to continue export activity (as firms in general do not have to operate permanently on foreign markets but can enter or leave them, adapt their offer or modify the directions of expansion), being at the same time characterised by the highest bankruptcy rates owing to their implementation of the riskiest market strategies.

Based on their analysis of American data, Bernard et al. (2007) also pointed out that, in addition to the extensive and extensive margins, the number of products offered by a firm is of particular importance (hence the significant role of multi-product firms), as is the number of markets where they sell their products (extent of the firm’s internationalisation).

The survey conducted by EFIGE (2010) makes it clear that the probability of engaging in exports and increasing export intensity is correlated with a firm’s level of innovation; European exporters are characterised by higher R&D expenditure, greater product innovation and a higher percentage of employees with university education. This will be discussed in more detail below.
3.5. The innovation and internationalisation nexus

The newest research findings demonstrate beyond doubt that internationalisation and innovation, or rather the scope of innovation and the extent of internationalisation, are closely intertwined and mutually complementary at the firm level.

For instance, Cassiman and Golovko (2011) concluded that product innovations, and less so process innovations, drive exports.

Based on a large panel of European manufacturing firms (EFIGE dataset), Altomonte et al. (2013) demonstrated that there is a positive, broad, strong and robust correlation between the extent of internationalisation of firms and innovation activities. They also emphasised that trade promotion and innovation policies should be better and more closely coordinated to reap full benefits from the apparent synergies.

Aw et al. (2011) found that the marginal benefits of simultaneous exporting and innovating increase with the growing productivity of firms.

The findings by Cieślik et al. (2014) corroborate the importance of a firm’s characteristics for export performance in the Central and Eastern European countries, including Poland. According to Cieślik et al. (2014), the financial support assigned to R&D and innovation activities in the transition economies should markedly improve the export performance of firms.

It should be stressed, however, that most of the studies on heterogeneous firms treat the notion of innovation in a very simplified manner, limited only to in-house R&D activity (e.g. Cieślik et al. 2014).

In his study of small Italian firms in non-R&D intensive industries, Sterlacchini (1999) found that the probability of being an exporter was positively affected by a firm’s size, and negatively by its role as a subcontractor or subsupplier. At the same time, innovative non-R&D activities, and in particular expenditure on design, engineering and pre-production developments, had a significant and positive impact on the share of exports in the firm’s sales.

Wakelin (1998) conducted an interesting study on a sample of British firms to analyse the export behaviour of both innovating and non-innovating firms. Export behaviour was defined both as the probability of a firm engaging in export and the propensity for exporting of firms already engaging in exports (export intensity). Contrary to expectations, non-innovative firms were found more likely to export than innovative ones. By contrast, larger innovators were found more likely to enter foreign markets. On the other hand, small innovators with one or two innovations were less likely to export, and more likely to service the domestic market alone. According to Wakelin (1998), the sunk costs associated with foreign market entry could be prohibitive for smaller innovative ones. Nevertheless, the number of past innovations had a positive impact on the probability of an innovative firm engaging in exports. At the same time, the improved quality of the sectoral innovation systems observably enhanced the export activity of both innovative and non-innovative firms. Wakelin (1998) concluded that the capacity to innovate significantly changed a firm’s behaviour as compared to non-innovators.

Roper and Love (2002) analysed the determinants of the export performance of UK and German manufacturing plants and found significant differences between them.
In particular, non-innovators differed from innovators in the absorption of spillover effects. Product innovation had a strong and positive impact on export probability and propensity in both countries. Although, on average, innovative activity was higher in Germany, the scale of innovative activity had a positive impact on export propensity in the UK, while it was negative in Germany. Surprisingly, the proximity of other innovative firms was found to lower the propensity of other firms for export.

Basile (2001) analysed the export behaviour of Italian manufacturing firms and found that innovation capabilities were among the key competitive factors and largely explained their heterogeneity in this regard. The export intensity of innovating firms was consistently higher than that of non-innovators.

Nassimbeni (2001) conducted an empirical analysis using a sample of 165 small Italian manufacturing firms to compare exporters and non-exporters in terms of technology, ability to innovate and a number of other structural factors (such as the firm’s size or age). The propensity of small firms to export was closely linked to their ability to innovate and develop products and create valid inter-organisational ties, while it was to a lesser extent related to a given firm’s technological profile. The firm’s larger size or longer age increased its propensity for export. Arguably, if product and process innovations are taken into account, product innovations are of greater importance for small exporters since they offer possibilities for entering into a foreign market and successfully competing against the local players. A wider product range and the ability to offer new products was proved to be as important. Nassimbeni also stressed that exporters, when faced with more heterogeneous market demands and fiercer competition, have more incentives to improve their product innovation or customisation capability.

Guan and Ma (2003) analysed several aspects of the innovation capability of Chinese firms and their export performance in a panel of 213 manufacturing industry firms. They found that export growth was related to the improvement of several innovation dimensions, except for the manufacturing capability. The domestic market share proved to be irrelevant, while the impact of productivity growth rate (effectiveness or productivity) was robust and significant. At the same time, larger firms demonstrated a stronger export competitiveness potential. Guan and Ma (2003) concluded that core innovation assets (R&D, manufacturing and marketing) could not alone lead to a sustainable export increase. Supplementary assets are additionally required to gain a sufficient level of competitiveness in more demanding international markets.

In their analysis of the export performance of Chinese firms, DiPietro and Anoruo (2006) showed that interaction and harmonisation of various innovation assets available at the level of firms are the primary factors in the improvement of international competitiveness. They came to a major conclusion concerning the next generation of export promotion policies - that they should include measures aimed at creating a favourable environment for creativity and innovation. The level of internationalisation and the potential for innovation can therefore be said to be closely interlinked.
Concluding remarks

As noted in the introductory part of Chapter 3, international trade as a practical activity of man is as old as mankind itself and has thrived without theory. Nonetheless, it represents such an essential part of activities undertaken by people participating in economic processes that theory of trade underpins international economics and economics as a whole.

Theory of international trade has evolved for centuries and embraced many new seams. It does not mean that the initial elemental concepts have been discarded or gone into oblivion - they now serve as points of reference allowing for comparisons to be made between research findings or are re-discovered in new, creative forms or re-interpretations.

It should be noted that the concepts formulated in early trade theories, such as absolute/comparative advantage, factors proportion and many others, are the contemporary lingua franca for researchers studying the nature, causes and consequences of international trade.

Researchers would perceive the so-called basis for international trade in various factors, e.g. differences in labour productivity; dissimilar proportions of factors endowment; economies of scale; different country ranks on the so-called technological advancement ladder. Some of the theories (such as H-O-S) identified the causes of trade in the differences between countries, while others (such as intra-industry trade) – in the similarities between them. An important seam of research has investigated the role of entities with foreign shareholdings in the creation of trade streams.

When we look at the contemporary research on trade between countries, we will notice that 3 seams of research deserve particular attention. These include: theory of intra-industry trade, theory of gravity and the so-called new new trade theory. They represent points of reference for the bulk of the research being undertaken today.

Intra-industry trade is the type of exchange taking place between countries that are similar to one another, e.g. in terms of GDP per capita. It is also a consequence of the operation of multinational corporations. In the case of Poland, analysis of intra-industry trade, its intensity and determinants is of pivotal significance mainly because of the country’s EU membership, its closing the (developmental) gap to the “old” EU Member States and a vital role of entities with foreign shareholdings, especially in the country’s exports and imports.

Initially underestimated by economists as devoid of sound theoretical underpinnings and rarely used in empirical research, contemporarily the gravity concept has practically become the standard tool for analysis. This has primarily been due to its empirical utility allowing the incorporation of many factors affecting trade, and the resultant flexibility of application. The undertakings of economists in the recent years relating to the application of the concept of gravity suggest that more and more sophisticated estimation methods of econometric models are being sought. Such methods take into account further, complex factors that go beyond pure economics and affect the intensity of trade between countries.
The third concept, the so-called new new theory, is a dynamically developing seam of research that seeks factors differentiating exporters from non-exporters. Its revolutionary aspect lies in the fact that it sees the causes of trade between countries in specific characteristics of individual businesses. In empirical terms, its usefulness for interpreting Poland's foreign trade will increase along with the much-expected improved availability of statistical data on individual business entities.
Chapter 4

Poland’s intra-industry trade, its decomposition and determinants. A model approach

This chapter presents the findings from empirical analyses of Poland’s foreign trade. First comes a review of the empirical literature on intra-industry trade. It is followed by a discussion of the findings from the analysis of Poland’s intra-industry trade (IIT) based on the level of technological advancement, and from the econometric analysis of the determinants of IIT intensity. The final part is a presentation of the estimations of Poland’s trade determinants calculated using the gravity model.

Tomasz Brodzicki

4.1. Review of empirical literature

Chapter 3 outlines the theoretical underpinnings of intra-industry trade, while Chapter 5 provides findings from empirical studies. Due to an extensive bibliography covering IIT issues, only selected publications have been discussed.

The first notable study on IIT determinants was conducted by Loertscher and Wolter (1980), who analysed trade between OECD countries in the years 1972-1973, in general terms and for the NACE 3-digit level of sectoral disaggregation. The authors used both weighted and unweighted IIT indices, and concluded that the overall model fit was too low. The results showed that the following factors had a positive impact on IIT intensity: average development level; size of the economy; shared border; one language group, and membership of an integration grouping. The negative factors included distance and disparities in the level of economic development, and differences in the size of the trade partners.

Using a cross-section model estimated with the NLS method, Balassa (1986) analysed the determinants of IIT trade intensity of the USA with 37 trade partners at the level of sectors. It was found that the specific characteristics of individual sectors played an important role. IIT was positively influenced by such factors as: degree of product heterogeneity; marketing expenditure; variability of profitability rates (other measures of product heterogeneity), and the extent of offshoring, and negatively – by economies of scale and degree of industry concentration which, in Balassa’s opinion, reflected product standardisation, FDI flows and transport costs. IIT is higher for more open partners, and lower where disparities in the size of the economies and development levels, as well as distance, are greater.
Bernhofen (1999) analysed the determinants of IIT in one sector of the US economy based on the trade with the Federal Republic of Germany’s petrochemical sector in the years 1988-1992, and he positively verified its oligopolistic IIT model. The empirical findings were consistent with the theoretical insights. He found that structural variables such as the differences between countries related to cost-effectiveness, market size and market concentration negatively impact the intensity of intra-industry trade. In other words, the greater the structural homogeneity (similarity), the higher the intensity of intra-industry trade.

Cieślik (2000) was the first researcher to carry out an extensive econometric analysis of Poland’s IIT determinants. The period covered by the analysis was relatively short and spanned the years 1992 to 1996. The author concluded that the role of IIT in Poland’s trade relations is relatively prominent, and on the increase. Intra-industry trade was of particular importance in the group of products with a high physical capital content, and was least important in the group of labour-intensive goods. Using panel data, the author also empirically verified the hypotheses proposed by Helpman (1987), and by Hummels and Levinsohn (1995). The analysis confirmed the Hummels and Levinsohn paradox (1995), which identified a statistically significant and positive impact of the differences in the relative factor endowment between countries on the share of IIT. When an additional explanatory variable correcting the previous model was included, the paradox disappeared.

A study by Cieślik (2000) found that the geographical distance between trade partners was a statistically significant determinant of Poland’s intra-industry trade. It should be stressed, however, that Cieślik employed relatively simple panel methods that were in use at the time, which could bias the findings from his analysis. Other than that, he did not decompose intra-industry trade into horizontal and vertical components.

Pugacewicz and Wincenciak (2007) stressed that an increased intensity of Poland’s intra-industry trade with better-developed countries (EU15) can be explained both by higher rates of growth of per capita income (accelerated income convergence) and reduced differences in the capital to labour (K/L) ratio.

In another study, Cieślik (2008) evaluated the role of multinational enterprises from the OECD countries in the fragmentation of production processes in Poland using an econometric model, looking at their impact on IIT. The results obtained using the least squares method (OLS) indicated a positive correlation, although they were no longer statistically significant in the panel specification with fixed and random effects (after the inclusion of country-pair specific effects).

It should be stressed, however, that there have been relatively few empirical studies discussing the determinants of vertical and horizontal intra-industry trade.

Czarny and Śledziewska (2009) evaluated the role of vertical and horizontal IIT in Poland’s trade relations with individual trade partners, although they did not perform an econometric analysis of the determinants of such trade. A similar approach was taken by Brodzicki (2013), who analysed the IIT, HIIT and VIIT of Poland and the remaining Visegrad Group countries with different groups of trade partners – the EU15, other new EU Member States, within the Visegrad Group and with the rest of the world.
In their analysis of the potential impact of relative factor endowment on the structure of IIT, Martin-Montaner and Rios (2002) demonstrated that it affects the scope of vertical IIT. Spain exports inferior-quality varieties of products to the northern OECD countries, which are more developed and have higher levels of physical and human capital endowments, and superior-quality ones – to the southern, less-developed countries. This means that Spain is not capable of competing in relation to higher-quality varieties of goods in more demanding markets. The structure of exports, and thereby indirectly of production, is adjusted to the existing conditions and needs of a specific trade partner.

Janda and Munich (2004) analysed the IIT determinants and components for the Czech Republic and highlighted a significant role of labour market factors, including remuneration levels. Higher wage levels reduce the intensity of intra-industry trade mostly due to their negative impact on vertical IIT, which prevails in Czech trade. In this case, their positive impact on the Czech horizontal IIT is of lesser importance. Their findings, however, should be treated with caution owing to a small size of the sample (only 81 observations), and to the structure of the models which did not include the standard variables suggested by the literature on the subject.

A very interesting econometric analysis of the determinants of both vertical and horizontal IIT for Poland and other Visegrad Group countries for the period 1995-2010, using both a panel and cross-section approach, was carried out by Ambroziak (2013). The author’s particular focus was on the role of FDI flows in determining the HIIT and VIIT of the Visegrad Group countries as a whole and of its individual members, notably Poland. In order to analyse the robustness of the selected estimation method, the author employed 5 different methods in his study, including pooled OLS, White’s heteroscedasticity-adjusted covariance, the Hausman-Taylor model, FGLS and PSCE, the latter being considered the most important. The estimation was made separately for the Visegrad Group countries, its individual members and specific years. While appreciating the attempt to evaluate the sensitivity of the results to the selected estimation method, we are of the opinion that the best solution would be to use one, optimum method chosen on the basis of sound methodological premises.

The estimation results for Poland were found to depend on the estimation method selected for the model (Ambroziak 2013: Table 3.9, pp. 170-171). In Poland, the level of aggregate FDI from the trade partner’s country has a positive impact on both vertical and horizontal IIT. A similar situation could be observed for the impact of the trade partner’s size. The impact of the differences in GDP volume on HIIT and VIIT proved statistically insignificant. By contrast, the impact of the differences in per capita GDP was found to be positive for VIIT and negative for HIIT only in several specifications and estimation methods. The impact of the geographical distance proved to be negative, and that of the shared border – positive, though statistically significant only for HIIT. The impact of the variables capturing different aspects of integration processes such as FTA or EU membership on both vertical and horizontal IIT proved both statistically significant and positive.

It should be emphasised that the goodness of fit in the models in Ambroziak’s study was average or low (Ambroziak 2013). It was higher in the case of the horizontal
model in relation to the vertical IIT model and was largely dependent on the selected estimation method.

4.2. Methodology of IIT analysis

The analysis was primarily based on the Grubel-Lloyd index, which is the most popular tool used in empirical studies to measure intra-industry trade. It is given by the following formula:

\[ IIT_{R,P,j,t} = 1 - \frac{\sum_{R} \sum_{P} \sum_{i \in j} |X_{R Pit} - M_{R Pit}|}{\sum_{R} \sum_{P} \sum_{i \in j} (X_{R Pit} + M_{R Pit})}, \]

where:
- \( IIT_{R,P,j,t} \) – IIT ratio of country \( R \) to country \( P \) for product \( i \) in section \( j \) and year \( t \),
- \( X_{R Pit} \) – exports from country \( R \) to country \( P \) of product \( i \) in year \( t \),
- \( M_{R Pit} \) – imports of country \( R \) to country \( P \) of product \( i \) in year \( t \).

The Grubel-Lloyd index may assume values from 0 to 1. If it is 1, it means that exports equal imports within a given industry, and the whole trade takes place within one industry (intra-industry trade). On the other hand, if within a given industry a given country only imports or exports a product, the value of the index is 0 – we then deal with inter-industry trade.

The concept of how to measure the flows of vertical and horizontal IIT was developed by Greenaway, Hine and Milner (1994). They assumed that the differences in the quality of products are reflected in price differentials, which roughly reflect the value of the units of goods under analysis. Under the conditions of perfect information, a variety of a commodity sold at a higher price must be “worth more”, and therefore must be of a higher quality than the cheaper varieties. Greenaway, Hine and Milner (1994) proposed to distinguish horizontal and vertical trade based on the comparison of unit values (UV - unit value) of exports and imports, measured e.g. in USD/kg.

\[ UV^X_{R Pit} = \frac{X_{R Pit}}{QX_{R Pit}} \]

\[ UV^M_{R Pit} = \frac{M_{R Pit}}{QM_{R Pit}} \]

where:
- \( UV^X_{R Pit} \) – unit value for product \( i \) exported from country \( R \) to country \( P \) in year \( t \),
- \( UV^M_{R Pit} \) – unit value for product \( i \) imported to country \( R \) from country \( P \) in year \( t \),
- \( X_{R Pit} \) – exports from country \( R \) to country \( P \) of product \( i \) in year \( t \),
- \( M_{R Pit} \) – imports of country \( R \) to country \( P \) of product \( i \) in year \( t \),
- \( QX_{R Pit} \) \& \( QM_{R Pit} \) – quantities of exports and imports of product \( i \).
In this study, the unit value was calculated separately for exports and imports, as the ratio of the value of trade in EUR to the trade quantity in supplementary units. Then, the relative unit value (RUV), as the ratio of UVx to UVm, was calculated for individual product categories.

Following Fontagné and Freudenberg (1997), the relative unit value (RUV) can be used to allow trade in a given product to be classified as HIIT or VIIT. For a product to be recognised as horizontally differentiated, the similarity criterion needs to be fulfilled, whereby the difference between unit values of exports and imports will be small. The similarity criterion is expressed as:

\[ \frac{1}{1 + \alpha} \leq \frac{UV^X_i}{UV^M_i} \leq 1 + \alpha, \]

where the dispersion factor \( \alpha \) is typically 15% or 25%.

When the conditions listed below are fulfilled, we can speak of, respectively, horizontally and vertically differentiated trade in low-quality products (down-market specialisation) and vertically differentiated trade in high-quality products (up-market specialisation).

The conditions in question may be expressed in the form of the following function:

- horizontal IIT

\[ \frac{1}{1 + \alpha} \leq \frac{UV^X_{R PIT}}{UV^M_{R PIT}} \leq 1 + \alpha \]

- vertical IIT (low quality)

\[ \frac{1}{1 + \alpha} \leq \frac{UV^X_{R PIT}}{UV^M_{R PIT}} \]

- vertical IIT (high quality)

\[ \frac{UV^X_{R PIT}}{UV^M_{R PIT}} \leq 1 + \alpha \]

Thus, for the relative unit value (average price) RUV in the range 0.85-1.15, trade was classified as horizontal, for RUV values below 0.85 and above 1.15 – as vertical, owing to considerable UV differences recorded in exports and imports. Values above 1.15 identify Poland’s specialisation in superior-quality products, i.e. up-market specialisation, whereas values below 0.85 identify Poland’s specialisation in inferior-quality products, i.e. down-market specialisation.

On this basis, specific IIT categories may be calculated, viz.:

\[ IIT_{R,P,j,t} = IIT^H_{R,P,j,t} + IIT^WL_{R,P,j,t} + IIT^WH_{R,P,j,t} \]

\[ IIT^H_{R,P,j,t} = \frac{\sum_p \sum_{i<j} \sum_{z=H} \left( X^z_{R PIT} + M^z_{R PIT} \right) - \sum_p \sum_{i<j} \sum_{z=H} \left| X^z_{R PIT} - M^z_{R PIT} \right|}{\sum_p \sum_{i<j} \sum_z \left( X^z_{R PIT} + M^z_{R PIT} \right)} \]
4. Poland’s intra-industry trade, its decomposition and determinants...

\[
IIT_{WL}^{\text{R,P},j,t} = \frac{\sum_R \sum_p \sum_{i\in j} \sum_{z\in WL} (X_{R,Pit}^z + M_{RPit}^z) - \sum_R \sum_p \sum_{i\in j} \sum_{z\in WL} X_{R,Pit}^z - M_{RPit}^z}{\sum_R \sum_p \sum_{i\in j} \sum_z (X_{R,Pit}^z + M_{RPit}^z)}
\]

\[
IIT_{WH}^{\text{R,P},j,t} = \frac{\sum_R \sum_p \sum_{i\in j} \sum_{z\in WH} (X_{R,Pit}^z + M_{RPit}^z) - \sum_R \sum_p \sum_{i\in j} \sum_{z\in WH} X_{R,Pit}^z - M_{RPit}^z}{\sum_R \sum_p \sum_{i\in j} \sum_z (X_{R,Pit}^z + M_{RPit}^z)}
\]

where:

- \(z\) – is one of three categories dependent on a given type of trade,
- \(H\) – two-way trade in horizontally differentiated products,
- \(WL\) – two-way trade in vertically differentiated low-quality products,
- \(WH\) – two-way trade in vertically differentiated high-quality products.

The data were derived from COMEXT, the Community database on international trade. It was conducted using the 8-digit combined nomenclature CN code, the level of disaggregation required for studies of intra-industry trade.

The definition of intra-industry trade means that only mutual export and import of products with similar technical parameters can be regarded as intra-industry trade. Detailed trade data on a sufficiently high level of disaggregation are the best way to avoid empirical problems associated with sectoral aggregation.

First, such data help to avoid interpretation errors resulting from the disaggregation level being too low. It means that currently most processed products are so differentiated that the study should be carried out while taking into account their various categories. Second, such a study can produce good estimates of unit values of the commodities.

The proposed research method minimises the flaws arising from sectoral aggregation owing to the use of data disaggregated as much as possible, which also reflect product differentiation, minimise geographical inaccuracies thanks to the analysis of bilateral trade, and make a distinction between horizontal and vertical intra-industry trade. The indices were calculated separately for each of Poland’s trade partners.

Krystyna Gawlikowska-Hueckel, Katarzyna Śledziwska

4.3. Intra-industry trade in Poland

4.3.1. Intra-industry trade by the level of technological advancement

As mentioned in the Introduction, the volume of intra-industry trade is one of the criteria used to assess real convergence between countries. The ability to generate trade flows as part of such exchange can also be viewed as a token of a country’s inclusion in the international division of labour, which is based on sectors (industries) and in itself demonstrates considerable specialisation. For this reason, the study of IIT was carried out for groups of countries differing in the levels of income and innovation (the acronyms used here are explained in the Annex).

An analysis of data suggests (Fig. 53) that intra-industry trade of HT goods on the largest scale takes place within the E12_n_PIGS and E15_n_Ez groups of countries.
In 2014, the level of the index for Poland differed substantially from that for the above groups of countries, but was slightly more favourable than that for the VIS countries.

Figure 53. IIT index for selected groups of countries by the technological advancement of exported goods in 2013 (left panel) and its changes from 2004 (right panel)
Source: author’s own calculations.

Figure 54. IIT indices for Poland and EU for trade in HT goods in 1999-2013
Source: authors’ own elaboration based on Eurostat data.

In 2013, Poland had a relatively greater participation in this trade in the category of MHT products, on a scale that can be compared to that of the E12_n_PIGS group and is higher than in the Visegrad Group.

An analysis of the IIT index for HT products in the period 1999-2013 indicates that the extent of Poland’s participation in this trade is on the rise. In 1999, the IIT
index for Poland was 13.31 (compared to -44.04 for the EU28), growing to 34.18 in 2013, compared to the EU28’s 43.39. The index recorded the largest increase in 2008; its value dropped in 2009-2011 and rebounded in 2012 and 2013.

These changes should be viewed as positive since they demonstrate Poland’s increasing participation in intra-industry trade, a process which is possible only at a certain level of technological development and which proves a country’s ability to cooperate with foreign partners.

**Figure 55.** IIT indices for Poland and the EU28 in HT trade in 1999, 2004, 2009 and 2013 (left panel) and their changes in selected years (right panel) (PAR: the world)

Source: authors’ own elaboration based on Eurostat data.

**Figure 56.** IIT indices (by IIT categories) for Poland and the EU28 in HT trade in 1999, 2004, 2009 and 2013 (left panel) and their changes in selected years (right panel) (PAR: EU28)

Source: authors’ own elaboration based on Eurostat data.
Figure 55 confirms the tendencies described above. In 2004/1999, Poland increased its share in the global IIT. Interestingly, this process did not have a similar intensity or direction as in the EU28 group. In 2004/1999 and 2008/2004, the IIT index decreased for the EU28 countries, and increased in Poland.

The IIT index measures how products that are close substitutes are simultaneously exported and imported and, importantly, the determinants of such trade can vary. Firstly, products that are traded can be of a similar quality (horizontal IIT) or a dissimilar quality (vertical IIT). As part of the latter, two different scenarios are possible. In the first, high-quality products are exported and low-quality ones imported (vertical trade in high-quality goods), and in the second – the situation is reversed (vertical trade in low-quality goods). Naturally, the most desirable situation is when high-quality vertical or horizontal trade represents a substantial share of exports.

The data in Fig. 56 (left panel) show that changes in the IIT index could be observed in all types of trade, although their pace and direction was different for different IIT types. Horizontal cooperation was relatively the slowest to increase; the highest index value, of 5.19, was recorded in 2009. In 2013, it fell to 3.47 (compared to 9.62 and 9.32, respectively, in the EU28). The fastest rise could be observed in the years 2004-2009.

It should be noted that the values of all IIT types changed more dynamically in Poland than they did in the EU countries. This indicates that Poland is closing the gap as far as its inclusion in the international division of labour is concerned.

As already mentioned in Chapter 3, the characteristic feature of this type of trade is that it comprises goods of a similar level of quality, production costs, and production technology. Nevertheless, these goods are different from the buyer’s perspective and therefore profitable to manufacture.

Due to the fact that such goods are manufactured in similar conditions and satisfy the same needs (since the consumers have comparable incomes), their trade will develop mainly in the group of countries at a similar level of economic development.

The changes taking place in up-market vertical IIT are very significant. Considerable involvement in this type of trade means that high-quality goods represent the bulk of exports, whereas low-quality goods are imported. One consequence of such a trade structure is specialisation, which leads either to an increase or a decrease of the role of sectors manufacturing lower- or higher-quality products.

By the same token, in vertical trade in low-quality goods, exports are dominated by low-quality products, while high-quality goods are imported. It is worth recalling that a given type of IIT flows is generated between countries with different levels of income. In Poland, the indices both for trade in low- and high-quality products increased in 2004-2013, and the value of the index for high-quality products was higher than that for low-quality products (8.4 and 7.1, respectively). These values did not grow equally for individual types of trade and differed from year to year. For instance, the IIT index for high-quality products increased considerably in the years 2004-2009, and grew on a distinctly smaller scale in the years 2009-2013.

The changes in the index values for IIT in high- and low-quality products had varying rates of intensity in the individual periods.
The data shown in Fig. 57 show the differences observable in HT goods in intra-industry trade in Poland and the EU28 which, however, gradually decreased in the years 1999-2013. In 2004-2013, the index for Poland increased by 11.9 percentage points, and that for the EU28 - by 2.15 percentage points. In the EU28, the scale of intra-industry trade is also increasing, but not as considerably as it did in the years 2004-2013.

Figure 57. IIT indices for Poland and the EU28 in HT trade in 1999, 2004, 2009 and 2013 (left panel) and their changes in selected years (right panel) (PAR: EU28)

Source: authors’ own elaboration based on Eurostat data.

Figure 58. IIT index (by IIT categories) for Poland and the EU28 in HT trade in 1999, 2004, 2009 and 2013 (left panel) and their changes in selected years (right panel) (PAR: EU28)

Source: authors’ own elaboration based on Eurostat data.
In 1999-2013 (40.3 in 1999, as compared to 41.2 in 2012). In the periods 1999-2004 and 2004-2009, its value contracted. A comparison of the level of the indices for Poland and the EU28 suggests that Poland is closing in on the EU and is increasingly participating in HT trade.

The process of Poland’s closing the gap to the EU28 regarding the different types of IIT proceeded at varying pace, being slowest in horizontal trade. According to theory, this could suggest that income differences between the countries are still so wide that trade in products of similar quality, manufactured in similar technological conditions, cannot thrive on a large scale.

At the same time, the volume of trade in high- and low-quality products increased; a rise in the index for high-quality goods can be interpreted as a positive change since it means that Poland has gradually boosted the exports of such products, while importing low-quality goods.

![Figure 59](image)

**Figure 59.** Differences between IIT for Poland, the EU28 and VIS by IIT categories in selected years

Source: authors’ own elaboration based on Eurostat data.

In 1999, the index for vertical trade in low-quality goods was 6.57, compared to 11.83 in 2013. Figure 58 shows that changes in its value had a varied intensity in different periods.

The data shown in Fig. 59 corroborate the earlier conclusions that the differences in the indices characterising various types of intra-industry trade between Poland and the EU28 have been on the decrease. This has been a constant process, with a tendency for the gap to reduce being observable throughout the 1999-2013 period. There are small differences between the IIT indices for the remaining Visegrad Group countries. They
were very low \textit{(in minus)}, but in the years 1999-2013 Poland was able to eliminate them and achieve IIT index values slightly above zero in all the categories, which, however, does not have to be a desirable phenomenon in the case of vertical IIT in low-quality products.

4.3.2. IIT index for HT trade for Poland in exports to groups of countries with which Poland has different types of trade agreements

![Figure 60. IIT index for Poland\'s trade with selected groups of countries and groupings in 1999-2013](image)

\textit{Source: authors\' own elaboration based on Eurostat data.}

Poland\'s IIT index for HT trade varied considerably depending on what group of countries was involved in the exchange. It was relatively stable in the trade with the EU15 and grew consistently, from 17.4 in 1999 to 231 in 2013. A similar tendency, albeit at a slightly lower level, could be observed in the trade with the new Member States: the value of the index increased from 13.6 in 1999 to 25.7 in 2013.

![Figure 61. Levels of IIT index for Poland\'s HT trade with selected groups of EU countries and groupings in 2013, by category of IIT index](image)

\textit{Source: authors\' own elaboration based on Eurostat data.}
The trend concerning the changes in the index depicting trade covered by EIA and FTA is quite dynamic. Interestingly, the breakdown of the trend line in IIT between these two groups took place in the same years, 2007 and 2011. The index started to increase again post 2011. Throughout the analysed period, relatively the lowest index values were found for trade with countries covered by the CU agreements.

An analysis of data provided in Fig. 61 shows clearly the picture and structure of IIT in the trade between individual groups of EU countries. Such exchange is effected on the largest scale with the EU15 countries, followed by the new Member States and the Visegrad Group, and on the lowest scale – with the PIGS countries. The structure of trade between groupings also differs in terms of structure. Horizontal trade is most robust with the new Member States (8.3), EU15 (7.9) and the Visegrad Group (6.9), and weakest with the PIGS countries (3.17).

Even though these groups differ in levels of income and technological advancement, products of a similar quality are traded between them, although the scale of such trade is rather modest. The low index value for trade with the PIGS countries is somewhat surprising; the difference in the income levels between those countries and Poland is smaller than that between the EU15 and Poland. Nevertheless, it is widely acknowledged that trade patterns are also shaped by other factors (other than consumer preferences, although these are becoming more and more uniform). In the case of PIGS, such factors include for example distance or the production structure.

A comparison of indices for high- and low quality trade shows that the index for HT trade is higher than that for LT trade only in the trade with the PIGS countries (8.16 and 7.87, respectively). In contrast, the low-quality IIT index is higher in the trade with the remaining groups. These differences are not very wide, but clearly show that in 2013 Poland was much more heavily involved in the export of low-quality goods (except PIGS) and imported more high-quality goods. The theory suggests that this could point to an unfavourable specialisation. It should be added, however, that the situation regarding changes for the indices concerned is rather dynamic (Fig. 61).

In terms of the structure of trade effected under various types of agreements that Poland has entered into, its most advanced IIT cooperation could be observed with the group of countries with which it is bound by EIA, FTA and CU agreements. A comparison of the types of HT trade indicates that, for the trade with all these groups, the horizontal trade index is the lowest, and the highest – for the trade in high-quality goods (reaching 25.97 in trade with EIA and 19.12 in trade with FTA).

4.3.3. IIT index for Poland’s exports to selected countries and groups of countries

A comparison of the IIT index for 1999-2013 demonstrates that it increased for trade with all the groups of countries, a process which should be viewed as positive since it implies Poland’s greater involvement in trade in technologically advanced products. The greatest increase could be observed in HT trade with the Visegrad Group countries (7.71) and the EU15 (6.09), and the smallest – in the trade with PIGS (4.00).
The changes in the index values for horizontal trade were also on the rise, with one exception - the PIGS countries, which recorded a 3.47 decrease. It should be added, however, that the index depicting this type of trade did not increase very sharply; it assumed highest values for trade with the new Member States (2.06).

The value of the index for trade in high-quality products was highest for the PIGS (3.72), despite its decrease by 0.37 in the years 2013/2009 (right). Its value was 2.82 in

Figure 62. Changes of IIT index for Poland’s HT trade with selected groups of EU countries in selected periods (in percentage points)

Source: authors’ own elaboration based on Eurostat data.

Figure 63. IIT index (by IIT categories) in Poland’s bilateral HT trade – 10 countries with which Poland has the highest IIT index, in 2013

Source: authors’ own elaboration based on Eurostat data.
Figure 64. Changes in the IIT index for Poland’s HT trade with countries with highest IIT in 2013, in selected periods

Source: authors’ own elaboration based on Eurostat data.
the trade with the EU15, 1.70 for the NMS and 1.92 for the Visegrad Group. Similarly, the indices for trade in low-quality products were also on the rise, especially in the trade with the Visegrad Group (4.22). This suggests that despite the fact that Poland’s development level is closest to that of the Visegrad Group and NMS countries, in its trade with VIS it imports more high-quality goods and exports more low-quality goods. In the case of the NMS, the index for trade in low-quality products is also slightly higher than that for trade in high-quality products (1.70 and 1.76, respectively). Trade with these groups seems to offer particularly favourable conditions, both thanks to similar levels of development and geographical proximity.

In 2013, the highest IIT index values could be observed in Poland’s trade with the USA (51.38 for all types of trade collectively), followed by the EU28 (49.62) and Germany (40.43), which had slightly higher values than the Czech Republic, Bulgaria and Austria.

In terms of quality, the structure of trade with individual partners varied from country to country. In all the cases, however, the lowest values were recorded for horizontal trade (the highest, 8.58, with the Czech Republic, 8.12 with Bulgaria, 5.68 with the EU25 and 4.76 with Germany). For the remaining partners, it ranged from 0 to 1.59.

Vertical trade in high-quality products was at the highest level with the USA (44.40), Iceland (9.46), Germany (25.03) and France (22.02). In the case of Iceland, practically the whole of intra-industry trade comprised high-quality products; the index values were 0.05 for low-quality goods and 0.00 for horizontal trade.

High values for IIT in low-quality goods were recorded in Poland’s trade with Austria (35.57), Bulgaria (27.88), Italy (22.94) and Denmark (20.19). For the 5 major trade partners, these values are higher than those for high-quality products; the differences are very wide in the case of Austria and Bulgaria, and wide in the case of Italy and Denmark.

What should be viewed as positive is the fact that in the years 2009-2013 the IIT index increased for all the partners. This means that Poland’s participation in intra-industry trade is on the increase, which can be considered to indicate growing economic maturity and an improved competitive edge.

In the period 1999-2013, the values of the index fluctuated: they rose the most for trade in low-quality goods with the EU28, Bulgaria, Austria, Italy and Denmark, and fell only for the trade with the Czech Republic. The lowest dynamics could be observed in the index for horizontal trade, which recorded the largest increase in the case of Bulgaria (5.57) and the Czech Republic (4.32).

The situation regarding the IIT index for high-quality goods was more favourable. In the period 1999-2013, it decreased in the case of Bulgaria (-13.05), Austria (-2.08), and Denmark (-2.68), and increased for the remaining countries, particularly in the trade with the USA (38.89), Iceland (28.78), France (18.55), and Germany (14.77).

In the subsequent periods, the index values demonstrated the greatest dynamics in the years 2009-2013, a process which was most likely associated with the volatile changes observable in the markets in the post-crisis period.
Concluding remarks

In Poland, the years 2004–2013 saw an increase in the index values of intra-industry trade in HT goods of both low and high quality (by 7.1 and 8.4, respectively). A comparison of the level of the indices for Poland and the EU28 suggests that Poland is closing the gap to the EU and is increasingly participating in HT trade.

What should be viewed as positive is the fact that in the years 2009–2013 the value of the IIT index increased for all the partners. This means that the participation of firms in intra-industry trade is on the increase and that Poland’s competitive position improved in the analysed period. The index values for the individual periods varied considerably, demonstrating the greatest dynamics in the years 2009–2013. Most likely, this was associated with the volatile changes observable in the markets in the period following the financial crisis.

In 1999–2013, the values of the index for the exchange of low-quality goods increased most significantly in the trade with the EU28, Bulgaria, Austria, Italy and Denmark, whereas the figures for the trade in high-quality goods decreased for Bulgaria (by 13.05), Austria (2.08) and Denmark (2.68). For the remaining countries, the index values rose, especially for the trade with the USA (38.89), Iceland (28.78), France (18.55) and Germany (14.77).

Horizontal trade is most robust with the new Member States (8.3), EU15 (7.9) and the Visegrad Group countries (6.9), and least developed with the PIGS countries (3.17).

Most effective IIT cooperation can be observed with the group of countries with which Poland has signed EIA, FTA and CU agreements.

A comparison of the types of HT trade indicates that, for the trade with all these groups, the index value for horizontal trade is the lowest, and the highest – for the trade in high-quality goods; in the latter, it reached 25.97 in the trade with EIA and 19.12 – with FTA.

**Tomasz Brodzicki**

4.4. An econometric analysis of the determinants of Poland’s intra-industry trade

An introductory analysis of the data has already demonstrated that the obtained results are strongly biased by high IIT values for small, exotic economies with residual significance for Polish trade. Therefore, after an in-depth analysis, it was resolved that a threshold criterion would be adopted. Thus, the econometric analysis of the determinants that follows includes only those trade partners with whom the value of Poland’s trade in 1999 exceeded EUR 250M (c. PLN 1bn). This eliminated most of the problems, but reduced the size of the sample concerned.

Just as in the econometric verification of trade intensity, some serious problems in the estimation process appeared. For this reason, the semi-mixed effects approach estimated with the PPML (pseudo-Poisson maximum likelihood) method was used
one more time. As in the analyses of trade intensity based on the gravity approach, European Union (EU) membership was adopted as the clustering variable. 

The explained variables in the individual models are, respectively: IIT, HIIT and VIIT indices at the aggregated level, and therefore averaged for all the analysed product groups. 

The analysed empirical model has the following general formula:

\begin{equation}
\text{iit}_{ijt} = \exp \left[ \ln \alpha_0 + \beta_1 \ln D_{ij} + \gamma \ln X_{ijt} + \rho \ln Z_{ij} + \nu_t + \eta_{ij} \right] e_{ijt}.
\end{equation}

The aggregate intra-industry trade index, the vertical intra-industry trade index or the horizontal intra-industry trade index is the explained variable.

Due to the nature of the research question, 3 groups of models with different groups of explanatory variables will be estimated separately; these will be, respectively, the Grubel-Lloyd index for intra-industry trade (iit), and its constituents of horizontal intra-industry trade (hiit) and vertical intra-industry trade (viit). The method of calculating the indices has already been described in detail. Such an approach is justified by the review of the theoretical literature provided in Chapter 3, which demonstrated that some of the determinants have a concordant effect on vertical and horizontal trade, whereas some may have a divergent effect.

The major source of data other than commercial data from the COMEXT database reflecting the Community’s trade was the Penn World Table 8.1 dataset (Feenstra et al. 2015). The World Bank’s Governance Matters dataset was used to measure the differences in the quality of institutions (for its description see: Kaufmann et al. 2010). 

As already emphasised above, the calculated indices for IIT intensity are strongly biased (artificially elevated) for Poland’s trade with small, often exotic partners. Including them all in the sample would lower the coefficient of determination of the analysed empirical models. For this reason, an additional analysis was carried out which looked at different threshold criteria such as: intensity of trade with a partner - the value of trade in the initial year of the analysis (1999); with a partner with over €250M or €500M, or with the value of trade in individual years over €100, 200, 250, 500, 750 or 1000 million.

The adoption of different threshold values fundamentally changed the number of observations included in the model. In the model “without limitations”, 1457 observations were taken into account; with the threshold set at €500M in 1999 – 234 observations; this, with the annual thresholds, gives, respectively: 750, 610, 562, 419, 349 and 318 observations. The reduced number of observations produces an increase of the R² coefficient since outliers are eliminated. To put it in context, the coefficient of determination for the same model specification grows from 19% to over 85%. After a long deliberation, those observations were included in the model for which the trade between Poland and its trade partner exceeded €500M.

A summary of the estimations for intra-industry trade is provided in Table 9. The use of the semi-mixed effects approach meant the need to include the clustering variable in the model. As with the gravity model, EU membership was chosen as the clustering variable.

In the (i1) model, the base specification comprises the logarithm for Poland’s and the trade partner’s real GDP; the distance between the partners approximating
transport costs and other aspects of distance; similarity of GDP per capita levels (rlf), and the binary variable reflecting a higher level of integration (lower barriers to trade) approximated by FTA (free trade area). Larger economies are as a rule more diversified, therefore the probability of intra-industry trade involving the exchange of heterogeneous goods is definitely higher.

The rlf variable is defined as a natural log of the absolute difference in the real GDP per capita levels. Lower values of the variable correspond to a higher degree of similarity in the development levels. The distance is measured in accordance with the approach used in the literature of the subject as the natural log of the geographical distance between Warsaw and the trade partner’s capital city.

In the (i2) model, the size of the trade partners’ economies is shown by the average level of their real GDP (GDP AV), calculated as the natural logarithm of the arithmetic mean of Poland’s and trade partners’ real GDP. The impact of the variable on the intensity of IIT is statistically significant and positive. The impact of the distance on the explained variable is negative, and statistically significant only for models (i6) and (i7).

It should also be noted that the intensity of IIT is generally higher for trade with the Member States of the European Union.

In the next model specification (i3), variables showing other aspects of the economic integration process are added: customs unions (CU) and other economic agreements (EIA). Their impact on the explained variable is statistically significant and positive. Of the variables showing the level of economic integration, the customs union has the strongest effect on the intensity of intra-industry trade. The impact of free trade areas and other agreements is comparable.

The impact of the border, that is the proximity of Poland’s trade partners (i4), is – rather surprisingly – statistically insignificant, after the impact of other factors has been eliminated.

The subsequent model specification (i5) includes the ROL (rule of law) variable, which shows the overall quality of the institutional environment. The parameter estimates indicate a positive and statistically significant effect of the quality of the institutions of Poland’s trade partner on the intensity of IIT. It was found that the difference in the quality of the institutional environment (difROL) does not affect the share of intra-industry trade in a statistically significant way and so, it was not included in the summary of results.

The review of the literature suggests that factors associated with the overall level of innovation in a given economy and human capital endowment, a key feature at higher levels of economic development, play a major role in determining intra-industry trade. For this reason, in the (i6) model, the difference in the global expenditure on R&D activities (difGERD) was added to the base set of variables as a percentage of the country’s GDP. Due to the gaps in the GERD data, the number of observations included in the estimation was much lower. It was found that as the difference in expenditure between Poland and its trade partner increased, the intensity of intra-industry trade decreased. The result, however, is statistically significant only at a level of 10%.

Two other model specifications examined the impact of human capital (models i7 and i8). It was found that the intensity of IIT increases as the stock of human capital
Table 9. Results of empirical model estimations for total IIT

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Notes: 1) Two numbers correspond to each variable in the subsequent models: evaluation of the model’s structural parameter, and estimation errors in the brackets below; 2) Significance of parameters and odds ratio: *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: author’s own calculations using STATA 12. Model estimated with PPML. Clustering variable: EU.
(HC) in the trade partner’s country grows, and that it is positively correlated with the difference in the human capital endowment (diffHC). Human capital is measured using the Barro-Lee database embedded in PWT 8.1, understood as the average schooling period of a working-age person. The result may be a derivative of the threshold criteria adopted for the observations and included in the model.

The last three analysed specifications take into account other aspects of similarities between the trade partners. The first variable reflects the difference in the physical capital endowment and the pool of labour (K/L ratio), which is a key variable in the neoclassical H-O model. The data on the stock of capital and labour were derived from the PWT 8.1 database. It was found (see model i9) that the intensity of overall intra-industry trade is the higher, the greater the difference in the capital to labour ratio between Poland and its trade partner.

The next specification takes into account the differences in the overall productivity level, TFP. The data on the trade partners’ TFP were derived from the PWT 8.1 dataset. TFP was measured for each of the countries in relation to its value for the United States, the country at the global technological frontier. An increase in the difference in productivity levels between Poland and its trade partners has a negative effect on the intensity of intra-industry trade between the partners. In other words, the share of intra-industry trade is higher for partners at a similar overall level of productivity.

The last analysed specification focuses on another potential measure of the technological difference between the partners. Just as in the analysis provided in the chapter on the gravity model, the difference in the patent potential was included on the basis of the USPTO data. Similarly to TFP, its impact on trade intensity is negative and consistent with our expectations.

Looking at the estimated models in terms of the goodness of fit, it can be concluded that in all the cases the value of the coefficient of determination R² is average, and ranges from 33% to 49%. This means that the models can explain from 1/3 to nearly 1/2 of the variability of the explained variable.

Tomasz Brodzicki, Dorota Ciołek, Katarzyna Śledziewska

4.5. Determinants of horizontal and vertical intra-industry trade

Intra-industry trade may be decomposed into horizontal and vertical components. In the case of Poland, a country in transition, the vertical component involving significant differences in the levels of quality of the exported and imported varieties is of special importance. The share of horizontal and vertical trade differs considerably between the trade partners. In 2013, horizontal IIT played a significant part (with a share of over 10%) in the trade with the Czech Republic and Germany, and was of residual importance in the trade with such countries as Singapore or Australia (under 1%), characterised by a clear prevalence of the vertical component. It is expected that some of the potential factors indicated by the theory of trade have a similar effect on horizontal and vertical IIT, and some have an opposite effect. The results of the models’ estimations are provided in Table 10 (for HIIT) and Table 11 (for VIIT).
Compared to the general IIT model, the empirical model for horizontal intra-industry trade, i.e. exchange of similar products with differentiated varieties having a similar level of quality but horizontally diversified, has a much lower goodness of fit. In this case, the model’s goodness of fit is low and does not exceed 20% (except for the h2 specification), and can be regarded as average for the vertical trade as it ranges between 30% and 36%.

For the specifications (v1) and (h1), the measures of GDP of the trade partner and of Poland were included. In the subsequent specifications of the vertical trade model, as with the general model analysed above, the log of the average GDP values for trade partners was used. In the case of the horizontal IIT model, the original values were used. It is clearly visible that Poland’s real GDP has a positive impact on the explained variable in the horizontal trade model, while the effect of real GDP for the trade partner is positive although statistically negligible.

In both models, and consistently with expectations, the impact of the distance is negative and statistically significant only for several specifications.

As expected, the trade partner’s EU membership has a positive effect on the intensity of both horizontal and vertical intra-industry trade.

The impact of similar GDP per capita values, and therefore of similar development levels measured with the c2 variable, is significant for vertical intra-industry trade and positive, but statistically negligible for horizontal IIT. On theoretical grounds, we expected that the impact would be statistically significant and negative, i.e. a greater difference should reduce the share of this trade component.

The extended specifications of the base models (h2 and v3) indicate a considerable role of the economic integration process, having the form of free trade areas, customs unions or other economic agreements, in the fostering of intra-industry trade. Their impact on the explained variables is statistically significant and positive, although visibly stronger for horizontal IIT. The impact of immediacy, that is of a shared border, is statistically significant for vertical IIT, and negative and insignificant for horizontal IIT.

In the subsequent specifications, as in the original model, the effect of the quality of institutional environment was controlled for. It was found that the quality of the trade partner’s institutions had a positive effect only on vertical IIT (v5 and h4). In contrast, the difference in the quality of institutions is statistically significant only for horizontal IIT, and its impact is negative. The trade partners at a similar level of institutional quality have a higher share of the horizontal component in their intra-industry trade.

The level of innovation, and in fact the level of expenditure on innovative activities (input index), was another factor under analysis. It was found that an increase in the differences in GERD, ceteris paribus, has a statistically significant effect (at a level of 10%) and a negative effect on the intensity of both vertical and horizontal IIT.

The trade partner’s greater stock of human capital stimulates the intensity of horizontal IIT, and so does a greater difference in human capital stock in comparison to Poland (v8 and v9). No statistically significant impact of these factors on the horizontal component of intra-industry trade was observed.

As with the general model, the final group of analysed model specifications are those associated with differences in basic factor endowments such as: K/L ratio, total
Table 10. Results of empirical model estimations for horizontal IIT (HIIT)

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4. Poland’s intra-industry trade: its decomposition and determinants...
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Notes: 1) Two numbers correspond to each variable in the subsequent models: evaluation of the model’s structural parameter, and estimation errors in the brackets below; 2) Significance of parameters and odds ratio: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: author's own calculations using STATA 12. Model estimated with PPML. Clustering variable: EU.
Table 11. Results of empirical model estimations for vertical IIT (VIIT)

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<tr>
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<th>(v1)</th>
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<th>(v10)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Partner's GDP</td>
<td>0.0702** (0.0321)</td>
<td></td>
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<tr>
<td>Poland's GDP</td>
<td>1.092*** (0.149)</td>
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<tr>
<td>AV GDP</td>
<td>0.196*** (0.0588)</td>
<td>0.204*** (0.0587)</td>
<td>0.227*** (0.0685)</td>
<td>0.198*** (0.0588)</td>
<td>0.182*** (0.0612)</td>
<td>0.241*** (0.0869)</td>
<td>0.201*** (0.0571)</td>
<td>0.190*** (0.0586)</td>
<td>0.196*** (0.0582)</td>
<td>0.212*** (0.0557)</td>
<td>0.192*** (0.0581)</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>-0.0900 (0.0618)</td>
<td>-0.0907 (0.0645)</td>
<td>-0.0430 (0.0821)</td>
<td>-0.142* (0.0649)</td>
<td>-0.0862 (0.0667)</td>
<td>-0.154 (0.129)</td>
<td>-0.133** (0.0626)</td>
<td>-0.146** (0.0609)</td>
<td>-0.0944 (0.0634)</td>
<td>-0.0691 (0.0609)</td>
<td>-0.107 (0.0651)</td>
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</tr>
<tr>
<td>EU</td>
<td>0.459*** (0.0630)</td>
<td>0.527*** (0.0631)</td>
<td>0.688*** (0.0831)</td>
<td>0.488*** (0.0674)</td>
<td>0.324*** (0.0822)</td>
<td>0.518*** (0.0698)</td>
<td>0.375*** (0.115)</td>
<td>0.468*** (0.0678)</td>
<td>0.486*** (0.0642)</td>
<td>0.464*** (0.0598)</td>
<td>0.594*** (0.0709)</td>
<td>0.447*** (0.0805)</td>
</tr>
<tr>
<td>Rif</td>
<td>0.179*** (0.0323)</td>
<td>0.166*** (0.0323)</td>
<td>0.175*** (0.0320)</td>
<td>0.149*** (0.0313)</td>
<td>0.0519* (0.0309)</td>
<td>0.166*** (0.0374)</td>
<td>0.0797*** (0.0244)</td>
<td>0.163*** (0.0310)</td>
<td>0.182*** (0.0340)</td>
<td>0.181*** (0.0315)</td>
<td>0.173*** (0.0327)</td>
<td>0.133*** (0.0370)</td>
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<tr>
<td>FTA</td>
<td>0.589*** (0.0726)</td>
<td>0.625*** (0.0728)</td>
<td>0.556*** (0.0731)</td>
<td>0.619*** (0.0714)</td>
<td>0.486*** (0.0760)</td>
<td>0.624*** (0.0778)</td>
<td>0.413*** (0.151)</td>
<td>0.512*** (0.0687)</td>
<td>0.542*** (0.0652)</td>
<td>0.613*** (0.0702)</td>
<td>0.681*** (0.0765)</td>
<td>0.570*** (0.0780)</td>
</tr>
<tr>
<td>CU</td>
<td>0.699*** (0.0843)</td>
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<tr>
<td>EIA</td>
<td>0.441*** (0.146)</td>
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<tr>
<td>Border</td>
<td></td>
<td>0.699*** (0.0843)</td>
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<tr>
<td>ROL</td>
<td></td>
<td>0.229*** (0.0486)</td>
<td></td>
<td></td>
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<tr>
<td>DiffROL</td>
<td></td>
<td>0.0108 (0.0191)</td>
<td></td>
<td></td>
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<tr>
<td>DiffGERD</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>-0.0341* (0.0203)</td>
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4. Poland's intra-industry trade: its decomposition and determinants...
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<th>(v9)</th>
<th>(v10)</th>
<th>(v11)</th>
<th>(v12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>DifHC</td>
<td>Ln dKL</td>
<td>Ln dITFP</td>
<td>ln dCUMP</td>
<td>Constant</td>
<td>Observations</td>
<td>R2</td>
<td>Notes:</td>
<td>Source:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.188*</td>
<td>0.0489***</td>
<td>0.0489***</td>
<td>-0.715***</td>
<td>-0.0939</td>
<td>-18.61***</td>
<td>418</td>
<td>0.364</td>
<td>1) Two numbers correspond to each variable in the subsequent models: evaluation of the model's structural parameter, and estimation errors in the brackets below; 2) Significance of parameters and odds ratio: *** p &lt; 0.001, ** p &lt; 0.05, * p &lt; 0.1.</td>
<td>author's own calculations using STATA 12. Model estimated with PPML. Clustering variable: EU.</td>
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</table>
productivity level TFP, and the technological or innovative potential measured by the capacity to patent at the global technological frontier, at the USPTO (output index). The comparison of results in Tables 10 and 11 show that an increase in the difference in the K/L endowments increases the vertical component of intra-industry trade, while simultaneously reducing the significance of the horizontal component (h9 and v10), which is consistent with our expectations and theoretical tenets. An increase in the TFP level has a negative impact on the vertical component, which is also statistically negligible for the horizontal component (h10 and v11). A greater difference in the innovative potential in the analysed sample has no statistically significant effect on either of the main components of intra-industry trade.

Concluding remarks

Intra-industry trade plays an increasing role in Poland’s trade. Its significance will grow together with increasing development convergence. It should be emphasised that the share of IIT in the trade relations with individual partners is strongly diversified, although the underlying causes of this phenomenon have not as yet been thoroughly explained in the Polish literature, with the exception of a study by Ambroziak (2013). Likewise, the factors determining the share of the horizontal and vertical components in the IIT structure have not been fully identified. This Chapter is intended to fill in this cognitive gap, and thereby identify, with the use of econometric methods, the determinants of Poland’s intra-industry trade with its trade partners in the relatively long period 1999-2013 and its components: vertical and horizontal.

In decomposing intra-industry trade, we used the approach developed by Greenaway et al., based on the concept of relative unit values. The sound rationale of the decomposition of IIT into its components should be stressed once again, also because of the wide disparities in the role of HIIT and VIIT in the trade with various groups of trade partners and a dissimilar impact of some of the determining variables.

As in gravity models, the estimation procedure proposed by Savaşçı (2011), the mixed effect PPML, was used. In the panel model, where the share of IIT is the explained variable, the effects typical of pairs of countries were added as random effects representing unobserved factors characterising the trade relations between individual partners. Since the assumptions of the model with random effects were not fulfilled, we used Lombardía and Sperlich’s approach (2011) with semi-mixed effects that introduced an additional clustering variable.

The obtained results are essentially in line with our expectations and theoretical tenets. They are also consistent with the results of earlier empirical studies carried out for Poland, and obtained inter alia by Cieślik (2000) and Ambroziak (2013).

4.6. Determinants of the intensity of Poland’s trade. The gravity approach

4.6.1. Methodology of the gravity model estimation

The literature offers many examples of theoretical and empirical analyses that discuss the estimation procedures for the gravity models of bilateral trade, which draw on both
cross-sectional and panel data.\textsuperscript{1} The discussion deals with the accurate specification of the gravity model on the one hand, and on the other – with the proper method for estimating the parameters. As explained above, the basic formula for the gravity model for trade consistent with the traditional approach proposed by Tinbergen (1962) assumes that the trade flows from country $i$ to country $j$, marked as $T_{ij}$, are proportional to the GDP of partner countries ($Y_i$, $Y_j$) and inversely proportional to the distance between them. However, account should be taken of the fact that trade is substantially different from physical gravity. According to Anderson and van Wincoop (2003), the gravity model is not accurately defined as long as it does not include the variables representing individual characteristics of the exporting and importing countries that can be relevant in a given context. Furthermore, the value of trade is fraught with uncertainty associated with business activity and social processes, and for this reason the variable in question should be regarded as a stochastic process.

In the majority of empirical studies, gravity models take into account many additional variables (economic, sociological or geographical) that can affect the intensity of bilateral trade. The set of explanatory variables includes, firstly, qualitative factors, constant in time and characterising a given pair of countries $(i,j)$, marked as $D_{ij}$, secondly, quantitative variables $Z_{ij}$, also constant in time and, thirdly, variables which are not constant in time and assume different values in both countries, marked as $X_{ijt}$. In addition, when modelling applies to panel data, it is possible to include unobserved periodic effects for the subsequent years $(t)$, specific effects for a given country $(i)$, but also effects typical of pairs of countries $(i,j)$. All of these effects can be regarded both as fixed effects (constant in time) or random effects.

Such models can be termed three-way effect panel data models, and in this case the stochastic version has the following form:

\begin{equation}
T_{ijt} = \alpha_0 Y_{it}^\alpha Y_{jt}^\beta Z_{ij}^\gamma X_{ijt}^\delta + v_t + \eta_{ij} + \epsilon_{ijt},
\end{equation}

where $v_t$ are time effects reflecting potential economic cycles, $\eta_{ij}$ are unobservable heterogeneous effects, and $\epsilon_{ijt}$ is the error term.

In turn, $\alpha_0$, $\beta_1$, $\beta_2$, $\gamma$, $\alpha$, $\delta$ are the model’s structural parameters which need to be estimated.

The literature on trade has a long tradition of log-linearisation of equation (10) and estimating the parameters that are of interest, using the Least Squares Method (LSM) in the form of the following equation:

\begin{equation}
\ln T_{ijt} = \ln \alpha_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \gamma \ln Z_{ij} + \alpha \ln X_{ijt} + \delta D_{ij} + v_t + \eta_{ij} + \ln \epsilon_{ijt}.
\end{equation}

However, according to Santos Silva and Tenreyro (2006), the validity of using this estimator mainly depends on fulfilment of the condition that the explanatory variables in the model are not conditional on $\ln \epsilon_{ijt}$. If this assumption is not fulfilled, the LMS
estimator becomes inconsistent and biased. To date, this issue has been largely left out of both theoretical and empirical analyses. What is more, most gravity models are characterised by heteroscedasticity, i.e. unequal variability, even if the individual effects are controlled. The variance of error $\varepsilon_{ijt}$ in equation (11) depends on the value of $Y_i$, $Y_j$, $D_{ij}$ and other explanatory variables. This means that the expected value $\ln \varepsilon_{ijt}$ also depends on regressors, as a result of which the LMS estimator becomes biased. It can be concluded therefore that the assessment of elasticity in the gravity model made using this method should not be considered reliable (Santos Silva and Tenreyro, 2006).

In many cases, the unequal variability may be associated with the so-called over-dispersion of the variable’s value. This happens when trade agreements between certain countries are signed only because trade contacts have been established earlier, and not following a change in the value of any of the observable economic variables. Such a regularity can explain the fact that trade is growing faster between some economies than between others, even though the distance between, and the size of these economies expressed as GDP, are similar in both cases.

Another issue associated with the estimation of the gravity model in the log-linear form is the question of zero flows: the value of trade between two countries can be zero because they either did not trade in a given period or the value of trade was very low. The presence of observations for which the value of the explained variable equates to zero causes problems in determining the log of such a variable. Many different methods have been developed to resolve this problem. One approach is to ignore the observations with zero flows. It should be borne in mind, however, that in such a situation the results will be biased because the fact that there was no trade between a given pair of countries in a given period can precisely be the effect of the variables that were included in the gravity model. Another method to deal with the problem of zero flows is to use $T_{ijt}+1$ as the explained variable in the gravity model. It has been found, however, that such a rescaling of the variable produces inconsistent estimation results. Yet another solution, used e.g. by Frankel and Wei (1993), was to estimate the multiplicative form of regression using the Non-linear Least Squares (NLS) method, which is an asymptotically valid estimator for model (10). However, as was demonstrated by Santos Silva and Tenreyro (2006), NLS can be an inefficient estimator in this context, especially in the case of heteroscedasticity referred to above.

To resolve both problems associated with the estimation of the gravity model (NLS bias and the problem of zero trade), Santos Silva and Tenreyro (2006) proposed the Poisson pseudo-maximum-likelihood (PPML) method, which is one of the most popular methods used for count data.² They observed that if economic theory suggests that the relationship between variables $y$ and $x$ is adequately reflected by the formula $y_i = \exp(x_i\beta)$, then the function $\exp(x_i\beta)$ is interpreted as the expectation of $y_i$ for a given $x$, that is $E[y_i \mid x]$. An efficient estimation of the parameters of such a regression can be made using the PPML method with an appropriate assumption regarding the form $V[y_i \mid x]$. Under the assumption that the conditional variance is proportional to

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² Such a solution can also be used in the overdispersion models described above.
the conditional mean, parameter $\beta$ can be estimated by solving the following set of first-order conditions:

$$\sum_{i=1}^{n} \left[ y_i - \exp(x_i \hat{\beta}) \right] x_i = 0.$$  

According to Santos Silva and Tenreyro (2006), the variables do not have to be Poisson at all for such an estimation, and $y_i$ does not have to be an integer for the PPML estimator to be consistent. Moreover, the implementation of this method, which does not require taking a log of each side of the equation in the regression model, helps to avoid the zero trade problem.\(^3\) Also Westerlund and Wilhelmsson (2009) indicated that the use of the PPML estimator is an appropriate way to resolve the problems of zero trade.

The gravity model estimated with the PPLM takes the following form:

$$T_{ijt} = \exp \left[ \ln \alpha_y + \beta_1 \ln Y_{ai} + \beta_2 \ln Y_{ai} + \gamma \ln Z_{ij} + \alpha \ln X_{ijt} + \delta D_{ij} + V_i + \eta_{ij} \right] \varepsilon_{ijt},$$

This means that the parameters of the variables can be interpreted as elasticities of trade $T_{ij}$ affecting individual explanatory variables. It should be observed that in regression (13), time effects $V_{ij}$ and effects characteristic of pairs of countries $\eta_{ij}$ are estimated as fixed effects, and therefore it is not possible to show how the value of trade depends on the variables which are constant in time. This is a considerable drawback, for instance for the evaluation of such factors as the conclusion of long-term trade agreements by the countries concerned.

Another improvement of the methodology of gravity model estimation was developed by Savaşçı (2011), who proposed to estimate the model of form (13) using the so-called mixed effect PPML. Additionally, the model takes into account the effects typical of countries $\eta_{ij}$ as random effects representing unobserved factors that characterise the relations between the economies in question. One problem this particular model involves is failure to fulfil the assumptions of the model with the random effects. In explained, Lombardía and Sperlich (2011) proposed a new class of models with semi-mixed effects.

The estimation of all the gravity models in the discussed study was conducted using the PPML method. To verify the significance of the impact of the individual explanatory variables on trade, errors of estimation resistant to failed stochastic assumptions (robust) were used (StataCorp. 2011).

### 4.6.2. The empirical model

In their classic work, Anderson and Wincoop (2004) used the shares in the exports of the trade partners to estimate the force of gravity in the model. The use of fixed effects for pairs of countries allows eliminating potential bias arising from the non-inclusion

\(^3\) It should be noted that some authors pointed out that this method is not universal for gravity models in international trade. For instance, Martínez-Zarzoso (2013) discusses a situation when the feasible GLS method combined with logarithmical transformation produces better results than PPML.
of multilateral resistance described in the literature of the subject. An alternative solution, based on the real values of trade flows, can also be used (e.g. Helpman, Melitz and Rubinstein 2008). In our study, and in line with the approach outlined above, the value of exports from Poland to a given trade partner, expressed in millions of euros, represents the explained variable ("Export$_{ijt}$").

The generalised model incorporating effects for pairs of countries assumes the following form:

$$\ln \text{Export}_{ijt} = \ln \alpha_0 + \beta_1 \ln Y_j + \beta_2 \ln D_{ij} + \gamma \ln X_{ijt} + \rho \ln Z_{ij} + \nu_i + \eta_{ij} e_{ijt},$$

where $Y_j$ is the trade partner's size, $D_{ij}$ is the distance between the partners, and $X_{ijt}$ is a set of additional conditional variables affecting bilateral trade relations.

The basic explanatory variables comprise: the partner's size measured with the natural log of real GDP (real GDP) or of the size of the population (population), and the natural log of the distance between the partners, measured as the distance "as the crow flies" from Warsaw to the capital of the trade partner, expressed in kilometres.

Economic theory holds that two countries of a similar size (measured by real GDP) should trade with each other more heavily than two countries of different sizes. Helpman and Krugman (1985) demonstrated that the smaller the difference in the relative sizes of the trade partners, the greater should be the intensity of mutual trade, and of intra-industry trade in particular. The closer the two economies are in the size, the higher the likelihood that the demand for differentiated varieties of final and indirect products will overlap.

In this study, we adopt two different measures for the similarity between the sizes of the economies, and predict that they will have a statistically significant and positive impact on Poland’s exports. One measure, SIM, is calculated using the following formula that includes the data on the GDP values of Poland and of the trade partner:

$$\text{SIM} = \ln \left[ 1 - \left( \frac{Y_{jPL}}{Y_{hPL} + Y_{jPL}} \right)^2 - \left( \frac{Y_{j}}{Y_{h} + Y_{j}} \right)^2 \right].$$

In the other measure, based on the approach proposed by Balassa and Bauwens (1988), the difference, DIFE, is calculated between the GDP values of Poland and of trade partner $j$, as:

$$\text{DIFE}_{ij} = 1 + \frac{\text{win}(w) + (1 - w)\ln(1 - w)}{\ln 2},$$

where $w = \frac{\text{GDP}_j}{\text{GDP}_j + \text{GDP}_i}$.

At the same time, two countries at a similar level of development should have more intense bilateral trade relations than two countries with a wider gap in the level of development. In order to verify the above hypothesis, the RFL variable will be added to the model, with a prediction that it will have a statistically significant and negative
impact on the explained variable. An increase in the development gap should, *ceteris paribus*, reduce the intensity of bilateral trade, and thereby have a negative impact on Polish exports. The RLF has the following form:

\[
rlf = \ln|y_{pcn} - y_{pcr}|.
\]

In addition, a number of other variables, including binary, are used for close proximity, a shared border, and differences in factor endowment and productivity. Similarly, the impact of bilateral trade agreement is taken into account.

**Sources of data**

The COMEXT database serves as the source of trade data. It is a statistical database on intracommunity and external trade of the European Union compiled by *Eurostat*, the Statistical Office of the European Commission.

A number of data sources are used to create a set of explanatory variables, notably *Penn World Tables 8.0* by Feenstra et al. (2013). We also use the World Bank collection of development indicators, the World Development Indicators (WDI) database, as well as the Worldwide Governance Indicators (WGI) database compiled by Kaufmann et al. (2010) for the World Bank. The data on patent applications were derived from the United States Patent and Trademark Office (USPTO), and the data on the migrant population from Poland – from the OECD database. The data on the average daily exchange rate for the Polish zloty (PLN) were obtained from the website of the National Bank of Poland (NBP); they were transformed by calculating the average standard deviation.

**4.6.3. Results of estimations and discussion**

The base and extended empirical model specifications were estimated using the semi-mixed effects method proposed in a paper by Proença et al. (2015), with a clustering variable – EU membership. The adoption of such a variable was well justified due to the specific regulations governing intracommunity trade taking place within the internal market and the role of such exchange for Poland’s trade. The model’s estimations were made using the STATA 12 econometric package. The estimation results are shown in Table 12.

The analysis was carried out for Poland’s 234 trade partners for the years 1999-2011. The value of exports from Poland expressed in millions of euros was the explained variable. It should at the same time be stressed that the traditional zero trade adjustment is not needed in this case since we take into account the export levels, and not the typically used natural log of exports.

Different specifications of the model were analysed; their number was limited owing to space restrictions. It should be stressed that the results are insensitive to the inclusion of time effects. Since they only slightly increase the model’s goodness of fit, we decided not to include them in the result tables.

The model’s overall level of fit is high as it explains 76% to 93% of the observable variability of exports. The results are robust (*robustness check*).
In most of the analysed specifications, the parameter estimates for the traditional determinants of trade intensity such as the real GDP of the trade partner or the distance are economically rational, and their impact on the explained variable is statistically significant. The intensity of Poland’s exports falls as the distance to the trade partner increases, and is positively dependent on the size of the trade partner’s economy: bigger countries have a tendency to have more intense trade with Poland. As expected, geographical distance proved to be an important determinant of bilateral trade flows since it is associated with transport costs and generally with costs of trade.

The impact of EU membership is distinctly positive and statistically significant. Poland exports more goods, \textit{ceteris paribus}, to the partners from the EU internal market (free flow of goods and services as part of a free trade area and a single market).

The impact of the development gap, measured by the RLF variable identified earlier, is negative in most of the analysed specifications, and statistically significant only in several cases (M7, M10, M13). A general conclusion can be drawn that Poland exports more, other things being equal, to countries with a similar level of development.

An analysis of variable correlations showed that the index of similarity of the economy’s sizes (SIM) is correlated with the trade partners’ real GDP. Therefore, to verify Helpman and Krugman’s hypothesis, we used the log (of the population) as the proxy for the partner’s size in model M2. The parameter’s estimation with SIM proved statistically insignificant, which is somewhat surprising. Using the alternative variable DIME in model M3 led us to a similar conclusion. The result proved to be largely dependent on the applied method of estimation (e.g. it is statistically significant in the FE method). Having in mind the advantages of the PPML method, we consider the result to be statistically insignificant and conclude that the tested hypothesis does not hold in the analysed sample.

The proximity of the trade partner expressed by a shared border plays a significant role (M4). Poland exports more products to the neighbouring countries, \textit{ceteris paribus}. The impact of the border length also proved to be equally important (M5). Both results are statistically significant at a level of 1%.

A factor of considerable importance which has as yet been seldom taken into account in the gravity models is the quality of the trade partner’s institutions. It can be assumed that exports should be bigger, \textit{ceteris paribus}, to partners with a more stable and higher institutional quality due to reduced risk and uncertainty. From among the different measures included in the Governance Matters database, we picked the rule of law (ROL) variable as one which is most frequently addressed in the empirical literature on issues related to economic development. Its influence on the explained variable (M7) proved positive and strongly significant statistically.

According to the theoretical literature, a fixed exchange rate or generally its low volatility, or higher stability in other words, is a factor favourable to trade. We looked at these issues in the subsequent specifications.

The parameter estimates using the binary variable of a country’s Eurozone membership are positive though negligible statistically, possibly because of the inclusion of the binary (clustering) variable for the EU Member States. Once it is dropped, the parameter estimate for the euro variable becomes positive and statistically significant, which
corroborates the so-called Rose effect (Frankel and Rose 2002). Taking into account the fact that currently the bulk of Poland’s exports are sold in the Eurozone and that the Eurozone is gradually expanding (given the increasing number of participating countries, including Germany, Poland’s main trade partner, as well as the neighbouring Slovakia and Lithuania), the costs of staying out of the common currency area in terms of the untapped export potential are considerably high. The introduction of the euro in Poland could drive a significant increase in exports, at least in the initial period, and produce a trade creation effect.

The impact of the volatility of the exchange rate (M7) of the Polish zloty on Poland’s exports, measured by the standard deviation of average daily PLN exchange rates observed in a year (S volatility) is negative, but not statistically significant. To calculate volatility, NBP data were used, and in the absence of a given exchange rate, the volatility vis-à-vis the euro for the remaining European countries, and vis-à-vis the dollar for the remaining countries, was adopted.

In order to eliminate potential bias and an asymmetric approach, in the next specification (M8) the volatility of individual currencies against the dollar (XR) was used, on the basis of the data derived from PWT 8.0. In this case, the impact of volatility is statistically significant and has a supposed direction. Lower volatility of the exchange rate, that is its greater stability, clearly stimulates trade.

Intuitively, a state should export more goods to those trade partners that have a sizeable population originating from the exporting country, also because of cultural factors or preferences. The size of the Polish migration (M9), approximated by the natural log of the number of Polish migrants in a given partner country (diaspora), has a surprisingly negative and significant impact on Poland’s exports. It should be stressed, however, that the data derived from the OECD database are available only for a limited number of trade partners, which can bias the results.

The next three specifications (M10, 11, 12) looked at the factors differentiating Poland from its trade partners related to factor endowment, productivity and technological advancement that are significant in light of theory and can potentially affect the intensity of Polish exports.

First, the difference in the K/L ratio has a significant and positive impact on the volume of Polish exports. Poland exports more goods to the countries, ceteris paribus, in relation to which it has an advantage in the capital to labour ratio. This could point to the still considerable role of differences in the classical factors proposed by the H-O theory and its developments (Heckscher and Ohlin 1991) in explaining a large part of Poland’s trade relations. The relatively low share of intra-industry trade in Poland’s trade relations can be viewed as its indirect proof.

Second, a greater difference in the productivity levels measured by total factor productivity TFP (DIF TFP) diminishes the intensity of Poland’s export. As the first step, Poland’s TFP ratio to a given trade partner is related to the TFP of the country at the global technological frontier, that is the United States. In general terms, Poland seems to export more goods to countries at a similar level of productivity and therefore of technological sophistication.
Third, the impact of the technology gap measured by the absolute difference in the number of patent applications submitted to the USPTO relative to the population (per 1 million population) (DIF abs CUMP) between Poland and its trade partner (with the variable’s structure similar to that of RLF), is statistically insignificant. After a thorough analysis, this result proved sensitive to the selected estimation method.

As the next step of the analysis, we analysed the impact of integration processes and liberalisation of bilateral and multilateral trade. In this case, the analysis requires a commentary. First and foremost, the bulk of the Polish exports is meant for the European Union’s internal market, mainly the Eurozone, and Germany in particular. In the EU, trade flows are regulated by the Single Market principles. When non-Community trade relations (M14) are included, especially free trade areas (FTA), customs unions (CU) and economic integration agreements (EIA), we will see that their impact on Poland’s exports is positive but statistically significant only with regard to free trade areas.

If the analysis is extended to include all the regional trade agreements (RTA) and specific relations with the post-Soviet countries (Post Soviet), the impact of RTA on the explained variable is positive and significant at a level of 5%, while the impact of the latter factor is statistically negligible.

In the last specification (M15), we looked at the overall indicator of development or competitiveness of the trade partner, the Global Competitiveness Index calculated by WEF (GWCI), i.e. the weighted index for 12 basic pillars of competitiveness (Schwab 2014). As expected, its impact on Polish exports is statistically significant and positive.

Concluding remarks

The aim of this Chapter was to verify empirically the determinants of the intensity of Poland’s exports sold to its trade partners, using the gravity model for trade. The analysis was conducted for Poland’s 234 trade partners in the years 1999-2013 with the use of panel methods (in reality, the number of partners included in the estimation was lower due to database limitations, especially the PWT 8.0 dataset). In the process of estimation, we used semi-mixed effects with PPML, an approach recommended by the most recent literature on the subject. EU membership was adopted as the clustering variable.

The framework of the gravity model was found to be solid. The goodness of fit of the empirical model is high, whilst the impact of the standard gravity determinants such as the partner’s size or the distance from the partner on the explained variable (level of exports) is highly significant statistically and consistent with general expectations. The impact of the similarity of the trade partner’s size was not positively verified. The partner’s proximity, ceteris paribus, has a strong and positive impact on Poland’s exports, as do EU and Eurozone membership, which applies particularly to Germany, the country that currently receives the bulk of Polish exports.

In the extended version of the base model, we analysed a number of additional factors which can potentially play a part in determining the intensity of Poland’s exports to individual trade partners, such as: relative differences in factor endowment, technology
gap measured by differences in TFP or relative effectiveness of patenting at the USPTO (in the country at the global technological frontier), quality of institutions or the impact of regional and bilateral trade agreements or exchange rate volatility.

Higher volatility (lower stability) of the exchange rate has a definitely negative influence on exports. A greater difference in the K/L ratio in Poland’s favour has a significant and positive impact on the intensity of Poland’s exports, which can suggest that the endowment in traditional production factors still plays an important role, as held by the traditional H-O theory. In the analysed period, Poland seems to export more goods to countries with a similar level of productivity and technological advancement. We export more, ceteris paribus, to countries with a higher institutional quality and overall development level.

Some of the findings were extremely surprising, such as the negative impact of the size of the Polish diaspora in the partner country, and require further research. A robustness test was made; as we know, the introduction of time effects basically did not alter the results. Categorisation of the studied countries by the level of development, from highly developed to less developed countries, which was not included in this Chapter, brought interesting results which will be discussed in scientific papers as separate publications. Generally speaking, the impact of some of the variables, especially those relating to differences in TFP, K/L ratio or innovation, was varied depending on the development level of the trade partner in relation to Poland.

In future studies, definitely more attention should be placed on the differences in results across various sectors of business activity. In particular, the present study should be elaborated and extended with sectoral analysis, based for example on the GTAP sectoral classification. Another potential extension is the role of the technology gap in determining Poland’s exports.
Table 12. Results of gravity model estimation for Poland’s exports

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Table 12 – continued

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Note: estimations made using the semi-mixed effects with PPML approach and the binary variable EU as the clustering variable. * Statistically significant at a level of 10%; ** Significant at a level of 5%; *** Significant at a level of 1%. Models estimated using the STATA 12 econometric package. Explained variable – total exports in € million. Total number of observations (no. with OB). In brackets () - standard error. R2 – coefficient of determination.
Chapter 5

Analysis of factors underpinning export activity of firms in Poland

This chapter discusses the findings of the survey from a dual perspective. Firstly, this is a statistical analysis of responses to vital questions such as barriers to export activity, competition pressure, awareness of the competitors’ advantages, effects of Poland’s EU membership and consequences of the financial crisis. Secondly, the findings are analysed with the use of a logit model in order to identify the factors underpinning export activity.

Tomasz Jurkiewicz, Stanisław Umiński

5.1. An analysis of the survey results

Introduction

Contemporary studies on export focus on the concept of heterogeneity of firms, which assumes the presence of the so-called asymmetric reactions in the sense that any single sector (branch of industry) may include both exporting and non-exporting firms. To put it very simply, the present analysis focuses on the attributes or features that distinguish exporting from non-exporting firms. First and foremost, this is the productivity level, which is to be expected on the basis of the Melitz and related models. To a great extent, however, the emphasis on the heterogeneity of businesses has opened up new channels for seeking factors other than productivity to determine export activity. The phrase “export activity” is used intentionally, since the focus is not strictly placed on the fact whether a given firm is an exporter or not. Empirical studies also deal with other questions of interest, such as whether the share of exports in total revenues is high or low; whether the export is accompanied by other forms of international activity (e.g. FDI) or whether the export activity was preceded by imports, etc.

The main problem faced by the researchers in Poland who wish to join the dynamically developing seam of analysis drawing on the concept of heterogeneity is the lack of data relating to individual businesses. The Central Statistical Office (GUS) offers no access to such data, not even for research purposes. Therefore, many of the interesting issues that are being analysed in the world literature on the subject cannot be analysed in relation to Poland. A review of current literature concerning export, as well as participation in international conferences, leave no doubt that various aspects
of business heterogeneity offer a wealth of opportunities for analysis, also in terms of discussing the effectiveness of export support measures.

To be able to join such scholarly debate, we decided to employ two methods of acquiring data about individual businesses. The first source of information was the InfoCredit database, which provides data from Poland to Amadeus. The second was a survey conducted in a group of businesses which are embraced by a 5-year financial reporting period in the InfoCredit database. The selection procedure of undertakings for the purposes of the survey was the following:

- businesses with an uninterrupted 5-year period of financial reporting (profit and loss account) were identified in the InfoCredit database,
- revenues from sales were in excess of PLN 2M in each year of the reporting period (in fact, total balance sheets of these businesses were taken into account, broken into micro, small, medium-sized and large companies),
- export value was in excess of PLN 1M in each year of the reporting period,
- a given entity operated mainly in the industry sector.

This produced a set of 3467 exporters, from among whom a group to be directly surveyed with the use of questionnaires via direct interviews was randomly selected. The questionnaires were circulated among 498 exporters. The next step was to obtain the contact details of non-exporters; their selection was based on the structure similar to that of the exporters in terms of location in individual voivodships. The contact detail database covered 1654 entities, of which 211 were ultimately surveyed. The survey process itself was not an easy task. In the field, it was conducted by a specialised company contracted by the Institute for Development. The main problem was the reluctance on the part of businesses to take part in the survey, for reasons difficult to explain unequivocally, since they seemed to be different for each of the respondents. First of all, there was an unwillingness on the part of managers and entrepreneurs to devote their precious time to filling in a questionnaire even if the survey in question has a solid foundation and basically is intended to find ways to support export. Secondly, there was concern that such surveys do not serve strictly scientific research purposes, but are a way of acquiring strategic information concerning the respondents’ operations, their markets, financial situation, etc. Some of the respondents claimed openly that they had fallen victim to industrial espionage, inside theft, strategic information, etc., and they consistently refused to cooperate.

Ultimately, the survey covered a total of 709 businesses. They were fairly large enterprises, operating mainly in the industry sector. The questionnaire itself was rather extensive and included questions subdivided into several groups dealing with specific issues such as competition; barriers and other obstacles to business activity; consequences of Poland’s EU membership; consequences of the 2008+ crisis; export and import; respondents’ expectations, and prospects for the future.

At this point, the main concept underlying the present study should be recalled. The experience gained by the research team indicates that respondents as a rule do not provide answers to questions relating to financial matters, including revenues from sales, profits, profitability, etc. Such data, however, are necessary for defining issues such as for instance the level of productivity, which is the core of all analyses invoking
5. Analysis of factors underpinning export activity of firms in Poland

the new new trade theory. By combining the information from the *InfoCredit* database with the survey results, we were able to obtain a single, comprehensive set of data which could be used as a source for many interesting analyses, including those that based on the concept of heterogeneity. The results of the survey offered below were ultimately derived from a set of weighted data concerning the sectoral structure (based on the *InfoCredit* population data, from among which businesses to be surveyed were randomly selected). Thus, the results discussed here offer estimates for the surveyed population, and not merely for the randomly selected sample.

5.1.1. Barriers to export activity

The respondents encounter many different barriers and difficulties in their exporting activity. Some of them reflect certain internal determinants relating, for instance, to the behavioural framework (propensity for risk, type of entrepreneurship or leadership), while others reflect the type of environment in which exporting entities operate (or non-exporting entities, but with a potential for exporting). The environment could be direct, such as the region, or indirect, affected by domestic or international factors. It also includes many other factors such as the quality of the transport infrastructure, including telecommunications; efficient institutions supporting exporters in their activities; the quality and transparency of the local legislation (e.g. local zoning plans in place); the national legislation, which defines the conditions for business operations, or the regulatory framework at the interface between the national economy and foreign markets, including e.g. the exchange rate system. The list of potential factors could be much longer, but due to the extensive length of the questionnaire already, their range had to be limited. Table 13 lists factors perceived by the respondents to be the major barriers impeding the commencement or expansion of their export activities.

### Table 13. Barriers to starting or expanding export activities

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Exporters</th>
<th>Non-exporters</th>
<th>Total of respondents</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intense competition in foreign markets</td>
<td>6.04</td>
<td>6.01</td>
<td>6.03</td>
<td>0.912</td>
</tr>
<tr>
<td>Currency risk</td>
<td>5.17</td>
<td>5.29</td>
<td>5.20</td>
<td>0.635</td>
</tr>
<tr>
<td>Low level of export support</td>
<td>5.01</td>
<td>5.21</td>
<td>5.07</td>
<td>0.396</td>
</tr>
<tr>
<td>Insufficient information concerning business opportunities in foreign markets</td>
<td><strong>4.36</strong></td>
<td><strong>5.02</strong></td>
<td><strong>4.56</strong></td>
<td><strong>0.005</strong></td>
</tr>
<tr>
<td>Failure to introduce the euro in Poland</td>
<td>4.56</td>
<td>4.42</td>
<td>4.52</td>
<td>0.579</td>
</tr>
<tr>
<td>Insufficient foreign market demand</td>
<td>4.35</td>
<td>4.51</td>
<td>4.40</td>
<td>0.527</td>
</tr>
</tbody>
</table>

1 0 to 10 scale.
Intense competition on foreign markets was identified by the respondents as a major barrier to starting or expanding export activity; in this case, the differences between exporters and non-exporters were statistically insignificant. The exchange rate risk was named the second most important obstacle, followed by a low level of export support. The fourth barrier was insufficient information about business opportunities offered by foreign markets, although the differences in the answers to that question given by exporters and non-exporters were statistically significant. Quite naturally, businesses which were already engaged in export activities were able to operate more efficiently on foreign markets due to their wider experience, including also acquiring information about business opportunities. Both groups of respondents alike recognised Poland’s not introducing the euro as a barrier to export, which, above all, results in high levels of volatility in the exchange rate of the zloty as an element of overall business risk. As regards the remaining factors which were identified as barriers, including the inability to cooperate in foreign market penetration with other entities, the differences between exporters and non-exporters were statistically significant. The ability to cooperate is vital in the present-day global, highly competitive economy. Cooperation – or at least some of its manifestations – is advisable even for the competing firms. The package of measures aimed at developing recommendations for export support should include promoting cooperation among various business entities and should emphasise benefits that can be derived from such cooperation (such as reduction/division of costs of the delivery of goods to foreign purchasers, sharing export-related risk, easier access to information on the legislation governing business activity in a given foreign market).

The respondents were also asked a more general question concerning barriers to business activity and its expansion. The structure of answers is summarised in Table 14, broken down into exporters and non-exporters. A high level of taxes was identified as the most important barrier, although the differences in assessments of its importance between exporters and non-exporters were statistically insignificant. However, they were statistically relevant as far as another factor was concerned, namely intense competition. Its importance was perceived to be lower in the case of exporters. This could prove that export operations, which involve the need to face many challenges associated with foreign market entry and incur the accompanying
so-called sunk costs, but which also drive higher productivity, help with the perception of competition on the part of other entities as a lesser obstacle to business operation and expansion.

Table 14. Barriers to business activity and its expansion

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Exporters</th>
<th>Non-exporters</th>
<th>Total of respondents</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of taxes</td>
<td>3.27</td>
<td>3.37</td>
<td>3.30</td>
<td>0.266</td>
</tr>
<tr>
<td>Intense competition</td>
<td><strong>3.19</strong></td>
<td><strong>3.39</strong></td>
<td><strong>3.25</strong></td>
<td><strong>0.034</strong></td>
</tr>
<tr>
<td>Rising prices of raw materials and supplies</td>
<td>3.13</td>
<td>3.24</td>
<td>3.16</td>
<td>0.207</td>
</tr>
<tr>
<td>Salary pressure, high labour costs</td>
<td>2.85</td>
<td>3.05</td>
<td>2.91</td>
<td>0.042</td>
</tr>
<tr>
<td>No support on the part of the state</td>
<td>2.73</td>
<td>2.93</td>
<td>2.80</td>
<td>0.061</td>
</tr>
<tr>
<td>Ambiguity and unpredictability of regulations</td>
<td>2.71</td>
<td>2.65</td>
<td>2.69</td>
<td>0.576</td>
</tr>
<tr>
<td>Problems with sales in the domestic market</td>
<td>2.42</td>
<td>2.60</td>
<td>2.48</td>
<td>0.051</td>
</tr>
<tr>
<td>Problems with sales in foreign markets</td>
<td>2.51</td>
<td>2.22</td>
<td>2.41</td>
<td>0.003</td>
</tr>
<tr>
<td>Lack of funds for investment</td>
<td>2.32</td>
<td>2.52</td>
<td>2.38</td>
<td>0.030</td>
</tr>
<tr>
<td>Volatility of currency rates</td>
<td>2.61</td>
<td>1.90</td>
<td>2.38</td>
<td>0.000</td>
</tr>
<tr>
<td>Condition of transport infrastructure in Poland</td>
<td>2.40</td>
<td>2.31</td>
<td>2.37</td>
<td>0.324</td>
</tr>
<tr>
<td>Condition of other infrastructure in Poland</td>
<td>2.39</td>
<td>2.33</td>
<td>2.37</td>
<td>0.493</td>
</tr>
<tr>
<td>Low financial liquidity</td>
<td>2.30</td>
<td>2.44</td>
<td>2.35</td>
<td>0.157</td>
</tr>
<tr>
<td>Problems with finding competent personnel</td>
<td>2.30</td>
<td>2.28</td>
<td>2.29</td>
<td>0.855</td>
</tr>
<tr>
<td>Problems with purchase of equipment</td>
<td><strong>1.91</strong></td>
<td><strong>2.10</strong></td>
<td><strong>1.97</strong></td>
<td><strong>0.032</strong></td>
</tr>
</tbody>
</table>

* to assess the significance of differences between exporters and non-exporters.

Source: authors’ own elaboration based on the survey.

The two other factors were related to an increase in broadly understood costs of: (a) raw materials and supplies, and (b) remuneration pressure and high costs of labour. In the case of the latter, the differences in the responses offered by exporters were significant.

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2 Sunk costs are costs that are incurred by a company and cannot be regained. Sunk costs are incurred always at the beginning of a given project, when its profitability is as yet unknown. They constitute a sizeable part of investment costs or are related to the entry to a new market, e.g. a foreign market. In such a situation, they are typically incurred on permits and licenses, market analyses, personnel training, introducing amendments to or signing new agreements and contracts concerning e.g. distribution, or must be incurred as investment required for the entry to a new market.
and non-exporters were statistically significant. Exporters, to a lesser degree than non-exporters, felt the severity of the labour cost pressure (rising labour costs). On the grounds of the heterogeneity concept, this can be interpreted as exporters being characterised by higher productivity, which allows them to reduce salary pressure. The fifth listed factor was lack of support on the part of the state. As we can see, such support is still expected by the respondents. Some of them are aware that countries to which they export their goods pursue a much more comprehensive industrial policy that also covers support offered to export. The next ranked factor was the ambiguity and unpredictability of legal regulations. Significant statistical differences between exporters and non-exporters were also listed in regard to difficulties in sales on foreign markets, volatility of currency rates, lack of funds for investment, and problems with the purchase of equipment. In the case of the first two factors, their severity was higher for exporters than non-exporters, which was quite logical and consistent with expectations. On the other hand, the last two barriers were more important for non-exporters. Relatively greater problems with financing investment and purchase of equipment can be an effect of lower productivity and, generally speaking, of lower competitiveness.

The respondents were also asked about difficulties with obtaining bank loans. For most of them, contracting a bank loan was not a problem; 5.1% of the respondents raised that issue as a problem (3.6% of non-exporters), while 37% of non-exporters had no opinion on the matter (10 percentage points less in the case of exporters) because they had never applied for a bank loan before. In their answers to open questions, the respondents also quoted low creditworthiness and excessive requirements on the part of banks relating to collaterals and required documentation. Some of the surveyed businesses were self-financing, while some respondents feared financing their businesses with bank loans due to excessively high risk related to the changeability of the market conditions.

5.1.2. Observable competitive pressure

The respondents felt pressure from competitors from different parts of the world; it was the most severe on the part of other business entities in Poland. This is easily understandable since only a part of the revenue from sales is generated by foreign markets – for most businesses, the domestic market is the main area of activity, which is the reason why competitive pressure is primarily felt from that market. The pressure from other firms operating in Poland was higher in the case of non-exporters (3.76) than exporters (3.20), which was consistent with expectations. That pressure (felt by non-exporters in respect of other entities) was at the same time the highest among all the answers provided by the respondents. Therefore, a conclusion of a more general nature may be drawn on this basis. Export activity is, for all intents and purposes, a confrontation with a highly competitive and demanding environment. It compels exporting entities to undertake a number of activities needed to identify their strengths and weaknesses, and to implement measures needed to adjust to a given environment (e.g. organisational changes, installation of new machinery and equipment, quality
improvement, etc.). As a result, they improve their competitive position on the market, especially with respect to domestic businesses. This can be viewed as indirect proof of the sorting out effect: the most productive firms become exporters, while less productive firms service the domestic market. Involvement in export activity increases the differences between the market position of exporting and non-exporting entities. This situation was reversed in the case of competitive pressure being felt by firms from outside Poland – in this case the average indications were higher among exporters than non-exporters. In the case of all the regions of the world (also with respect to firms from Poland), the differences between exporters and non-exporters were statistically significant.

Table 15. How strong is the competition from the following regions (arithmetic mean from the answers)?

<table>
<thead>
<tr>
<th>Regions</th>
<th>Exporters</th>
<th>Non-exporters</th>
<th>Total of respondents</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms of Poland</td>
<td>3.20</td>
<td>3.76</td>
<td>3.38</td>
<td>0.000</td>
</tr>
<tr>
<td>Countries with low labour costs (e.g. China, India)</td>
<td>2.68</td>
<td>1.87</td>
<td>2.42</td>
<td>0.000</td>
</tr>
<tr>
<td>Old EU countries</td>
<td>3.11</td>
<td>2.20</td>
<td>2.82</td>
<td>0.000</td>
</tr>
<tr>
<td>New EU countries</td>
<td>2.76</td>
<td>1.98</td>
<td>2.51</td>
<td>0.000</td>
</tr>
<tr>
<td>Other</td>
<td>2.27</td>
<td>1.29</td>
<td>1.94</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: authors’ own elaboration based on the survey.

The respondents also mentioned “other” countries/regions; this referred mainly to the countries of the former Soviet Union and multinational corporations. A more precise structure of the answers is presented in Fig. 62. The highest percentage of responses, marked as “5” (representing serious competition) and also “4”, concerned the competitors from Poland. On the other hand, the highest percentage of responses marked as “1” or “2”, concerned business entities from countries with low labour costs.

A detailed analysis of the respondents’ perception of the competitors’ advantages was performed for each of the above regions. As regards the competitors from Poland, these advantages included: flexibility of operations and openness to the customers’ needs, the speed of action and timeliness of deliveries. In the case of business entities from “old” EU countries, the respondents perceived their competitive advantages mainly as brand recognition and reputation; the technological level of products and services; effective marketing and up-to-date forms of promotion and advertising, in addition to ecological qualities of the offered products. In the case of business entities from “new” EU Member States, these were mainly low prices of products and services, whereas in the case of countries with low labour costs, these were low prices, in addition to low labour costs.

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3 Owing to rounded-up figures, the answers may not add up to 100.
If the respondents’ answers are relativised to the average values, the following conclusions can be formulated:

- Exporters consider the flexibility of action, speed and timeliness of deliveries as the most important characteristics of their domestic competitors. As regards competitors from “old” EU countries, these are: brand recognition, reputation and pro-ecological orientation. With respect to “new” EU countries, it was high attractiveness and state-of-the-art character of products and services, in addition to low costs.

- The opinions of non-exporters relating to the advantages of domestic competitors were similar to those voiced by exporters, with some slight differences concerning the question of speed and timeliness of deliveries. As regards “old” EU countries, they named high technological level (which was not emphasised to such an extent by exporters) and marketing. In the case of “new” EU countries, non-exporters mentioned mainly low costs and pro-ecological orientation.

- Both exporters and non-exporters similarly perceived the advantages of businesses from countries with low labour costs. Apart from low labour costs as such, these were low prices, speed and timeliness of deliveries, and diversity and a wide range of a merchandise offer.

5.1.3. Consequences of Poland’s EU membership

Eleven years of Poland’s membership in the European Union represent a period which is sufficiently long to evaluate its consequences for business entities, both those engaged in exports and those which concentrate their operations on the domestic market. The respondents graded each category under evaluation on a scale ranging
from -3 (definitely adverse effects) to +3 (definitely positive effects). A comprehensive evaluation of the consequences of Poland’s EU accession is obviously a task far beyond the scope of the present study. Therefore, the opinions presented here only concern business matters inherently related to functioning within the internal EU market, with an emphasis on issues connected directly with export operations. The structure of the answers is presented in the table below. First of all, an interesting regularity concerning the statistical significance of the differences in the answers of exporters versus non-exporters can be observed. For all the cases of positively viewed consequences of EU membership, the marks offered by exporters’ were higher than those of non-exporters, and the differences were statistically significant. Therefore, a general conclusion can be formulated, that it was mainly exporters who felt the positive effects of Poland’s EU membership.

**Table 16. Evaluation of the effects of Poland’s EU membership**

<table>
<thead>
<tr>
<th>An effect</th>
<th>Exporters</th>
<th>Non-exporters</th>
<th>Total of respondents</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplification/abolition of border crossing procedures</td>
<td>2.17</td>
<td>1.43</td>
<td>1.93</td>
<td>0.000</td>
</tr>
<tr>
<td>Access to the EU market, increased interest in offered products and in cooperation</td>
<td>2.13</td>
<td>1.33</td>
<td>1.87</td>
<td>0.000</td>
</tr>
<tr>
<td>Faster deliveries, easier flow of goods, more efficient logistics</td>
<td>2.13</td>
<td>1.41</td>
<td>1.90</td>
<td>0.000</td>
</tr>
<tr>
<td>Abolition of customs duties</td>
<td>1.98</td>
<td>1.25</td>
<td>1.75</td>
<td>0.000</td>
</tr>
<tr>
<td>Free flow of capital</td>
<td>1.77</td>
<td>1.25</td>
<td>1.60</td>
<td>0.000</td>
</tr>
<tr>
<td>Prospects for introducing the euro in Poland</td>
<td>1.03</td>
<td>0.50</td>
<td>0.86</td>
<td>0.000</td>
</tr>
<tr>
<td>Need to align to the EU requirements/ regulations</td>
<td>-0.16</td>
<td>-0.15</td>
<td>-0.16</td>
<td>0.902</td>
</tr>
<tr>
<td>Changes of regulations</td>
<td>-0.34</td>
<td>-0.19</td>
<td>-0.29</td>
<td>0.229</td>
</tr>
<tr>
<td>Increased competition</td>
<td>-0.49</td>
<td>-0.67</td>
<td>-0.55</td>
<td>0.214</td>
</tr>
<tr>
<td>Increased bureaucracy</td>
<td>-0.79</td>
<td>-0.76</td>
<td>-0.78</td>
<td>0.848</td>
</tr>
<tr>
<td>Price increases</td>
<td>-0.82</td>
<td>-0.81</td>
<td>-0.82</td>
<td>0.939</td>
</tr>
</tbody>
</table>

Source: authors’ own elaboration based on the survey.

From the exporters’ perspective, reduced or wholly eliminated border crossing procedures are the key positive consequence of membership. The second in rank was access to the EU market and increased interest in the products offered by exporters and generally in cooperation with exporters. Issues related to faster deliveries, easier flow of goods and more effective logistics were ranked at more or less the same level. It can be easily seen that respondents who were exporters mostly appreciated matters relating to access to the EU market, which is consistent with expectations. A somewhat
lower ranking was given to the abolishment of customs duties. Custom duties are cost
drivers that are obviously an obstacle hindering international trade. Nevertheless,
customs duties for the majority of products being traded between Poland and the EU
were abolished much earlier, before Poland joined the EU, pursuant to the provisions
concerning a free trade area for industrial products. Therefore, the perception of
advantages was concentrated around free access to the EU market in terms of logistics,
procedures and easier cooperation with foreign partners.

Free flow of capital was ranked the last but one positive consequence of membership.
In practical terms, it helped managers to run their businesses on a daily basis (for
instance, in making current payments), but also made it possible for businesses from
Poland to implement direct business projects in the EU countries. The prospect of
introduction of the euro in Poland was also quoted as an advantage. This issue revealed
the highest, more than double divergence between exporters’ and non-exporters’
opinions. Taking into account political factors (such as, for instance, the need to amend
the Polish Constitution) and the successive phases of the crisis still being felt in some
EU Member States, the prospects of introducing the European currency in Poland are
becoming more remote. Nevertheless, joining the Eurozone would undoubtedly bring
many benefits to business entities involved in international trade.

Although Poland’s membership brought a number of positive consequences, there
were also some negative ones. As already mentioned, for all the categories considered
by the respondents as negative, there were no statistically relevant differences between
the answers of exporters and those of non-exporters. First of all, among the negative effects, the respondents indicated price increases and excessive bureaucracy (as regards negative effects of membership, the sequence/ranking of individual factors was identical for exporters and non-exporters alike). Increased competition and changes in the regulations were considered somewhat less burdensome, while the need to adjust to the requirements and regulations of the EU was ranked as the least troublesome. The positive effects prevailed over the negative ones, with exporters finding more advantages than disadvantages. With more or less similar answers of exporters and non-exporters regarding the negative effects of membership, exporters’ evaluation concerning its positive consequences was much favourable.

This conclusion was confirmed by the answers to the next question of the questionnaire, concerning overall evaluation of the effects of Poland’s EU membership. All the respondents considered the consequences of membership to be definitely positive or rather positive, although the answers of exporters differed significantly, in statistical terms, from those of non-exporters. Among non-exporters, the percentage of explicitly positive answers was lower by 21.9 percentage points. On the other hand, among non-exporters, the percentage of answers “EU membership did not affect my firm” or suggesting both positive and negative effects at the same time, was more favourable.

5.1.4. Perception of the consequences of the 2008+ crisis

The results of the survey cover a period during which the respondents had to operate under the rather harsh conditions of 2008+ crisis. The successive phases of the crisis brought about a slump in the world economy and hence a decreased demand for Poland’s exports, in addition to increased overall risk associated with business activity, severance of many cooperative links and a high volatility of exchange rates. The first phase of the crisis also resulted in reduced FDI inflows, which had adverse consequences for international trade. Activities of foreign investors, especially of multinational corporations, were important drivers of international trade. Undoubtedly, the crisis brought about many negative effects in the Polish economy for exporters and non-exporters alike. However, at least two factors should be mentioned that alleviated the consequences of the crisis suffered by business entities operating in Poland. First, the fact of Poland’s remaining outside the Eurozone allowed an adjustment effect via exchange rate policy to take place. Depreciation of the zloty partly offset the adverse consequences of the decreased exports and lower foreign demand. It should be remembered, however, that the positive effect of depreciation on improved competitiveness is the weaker, the more imported raw materials and components are needed for export operations (export dependence on import). This is because a weaker currency means that importing becomes more expensive. As regards the second factor, the crisis offered opportunities for some firms due to the fact that more expensive components offered by suppliers from the “old” EU countries were substituted by the supply of Polish products characterised by a favourable value-for-money ratio.

Of the respondents’ answers, opinions indicating definitely positive or rather positive effects of the 2008+ crisis and of the economic slowdown in Poland were in the minority
(a total of 7.9% of the answers, with a slightly higher percentage recorded among the exporters). 23% of respondents felt both positive and negative consequences. As regards rather negative and definitely negative effects, the percentage of answers was higher among exporters. Thus, export turned out to be a crisis-driving factor. Non-exporting entities more often than exporting ones declared that the crisis and the economic slowdown in Poland did not affect their operations. The answers provided by exporters differed in a statistically significant way from those of non-exporters.

![Figure 67. Consequences of the 2008+ global crisis and the economic slowdown in Poland](image)

Source: authors’ own elaboration based on the survey.

The consequences of the crisis are manifold and influenced by a number factors, many of which are unique to individual entities. One of such factors is resignation from or postponement of projects planned earlier, for instance implementation of innovative projects. According to the theory of heterogeneous firms, activities of this kind are particularly important for building and expanding the export potential. In the case of 23.3% of the respondents, investment plans concerning the implementation of innovation were either delayed or postponed in time. This referred to exporters (25.3%) rather than to non-exporters (19%), and the differences were statistically significant.

Due to the world crisis, some of the respondents adopted adjustment measures. These were mainly exporting entities, of whom 43.3% declared that they had taken such measures, as compared to 19.4% of non-exporting ones; in this case, the differences between exporters and non-exporters were statistically significant.
Cost reduction was the measure that exporters and non-exporters alike resorted to most frequently. The differences between the two groups relating to the structure of answers were statistically insignificant. On the other hand, the differences between exporters and non-exporters were statistically significant in the case of the second measure listed by the respondents - analysis of foreign market demand. During the crisis, requirements of the foreign markets are analysed primarily by those who are already exporters: 24.1% of exporting entities chose this particular measure, as compared to 6.8% of non-exporting entities. The answers pointed to a rather slight interest in export opportunities among businesses so far focusing their activities on the domestic market.

Table 17. Adjustment measures adopted by respondents during the 2008+ crisis

<table>
<thead>
<tr>
<th>A measure</th>
<th>Exporters</th>
<th>Non-exporters</th>
<th>Total of respondents</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost reduction</td>
<td>30.3</td>
<td>38.6</td>
<td>31.8</td>
<td>0.127</td>
</tr>
<tr>
<td>Analysis of foreign market requirements</td>
<td>24.1</td>
<td>6.8</td>
<td>21.0</td>
<td>0.000</td>
</tr>
<tr>
<td>Quality improvement of products/services</td>
<td>23.1</td>
<td>27.3</td>
<td>23.9</td>
<td>0.320</td>
</tr>
<tr>
<td>Technological changes in the firm</td>
<td>11.2</td>
<td>13.6</td>
<td>11.6</td>
<td>0.643</td>
</tr>
<tr>
<td>Upgraded employee qualifications</td>
<td>11.2</td>
<td>13.6</td>
<td>11.6</td>
<td>0.409</td>
</tr>
</tbody>
</table>

Source: authors' own elaboration based on the survey.

A relatively large number of the respondents (23.9%) also implemented measures aimed to improve the quality of their products, while fewer of them chose the answers relating to the introduction of technological changes and upgrading employee qualifications. In their answers to an open question, the respondents also listed such adjustment measures: personnel reduction (18 answers), diversification of production/expanding the range of products (17 answers) and entry to the Polish market (2 answers).

The respondents also evaluated the preparations and remedial measures taken to combat 2008+ crisis and economic slowdown. In this case, the answers of exporters and non-exporters differed considerably in a statistically significant way. The respondents could choose the answer “does not apply”; this answer was chosen more frequently by non-exporters. A comparison of the answers in both groups of respondents implied that, from today’s perspective, exporters better evaluated the measures that had been adopted to prepare the firm for the crisis. This was evidenced by a more frequent selection of the answer: “very well” and “rather well”.

In interpreting the survey results, it is worth commenting on the answers to questions of a more general nature. On the one hand, export turned out to be a channel for transmitting critical tensions and therefore affected mainly exporters. On the other hand, exporters evaluated remedial and adjustment measures more favourably. This was due to their operation in a more demanding and competitive environment, which allows them to recognise potential threats much faster but also to raise more capital (since
exporters are usually larger entities, also characterised by a higher level of productivity). Moreover, exporters could choose from a wider range of measures due to conducting their operations in more than one domestic market. Naturally, the ultimate decisions concerning the choice of such measures depend on the actual situation of individual entities. For exporters, activity on more than one market opens up opportunities for the diversification of risk. The current crisis is obviously global in nature, yet its course and intensity have been different for different regions of the world/countries and for different sectors of the economy.

**What is your evaluation of the measures adopted to prepare for the 2008+ crisis/economic slowdown?**

*Figure 68. Evaluation of preparation for the 2008+ crisis/economic slowdown – from the present-day perspective*

Source: authors’ own elaboration based on the survey.
As regards the question whether the crisis had already ended or not, the answers obtained in the survey were rather balanced: 21% of the respondents had no firm view on the matter, 46.5% believed the crisis was over, 19.2% claimed it would soon be over, while 12.9% expressed the opinion that it was there to stay for much longer. In this case, the answers of exporters and non-exporters did not differ in a statistically significant manner.

The crisis has many different consequences. However, as already mentioned, these consequences not only involve threats to business operations. According to 46.5% of the respondents, the crisis brings both threats and opportunities. For 12% of the respondents, it mostly means opportunities or likely opportunities rather than threats. However, 41.6% of the interviewees regarded it as a threat or a likely threat, rather than an opportunity.

![Figure 69. Evaluation of the crisis in terms of opportunities/threats](source: authors' own elaboration based on the survey)

Dorota Ciołek, Tomasz Brodzicki

5.2. Determinants of export activity of firms in Poland – the logit model

In addition to the above multivariate statistical analysis of the survey’s major findings, the causal relationships occurring between different variables and categories characterising the respondents’ operations were examined. From the perspective of the entire study, most interesting was to identify the factors that have a statistically significant impact on the fact that a given firm is an exporter. Therefore, an attempt was made to answer the question on what features and attributes of a firm are conducive to its commencing export capacity, and which of them play a major, and a minor, role. The selection of the explanatory variables for the econometric models was based on
the results of the critical review of theoretical and empirical literature concerning the so-called new new trade theory, provided in Chapter 3.

5.2.1. Definitions and statistics of variables

The key variable of the analysis, namely the exporter variable, was defined as a binary variable equalling 1 for exporting firms or equalling 0 for non-exporting ones. The main objective of the analysis at this stage was to identify factors that encourage firms to start export activity rather than to isolate factors which determine the value of the firm’s exports. Therefore, the fact whether a firm was an exporter or not, and not the value of exports, was the dependent variable. It should be borne in mind that 69% of all the surveyed entities were exporters.

The first stage of the modelling process was to identify those attributes which, according to theory and assumptions, were of major importance to a firm’s decision on commencing (or being able to commence) export activity. One of the crucial features is the size of the firm that reflects the scale of its operations, and the sector in which it operates. The size of the company may be defined by means of the value of its revenues or by employment size. Since it seems that official employment data may be less biased than data on the volume of sales, given the entrepreneurs’ unwillingness to reveal the real figures, it was decided that the scale would be represented by the level of employment. The sector of activity, on the other hand, was defined by three qualitative variables, classifying firms as manufacturing, service or trade businesses. It should be noted that this classification was based on the type of activity declared by the respondents to be central to their businesses, and it should be remembered that many firms were involved in two or more forms of business activity.

In addition to the two basic variables mentioned above, other features that might have some influence on a firm’s decision to engage in export were also indicated. These were as follows:

- Foreign shareholdings in the firm’s equity – we expect companies with foreign shareholdings to get involved in export activity more frequently (foreign capital). The presence of foreign capital was defined with a binary variable: 1 for companies with foreign shareholdings, and 0 for firms which were wholly Polish-owned.
- Age of the firm in years – in accordance with the assumption that firms with a longer market experience are more likely to undertake export activity (age). The firm’s duration: 2012 (the year covered by the survey) minus the declared date of establishment.
- Level of human capital, represented by the percentage of employees with higher education in total employment (human capital) – it may be of considerable significance for commencing export activity.
- A wide range of products, i.e. whether the firm offers more than one product (a good or service), (multi-product) – we assume that a larger number of products increases export opportunities.

The further stages of the analysis looked at the impact of the following qualitative features on export activities, represented in the model by dummy variables:
• whether the firm imports goods or services from abroad \((\text{importer})\),
• whether the firm is engaged in any direct investment activity in foreign markets \((\text{active}_{\text{FDI}})\),
• whether the firm is a part of a multinational enterprise \((\text{intern}\_\text{group})\),
• whether any cooperation with other firms has been declared \((\text{cooperation})\),
• whether the firm operates within an industrial cluster \((\text{clusters})\),
• whether the firm uses any state aid subsidies, such as incentives or tax rebates \((\text{incentives})\).

In the light of the most recent economic theories, the company's productivity and innovation are factors which stimulate export capacity to the highest degree. Various measures of productivity are adopted both in theoretical and empirical studies. The simplest and most frequently used measure, which is also the easiest to interpret intuitively, is labour productivity \((LP)\), which, for firm \(i\), is determined as:

\[
LP_i = \frac{S_i}{L_i},
\]

where \(S_i\) represents the volume of sales in firm \(i\), and \(L_i\) represents the number of employees.

The measure of the firm's productivity is therefore represented by the volume of sales per employee. Value added per employee may also be used:

\[
\frac{VA}{\text{worker}}_i = \frac{VA_i}{L_i},
\]

where \(VA_i\) means added value in firm \(i\), determined by the subtractive method as \(VA_i = S_i - B_i - ES_i\), with \(B_i\) representing the cost of material and energy, and \(ES_i\) – the cost of external services.

Another measure of productivity is the productivity of the second basic production factor, namely capital \((CP – \text{capital productivity})\), which is determined as:

\[
CP_i = \frac{S_i}{FA_i},
\]

where \(FA_i\) represents the firm’s fixed assets.

In order to take into consideration the productivity of both production factors, it is suggested to use the total productivity index, as measured by:

\[
TPROD_i = \sqrt{\frac{VA_i}{FA_i} \cdot \frac{VA_i}{L_i}},
\]

with the use of the variables defined above. Productivity understood in this way is a weighted average of labour productivity and capital productivity (both having equal weights).
Following the conversion of the data obtained from the survey, several basic variables concerning innovative activity were introduced. First, dummy variables were introduced relating to the classic division into the product \((\text{innov\_product})\), process \((\text{innov\_proc})\) and organisational innovations \((\text{innov\_org})\); the dummy variable takes the value of 1 if the firm declared the implementation of an innovation during the last 3 years. A similar procedure was applied to product innovations, novel to the market and recognised as radical types of innovation \((\text{innov\_new\_market})\). Second, taking into consideration the significant role of technological innovations based on R&D activity, another variable has been added, \(\text{patents}\), provided that in the period in question the firm acquired protection of intellectual property rights by way of a patent. Third, on the basis of the answers provided by respondents to the questions relating to innovations that had been introduced, \(\text{a variable was developed to reflect the attitude toward changes (changes), and a binary variable to reflect the declared implementation of innovative products in the last 3 years (innov\_declar)\). Finally, one more variable was developed to reflect, in a comprehensive way, the intensity of innovative activities \((\text{innov\_extent})\). Table 18 shows the frequency of all binary variables which reflect qualitative features defined on the basis of the survey. Most of them have been discussed in the earlier part of the study.

### Table 18. Distribution of qualitative variables used in econometric models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Exporter</td>
<td>68.9</td>
</tr>
<tr>
<td>Manufacturing firms</td>
<td>75.3</td>
</tr>
<tr>
<td>Trading firms</td>
<td>17.6</td>
</tr>
<tr>
<td>Service firms</td>
<td>7.1</td>
</tr>
<tr>
<td>Multi-product firms</td>
<td>93.8</td>
</tr>
<tr>
<td>Foreign capital firms</td>
<td>25.7</td>
</tr>
<tr>
<td>Importer</td>
<td>44.6</td>
</tr>
<tr>
<td>Active_FDI</td>
<td>10.2</td>
</tr>
<tr>
<td>Intern_group</td>
<td>11.1</td>
</tr>
<tr>
<td>Cooperation</td>
<td>88.4</td>
</tr>
<tr>
<td>Clusters</td>
<td>2.0</td>
</tr>
</tbody>
</table>

4 The questions basically tackled two issues. The first was the implementation (over the last 3 years), or planned implementation (over the next 3 years), of: new products or services, technologically improved products or services, more modern production methods, substantial organisational changes (e.g. in the management or implementation of ISO standards) or ownership changes (e.g. mergers, takeovers, finding an investor), starting or expanding cooperation with other firms (e.g. in R&D) and expanding the scope of or finding new markets to sell products or services. The second was the nature of innovative products that had been introduced, that is products which were innovative only to a given respondent or products innovative in the market. In addition, the share of innovative products in total revenue from sales was also taken into account.
As has been mentioned earlier, nearly 69% of the respondents were exporting firms. In the majority of them, production was the core activity (over 75%), and nearly all the firms (as much as 93.8%) declared that they offered more than one product for sale. About 26% of enterprises were companies with foreign shareholdings, while 10% of the surveyed firms were involved in direct investment abroad. Contact with foreign markets was also established through imports; nearly 45% of firms imported products or services from abroad. As regards cooperation with other firms, the majority (88.4%) of the respondents declared such cooperation, although only 2% of them decided, intentionally, to operate in clusters. A mere 9.4% of all the surveyed firms were beneficiaries of state aid instruments such as incentives or tax breaks. As regards innovation, it was found that, apart from product innovation, the majority of firms were not involved in any innovative activity.

In addition to qualitative variables (binary), econometric modelling took into account quantitative variables. Table 19 shows the descriptive statistics for these variables. It should be noted that apart from the firm’s age, all the remaining ones are highly volatile variables, i.e. with a considerable diversification in the surveyed population. We assume this would also apply to the general population.

Figure 70 shows the distribution of productivity measures in the group of firms under analysis. Productivity distribution measured in different ways was characterised by similar features: it was asymmetrical – distinctly skewed to the right, slender and with the central tendency in the same place. Comparison of capital productivity (the green line) with labour productivity (the blue line) revealed that capital productivity had a larger negative asymmetry. This means that more firms are characterised by capital productivity, which is lower than average than in the case of labour productivity.

Table 18 – continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Innov_product</td>
<td>66.0</td>
</tr>
<tr>
<td>Innov_proc</td>
<td>32.4</td>
</tr>
<tr>
<td>Innov_org</td>
<td>24.1</td>
</tr>
<tr>
<td>Innov_new_market</td>
<td>28.5</td>
</tr>
<tr>
<td>Patents</td>
<td>17.3</td>
</tr>
<tr>
<td>Changes</td>
<td>82.0</td>
</tr>
<tr>
<td>Innov_declar</td>
<td>42.0</td>
</tr>
</tbody>
</table>

Source: authors’ own elaboration based on the survey.

5 Functioning in clusters may be an intentional choice when it refers primarily to formal cluster initiatives, or not intentional, which is when the co-called colocated firms cooperate in accordance with the definition of the cluster, but do not define their cooperation using that term. A wider discussion of cluster cooperation in Poland may be found in the publication edited by Brodzicki and Kuczerska (2012).
Table 19. Basic descriptive statistics for quantitative variables used in the models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average</th>
<th>Deviation</th>
<th>Coefficient of variation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>110</td>
<td>187</td>
<td>169%</td>
<td>1</td>
<td>2,000</td>
</tr>
<tr>
<td>Sales</td>
<td>53,278</td>
<td>111,545</td>
<td>209%</td>
<td>-0.015</td>
<td>1,031,172</td>
</tr>
<tr>
<td>Age of firm</td>
<td>19.0</td>
<td>12.8</td>
<td>68%</td>
<td>2</td>
<td>98</td>
</tr>
<tr>
<td>Human capital</td>
<td>22.7</td>
<td>20.9</td>
<td>92%</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Labour productivity</td>
<td>1.218</td>
<td>8.151</td>
<td>669%</td>
<td>-0.001</td>
<td>187,064</td>
</tr>
<tr>
<td>Capital productivity</td>
<td>91.7</td>
<td>784.3</td>
<td>855%</td>
<td>0.270</td>
<td>14,404</td>
</tr>
<tr>
<td>Total productivity</td>
<td>71.9</td>
<td>232.3</td>
<td>323%</td>
<td>0.625</td>
<td>3,036</td>
</tr>
<tr>
<td>Value added per employee</td>
<td>622</td>
<td>3,514</td>
<td>565%</td>
<td>1,357</td>
<td>68,682</td>
</tr>
<tr>
<td>Innov-extent</td>
<td>2.38</td>
<td>1.78</td>
<td>75%</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: authors' own elaboration based on the survey.

5.2.2. Characteristics of logit modelling

In econometric modelling of the binary variable, logit models are among the ones most commonly used. In such models, the probability of the analysed binary variable taking the value of 1 - that is the value which represents a specific variant of the analysed feature - is the original response variable. In the study at hand, this is the probability of

---

6 Other models for binary variables are: the linear probability model and the probit model.
a firm being engaged in the export activity. The modelling of such a variable using linear regression, that is a linear probability model, involves some interpretation problems since the values of the estimated probability can be outside of the (0,1) range. One of the solutions addressing this problem is to adopt the so-called logit instead of probability as the response variable. Let \( p_i \) mean the probability of success, which in the case at hand is the firm being an exporter. The term \( \text{logit} \) refers to the logarithm of the ratio of the probability of success and probability of failure for the analysed feature,\(^7\) so:

\[
\text{logit} (p_i) = \ln \frac{p_i}{1 - p_i}.
\]

If the probability of a firm becoming an exporter or continuing to be a firm operating solely in the domestic market was equal (\( p_i = 0.5 \)), the logit would be 0. For \( p_i < 0.5 \), the logit assumes a negative value, and a positive value when \( p_i > 0.5 \). In the logistic regression model, instead of directly modelling the \( p_i \) variable with respect to response variables \( X \), the logit defined above is modelled as a function of these variables. Therefore, the form of the logit model can be represented as follows:

\[
\text{logit} (p_i) = Z_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_k X_{ik} + \xi_i.
\]

This model allows to estimate \( \beta \) parameters which reflect the direction and strength of the influence of the explanatory variables \( X \) on the logit, that is, indirectly, on the probability of the fact that the firm in question is an exporter.

Model (6) is estimated by the Maximum Likelihood Estimation method (MLE), which in this case is a consistent, asymptotically efficient and asymptotically normal estimator. The significance of the model estimated in this way is evaluated using the likelihood ratio test \( LR \). According to the null hypothesis, all the parameters equal 0 (this means that the model only with a constant term is a true one), whereas the alternative hypothesis assumes that at least one of the explanatory variables has a significant impact on the response variable. Rejecting the null hypothesis in the test (when the p-value is lower than the assumed level of significance, e.g. 0.01) means that the regression as such is statistically significant.

In nonlinear models the parameters do not have direct interpretations, as is the case with the classical linear model. The logit model allows two possible ways of interpretation. First, the results are interpreted using the odds ratio \( \left( \frac{p_i}{1 - p_i} \right) \). If \( \hat{\beta}_j \) is an estimate of the parameter for variable \( X_j \) in the logit model, then \( \hat{\beta}_j > 0 \) means that the odds that \( y_i = 1 \) (here: the firm is an exporter) increase as the value of the variable \( X_j \) increases. If \( \hat{\beta}_j < 0 \), these odds are lower. To be exact, an increase in the value of variable \( X_j \) by a unit entails \( e^{\hat{\beta}} - 1 \) fold change in the odds ratio. Therefore, if explanatory variable \( X_j \) is a binary variable, \( (e^{\hat{\beta}} - 1) \) tells us by what percentage the probability of the response variable taking 1 increases when variable \( X_j \) changes its value from 0 to 1. For continuous variables, every additional unit of variable \( X_j \) increases (or decreases) the probability that the response variable takes 1 by \( (e^{\hat{\beta}} - 1) \) per cent. To sum up, we

\(^7\) Maddala (2001), p. 323.
can say that the odds ratio states the average change of probability of the firm being an exporter when the explanatory variable increases by 1 unit.

Another way to interpret the estimation results in the logit model is to determine the marginal effects using the following formula:

\[
\frac{\delta P_i}{\delta x_{ji}} = \beta_j \frac{\exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki})}{[1 + \exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki})]^2},
\]

where, most frequently, we substitute average values of these variables in the sample for \(X_{ki}\), and make the interpretation using the category of changes in the probability of the event described by \(y_i = 1\), caused by a single (marginal) value of variable \(X_j\). However, if – as in our model – the explanatory variables are qualitative variables, determining the marginal effects for the average values of all the variables is not expedient because the average values of the binary variables equal the fraction of ones in the analysed population (percentage of firms that gave a positive answer to the questionnaire question). Yet, due to the differences in the explanatory variables in the models, the interpretations of the estimation results for individual logit models presented below are based on the odds ratio.

In classic econometric modelling, which most frequently refers to time series or macroeconomic data, the goodness of fit of the model in terms of empirical data is evaluated using the coefficient of determination \(R^2\). However, the values of this coefficient in the models estimated for the survey data or, more broadly, in microeconomics, are usually very low. Therefore, the model as such can be quite correct, but the value of the coefficient of determination will be low (Wooldridge 2003, Murray 2006). In the logit model, the value of the classic coefficient of determination is not estimated; instead, McFadden’s Pseudo-\(R^2\) (McFadden 1974) is calculated. It is based on the comparison of the full model estimation with the model reduced to the constant term only.\(^8\) It should be borne in mind, however, that the value of the coefficient of determination defined in this way most frequently assumes values closer to 0 rather than 1.

Another way to evaluate the model’s goodness of fit is to check the accuracy of predictions made on its basis. Then, the percentage of accurate predictions is determined, often termed count-\(R^2\), which, in the case of logit models, seems to be a better tool for the evaluation of the goodness of fit than the “classical” coefficient of determination.

5.2.3. The role of productivity in export activity

According to the Melitz model (2003), a firm’s productivity is of crucial importance for its competitiveness and is, therefore, vital for commencing export activity that requires substantial market entry costs to be incurred. Firms with an insufficient entry level of productivity are not even able to succeed at home and are eliminated from the domestic market. Firms with a higher level of productivity can meet the competitive pressure domestically, but they lack sufficient productivity to overcome serious barriers to foreign market entry. Only the most productive firms, with higher productivity than

\(^8\) Measures proposed by McKelvey & Zavoina (1975) and Maddala (1983) can also be used.
the theoretical threshold value, can successfully penetrate one or more foreign markets. This is how the natural process of selecting exporters from the overall population of firms occurs (selection effect). Here, the initial level of productivity, before foreign market entry, is of critical importance since the available research findings do not corroborate the learning from exporting process.

As discussed above, productivity can be measured in various ways, and it is difficult to decide unequivocally which of these ways is the most adequate. For this reason, this part of the analysis provides estimations for the logit models which include all the measures of productivity mentioned above in their explanatory variables, i.e.: labour productivity in model (M1), value added per employee in model (M2), capital productivity in model (M3), and total productivity \( TPROD \) defined by formula (4) in models (M4) and (M5). The estimation results of the logit models for all the variants are provided in Table 20. The subsequent columns present the results for different specifications; in the model (M4), dummy variables for manufacturing and service firms were included to denote the sector of activity. In this case, the coefficients on the variables should be interpreted vs. trading firms which represented the reference values. On the other hand, in the model (M5), in which the binary variables representing production and trading firms were included, the estimated parameters provide information on the deviation in relation to the service firms. The set of the remaining explanatory variables is the same in all the 5 models (specifications).

Based on the results of the likelihood ratio test (LR), it can be concluded that each of the models presented in Table 20 is significant – p-values are lower than the usually accepted level of significance of 5%. When evaluating the estimated models for the goodness of fit, it should be noted that in all the cases the value of the coefficient of determination is low, at approximately 20%. As explained above, a better measure of the model’s verification is in this case the prediction accuracy rate, which was about 76-77%. Looking at this indicator, we find that total productivity (\( TPROD \)) best of all the considered productivity measures explains the differences between exporters and non-exporters; in this particular specification, the accuracy rate was the highest, at 77.5%.

Table 20. Estimation result of the logit model for exporters – different variants of productivity measures

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M1) exporter</th>
<th>(M2) exporter</th>
<th>(M3) exporter</th>
<th>(M4) exporter</th>
<th>(M5) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing firms</td>
<td>-1.037***</td>
<td>-0.642*</td>
<td>-1.205***</td>
<td>-0.657*</td>
<td>0.789**</td>
</tr>
<tr>
<td></td>
<td>(0.324)</td>
<td>(0.333)</td>
<td>(0.344)</td>
<td>(0.351)</td>
<td>(0.398)</td>
</tr>
<tr>
<td></td>
<td>0.354***</td>
<td>0.526*</td>
<td>0.299***</td>
<td>0.519*</td>
<td>2.201**</td>
</tr>
<tr>
<td>Service firms</td>
<td>-1.479***</td>
<td>-1.174**</td>
<td>-1.917***</td>
<td>-1.432***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.465)</td>
<td>(0.474)</td>
<td>(0.481)</td>
<td>(0.489)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.228***</td>
<td>0.309**</td>
<td>0.147***</td>
<td>0.238***</td>
<td></td>
</tr>
<tr>
<td>Trading firms</td>
<td></td>
<td></td>
<td></td>
<td>1.492***</td>
<td>4.447***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.502)</td>
<td></td>
</tr>
</tbody>
</table>
Table 20 – continued.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M1) exporter</th>
<th>(M2) exporter</th>
<th>(M3) exporter</th>
<th>(M4) exporter</th>
<th>(M5) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(employment)</td>
<td>0.853***</td>
<td>0.916***</td>
<td>0.730***</td>
<td>0.867***</td>
<td>0.873***</td>
</tr>
<tr>
<td></td>
<td>(0.109)</td>
<td>(0.111)</td>
<td>(0.118)</td>
<td>(0.121)</td>
<td>(0.122)</td>
</tr>
<tr>
<td></td>
<td>2.346***</td>
<td>2.500***</td>
<td>2.074***</td>
<td>2.379***</td>
<td>2.395***</td>
</tr>
<tr>
<td>Log(human capital)</td>
<td>-0.004</td>
<td>-0.022</td>
<td>0.088</td>
<td>0.037</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(0.102)</td>
<td>(0.104)</td>
<td>(0.103)</td>
<td>(0.108)</td>
<td>(0.108)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.008)</td>
</tr>
<tr>
<td></td>
<td>0.999</td>
<td>0.978</td>
<td>1.091</td>
<td>1.037</td>
<td>1.033</td>
</tr>
<tr>
<td>Log(LP)</td>
<td>0.388***</td>
<td>1.474***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.092)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(VA/labour)</td>
<td></td>
<td>0.510***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.099)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.665***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(CP)</td>
<td></td>
<td>0.101</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.071)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(TPROD)</td>
<td></td>
<td></td>
<td></td>
<td>0.470***</td>
<td>0.470***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.110)</td>
<td>(0.110)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.600***</td>
<td>1.599***</td>
</tr>
<tr>
<td>Foreign capital</td>
<td>1.345***</td>
<td>1.311***</td>
<td>1.597***</td>
<td>1.551***</td>
<td>1.548***</td>
</tr>
<tr>
<td></td>
<td>(0.305)</td>
<td>(0.311)</td>
<td>(0.320)</td>
<td>(0.333)</td>
<td>(0.333)</td>
</tr>
<tr>
<td></td>
<td>3.840***</td>
<td>3.709***</td>
<td>4.938***</td>
<td>4.717***</td>
<td>4.701***</td>
</tr>
<tr>
<td>Multi-product</td>
<td>0.388</td>
<td>0.390</td>
<td>0.392</td>
<td>0.410</td>
<td>0.387</td>
</tr>
<tr>
<td></td>
<td>(0.467)</td>
<td>(0.490)</td>
<td>(0.470)</td>
<td>(0.502)</td>
<td>(0.504)</td>
</tr>
<tr>
<td></td>
<td>1.470</td>
<td>1.476</td>
<td>1.479</td>
<td>1.506</td>
<td>1.472</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.285***</td>
<td>-5.029***</td>
<td>-1.994***</td>
<td>-4.071***</td>
<td>-5.527***</td>
</tr>
<tr>
<td></td>
<td>(0.894)</td>
<td>(0.948)</td>
<td>(0.722)</td>
<td>(0.909)</td>
<td>(0.885)</td>
</tr>
<tr>
<td>Observations</td>
<td>616</td>
<td>610</td>
<td>589</td>
<td>586</td>
<td>586</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.192</td>
<td>0.210</td>
<td>0.181</td>
<td>0.211</td>
<td>0.212</td>
</tr>
<tr>
<td>Accuracy rate</td>
<td>76.1%</td>
<td>77.0%</td>
<td>76.1%</td>
<td>77.5%</td>
<td>77.3%</td>
</tr>
<tr>
<td>LR</td>
<td>146.36</td>
<td>159.35</td>
<td>132.66</td>
<td>153.77</td>
<td>154.38</td>
</tr>
<tr>
<td>LR Prob</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
</tbody>
</table>

Source: authors’ own calculations using STATA 14.

Notes:
1) Three numbers correspond to each variable in the successive models, viz.: estimation of the model’s structural parameter, in brackets under the parameters – robust errors,9 odds ratio figures in italics, under the robust error figures.
2) Significance of parameters and odds ratios: *** p < 0.01, ** p < 0.05, * p < 0.1.

9 It should be noted that in all the models robust errors were used to verify the significance of the parameters. This was advisable because in each case the hypothesis of homoscedasticity was rejected, which means that the standard errors were biased.
The parameter estimations for all the productivity measures are statistically significant and positive. Therefore, it can be concluded that, as the level of productivity grows, the probability of a firm becoming an exporter also increases. The odds ratio was additionally shown under each structural parameter estimation in the logit model; it indicates the average change in the probability of a firm becoming an exporter if the explanatory variable increases by 1 unit. It can be observed that if the log of labour productivity increases by 1, then the odds that a given firm will engage in the export activity increases by 47% on average. In other words, it means that a 10% increase in the labour productivity (LP) increases the probability of commencing the export activity by 2.76%. Similarly, an increase in value added per employee by 10% increases such probability by 3.87%, while an increase in total productivity (TPROD) by 10% increases the probability that a given firm will export on average by 3.5%.

On the basis of the results provided in Table 20, we can evaluate which of the remaining variables included in the models had a significant impact on export capability and what direction this process had. It was found that the scale of activity represented by employment determines export capability in a statistically significant way, and the larger the firm, the higher the probability that it will engage in export activity. The average probability ratio estimation for this particular variable is 2.34, which means that, on average, a 10% increase in employment increases the probability of the firm being an exporter by 7.8%. It was also found that the level of human capital measured by the percentage of employees with higher education, declared by the respondents, is not statistically significant for a firm's decision on engaging in export activity. It should be stressed, however, that this result may be an effect of using a relatively simple concept of measuring human capital.

Economic theory holds that the longer a firm operates on the market, the greater the chance it will export its products. However, the results of the discussed survey indicate that the firm's age has no bearing on whether it is an exporter or not, and the parameter in the case of this variable is statistically insignificant. This could be due to the ambiguous survey question that was asked. In answering the question on the year of starting a business, some of the interviewees might have listed the year in which the firm started its business operations, while others might have referred to the year of starting operations in the Polish market. Owing to the fact that many of the surveyed firms were companies with foreign shareholdings, the observations using this variable could be biased, which led to formulating the conclusion on its negligible impact in the model identifying the determinants of export activity. The impact of the number of products offered by a firm (whether one or more) was found to be similarly negligible, which could possibly be attributed to the fact that only some 6% of the surveyed firms declared one product or service as the object of their business activity. It should be noted that the insignificant impact of these variables was also identified in other specifications, irrespective of whether they included a reduced or an increased number of explanatory factors. In order to maintain clarity and consistency of argumentation, the results of these models' estimations were left out from the analysis.

Sector of activity was found to be statistically significant for exports. Comparison of the estimations of models (M4) and (M5) shows that the probability that a manufactur-
ing or a service firm is engaged in the export activity is significantly lower than in the case of a trading firm. To sum up the results of the calculation for this variable, it can be concluded that strictly trading firms have the best chance of starting export activity; for them, trade, including foreign trade, is the core area of operation. The probability that a manufacturing firm is an exporter is 48% lower than for a trading firm, while the chance that a service firm is engaged in export activity is 76% lower than in the case of a trading company *ceteris paribus*, i.e. under the assumption that the firms concerned are similar in respect of all the remaining attributes included in the model. In reality, however, many manufacturing firms sell their products abroad via specialised intermediaries. In parallel, the probability that a manufacturing firm will start to export is 120% of the probability for a service firm, *ceteris paribus*. A comparison of the probability figures for different types of firms is shown in Fig. 71.

![Figure 71. Probability of engagement in export activity by different types of firms (ceteris paribus)](source: authors' own calculations based on the questionnaire survey)

Analysis of the estimation results shown in Table 20 demonstrates that - irrespective of the model - the highest estimation for the structural parameter was obtained for the variable representing foreign capital in a firm. This means a strong and statistically significant (as shown by the p-value of a significance test) impact on export activity. Since the average value of the odds ratio is 4.38, it can be concluded that the probability of being engaged in export activity can be as much as 300% higher for firms with foreign shareholdings than for wholly Polish-owned firms, on the assumption that these firms are of a similar size, operate in the same sector and have a similar level of productivity. To sum up, it can be said that in the analysed sample the fact whether a given firm is or is not an exporter depends above all on the presence of foreign capital, with a sector of activity as the second most important factor. What is also significant is the firm’s size represented by the number of personnel and, albeit to a lesser though still significant extent, its productivity. In contrast, and surprisingly, the age of the firm, the level of human capital and the number of offered products were all factors for which no significant impact was found. This could be associated with the selection of firms for the survey and the selection criteria applied.
A similar modelling exercise was conducted with the scope of data limited to manufacturing firms only. It was found that the estimation results are substantially different from those for the whole sample. This could suggest that the conclusions are robust, i.e. not sensitive to the selected research sample.

5.2.4. Internationalisation and export activity

In the next part of the modelling process, it was tested on the basis of the questionnaire survey results whether the regularities suggested by theory were also observable in the analysed population of enterprises. The variables representing the ties between firms and foreign markets were added to the logit model. Foreign capital, discussed in the earlier part of the analysis, was the first such variable. It was found that foreign capital is the most important factor of all examined so far that has a bearing on export capability. This time, the model also took account of whether a given firm imports goods or services from abroad, which, according to theory, should be of paramount importance for its exports. Here, the learning from importing hypothesis was verified: the variable \( \text{importer} \) was introduced as a binary variable that takes 1 for importing firms and 0 for non-importing ones. One more variable was added to the model to denote a higher potential for internationalisation; that is the ability to invest in foreign markets in the form of FDI, e.g. investment made by Polish firms abroad, a process the scale of which has been on the increase in the recent years. In this case, one more binary variable was added, which assumed 1 for firms investing abroad and 0 for non-investing ones. Additionally, a binary variable to identify firms which were subsidiaries of international groups was included in the set of factors illustrating the nature of a firm's internationalisation (\( \text{intern\_group} \)). It should be stressed that nearly one third of global trade takes place within corporations.

The model estimated in this part of the analysis includes factors that were identified as statistically significant in the previous part of the study, and variables representing ties with foreign markets. It should be noted that the inclusion or the lack of inclusion of variables which were earlier found to be insignificant statistically did not have any considerable impact on the parameter estimations for the remaining variables. The firm's productivity was represented again as total productivity \( TPROD \). Similarly to the model specifications discussed above, the binary variable \( \text{exporter} \) was the response variable.

Table 21 shows the results of the model estimations using two specifications: (M6) is the model which included all the variables indicating ties with foreign market other than export, whereas model (M7) leaves out the variable representing the presence of foreign capital in a firm. Model (M7) offers an answer to the question on the impact of the variables concerned, with no assumptions as to the firms being companies with foreign shareholdings.

Similarly to the previous models, regression as a whole was found to be a significant factor. The fact that a given firm imports products or services from abroad has a statistically significant influence on its export capability. The likelihood that an importing firm will start export activity is more than 3 times higher than in the case
of a non-importing firm (the odds ratios are above 3 in both (M6) and (M7) models; in other words, the probability is more than 200% higher.

Table 21. Estimation results of the logit model for exporters – internationalisation of firms

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M6) exporter</th>
<th>(M7) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing firms</td>
<td>0.671</td>
<td>0.667</td>
</tr>
<tr>
<td></td>
<td>(0.426)</td>
<td>(0.416)</td>
</tr>
<tr>
<td></td>
<td>1.956</td>
<td>1.948</td>
</tr>
<tr>
<td>Trading firms</td>
<td>1.361***</td>
<td>1.351***</td>
</tr>
<tr>
<td></td>
<td>(0.517)</td>
<td>(0.504)</td>
</tr>
<tr>
<td></td>
<td>3.899***</td>
<td>3.859***</td>
</tr>
<tr>
<td>Log(employment)</td>
<td>0.849***</td>
<td>0.891***</td>
</tr>
<tr>
<td></td>
<td>(0.127)</td>
<td>(0.128)</td>
</tr>
<tr>
<td></td>
<td>2.337***</td>
<td>2.437***</td>
</tr>
<tr>
<td>Log(TPROD)</td>
<td>0.399***</td>
<td>0.411***</td>
</tr>
<tr>
<td></td>
<td>(0.105)</td>
<td>(0.104)</td>
</tr>
<tr>
<td></td>
<td>1.490***</td>
<td>1.506***</td>
</tr>
<tr>
<td>Foreign capital</td>
<td>1.374***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.332)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.949***</td>
<td></td>
</tr>
<tr>
<td>Importer</td>
<td>1.146***</td>
<td>1.224***</td>
</tr>
<tr>
<td></td>
<td>(0.228)</td>
<td>(0.228)</td>
</tr>
<tr>
<td></td>
<td>3.145***</td>
<td>3.399***</td>
</tr>
<tr>
<td>Active_fdi</td>
<td>3.816***</td>
<td>3.744***</td>
</tr>
<tr>
<td></td>
<td>(0.950)</td>
<td>(0.947)</td>
</tr>
<tr>
<td></td>
<td>45.423***</td>
<td>42.273***</td>
</tr>
<tr>
<td>Intern_group</td>
<td>0.540</td>
<td>1.239***</td>
</tr>
<tr>
<td></td>
<td>(0.592)</td>
<td>(0.467)</td>
</tr>
<tr>
<td></td>
<td>1.716</td>
<td>3.453***</td>
</tr>
<tr>
<td>Constant</td>
<td>-5.246***</td>
<td>-5.277***</td>
</tr>
<tr>
<td></td>
<td>(0.728)</td>
<td>(0.718)</td>
</tr>
<tr>
<td>Observations</td>
<td>612</td>
<td>612</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.298</td>
<td>0.273</td>
</tr>
<tr>
<td>Accuracy rate</td>
<td>77.1%</td>
<td>78.3%</td>
</tr>
<tr>
<td>LR</td>
<td>225.006</td>
<td>206.233</td>
</tr>
<tr>
<td>LR Prob</td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
</tbody>
</table>

Notes: 1) Three numbers correspond to each variable in the successive models, viz.: estimation of the model’s structural parameter, in brackets under the parameters – robust errors, odds ratio figures in italics, under the robust error figures.
2) Significance of parameters and odds ratios: *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: authors’ own calculations using STATA 14.
If, however, a firm has internationalised its operations on the foreign markets in the form of FDI, then the probability that it is also an exporter is more than 40 times higher than for other firms of a similar size, type of activity and productivity. This corroborates the findings from comparable studies abroad.

On the other hand, the significance of the third variable describing firms’ ties with foreign markets is not as obvious. The declared being part of an international capital group is of no particular consequence for pursuing an export activity, in particular, especially under the assumption that firms are similar in terms of their ownership structure approximated by the presence of foreign capital.

### 5.2.5. The impact of external environment

Attitude to corporations is another operational aspect that could influence a firm’s being engaged or not engaged in an export activity, including the attitude to entities from the firm’s direct environment. It is expressed by cooperation with other enterprises, in particular within industrial clusters. To verify this hypothesis, two additional binary variables were added to the model: cooperation and clusters. Another factor associated with the environment referred to various activities of public institutions whose aim was to encourage firms to commence export activity, a major component of the state policy to promote exports. Based on the respondents’ answers to the question: Has the firm been a recipient of support instruments such as tax incentives/tax breaks during the past three years?, a binary variable incentives was constructed, which took 1 for the answer “Yes”, and 0 for the answer “No”.

Table 22 provides the estimation results for the model, including variables representing links with the external agents – cooperation with other firms and state aid. It was found that none of these variables has a statistically significant impact on the firms’ ability to engage in exports. This means that cooperation with other firms or lack of such cooperation was of no consequence for their foreign market entry. Likewise, no significant impact of cluster cooperation was identified. Moreover, the obtained results suggest that the declared use of support instruments had no considerable impact on starting the export activity.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M8) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing firms</td>
<td>0.666 (0.417) 1.946</td>
</tr>
<tr>
<td>Trading firms</td>
<td>1.367*** (0.520) 3.922***</td>
</tr>
<tr>
<td>Log(employment)</td>
<td>0.850*** (0.129) 2.340***</td>
</tr>
</tbody>
</table>
### Table 22 – continued

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M8) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Log}(TPROD) )</td>
<td>0.388***</td>
</tr>
<tr>
<td></td>
<td>(0.108)</td>
</tr>
<tr>
<td></td>
<td>1.474***</td>
</tr>
<tr>
<td>( \text{Foreign capital} )</td>
<td>1.543***</td>
</tr>
<tr>
<td></td>
<td>(0.324)</td>
</tr>
<tr>
<td></td>
<td>4.679***</td>
</tr>
<tr>
<td>( \text{Importer} )</td>
<td>1.113***</td>
</tr>
<tr>
<td></td>
<td>(0.227)</td>
</tr>
<tr>
<td></td>
<td>3.042***</td>
</tr>
<tr>
<td>( \text{Active fdi} )</td>
<td>3.810***</td>
</tr>
<tr>
<td></td>
<td>(0.993)</td>
</tr>
<tr>
<td></td>
<td>45.143***</td>
</tr>
<tr>
<td>( \text{Cooperation} )</td>
<td>-0.0370</td>
</tr>
<tr>
<td></td>
<td>(0.323)</td>
</tr>
<tr>
<td></td>
<td>0.963</td>
</tr>
<tr>
<td>( \text{Clusters} )</td>
<td>-0.148</td>
</tr>
<tr>
<td></td>
<td>(0.678)</td>
</tr>
<tr>
<td></td>
<td>0.862</td>
</tr>
<tr>
<td>( \text{Incentives} )</td>
<td>0.510</td>
</tr>
<tr>
<td></td>
<td>(0.483)</td>
</tr>
<tr>
<td></td>
<td>1.665</td>
</tr>
<tr>
<td>( \text{Constant} )</td>
<td>-5.198***</td>
</tr>
<tr>
<td></td>
<td>(0.784)</td>
</tr>
<tr>
<td>Observations</td>
<td>612</td>
</tr>
<tr>
<td>Pseudo R(^2)</td>
<td>0.299</td>
</tr>
<tr>
<td>Accuracy rate</td>
<td>0.779</td>
</tr>
<tr>
<td>LR</td>
<td>225.440</td>
</tr>
<tr>
<td>( LR \text{ Prob} )</td>
<td>[0.000]</td>
</tr>
</tbody>
</table>

Notes: 1) Three numbers correspond to each variable in the successive models, viz.: estimation of the model’s structural parameter, in brackets under the parameters – robust errors, odds ratio figures in italics, under the robust error figures.
2) Significance of parameters and odds ratios: *** \( p < 0.01 \), ** \( p < 0.05 \), * \( p < 0.1 \). Source: authors’ own calculations using STATA 14.

#### 5.2.6. The role of innovation

Many research findings indicate beyond doubt that internationalisation and innovation (or, in other words, the scope of innovation and the scope of internationalisation) are closely interrelated and mutually complementary at the firm level. For instance, Cassiman & Golovko (2011) pointed out that product innovations, and less so process innovations, drive exports. Altomonte et al. (2013) suggested that there is a positive, broad, strong and robust correlation between the scope of internationalisation of
enterprise operations and the scope of innovative activity in a large group of European manufacturing firms. These results were discussed in the literature review provided in Chapter 3. Therefore, it is expected that a significant correlation will be identified between innovation and probability of export activity.

Table 23. The impact of innovation on the ability to engage in the export activity

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M9) exporter</th>
<th>(M10) exporter</th>
<th>(M11) exporter</th>
<th>(M12) exporter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing firms</td>
<td>0.667 (0.417)</td>
<td>0.619 (0.418)</td>
<td>0.652 (0.414)</td>
<td>0.645 (0.416)</td>
</tr>
<tr>
<td>Trading firms</td>
<td>1.948 1.856</td>
<td>1.919 1.906</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(employment)</td>
<td>1.361*** (0.513)</td>
<td>1.400*** (0.518)</td>
<td>1.389*** (0.514)</td>
<td>1.293** (0.514)</td>
</tr>
<tr>
<td></td>
<td>3.901*** 4.054***</td>
<td>4.011*** 3.644***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(TPROD)</td>
<td>0.845*** (0.128)</td>
<td>0.824*** (0.124)</td>
<td>0.822*** (0.127)</td>
<td>0.847*** (0.126)</td>
</tr>
<tr>
<td></td>
<td>2.327*** 2.280***</td>
<td>2.275*** 2.332***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign capital</td>
<td>1.485*** 1.480***</td>
<td>1.468*** 1.491***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.534*** 1.539***</td>
<td>1.545*** 1.540***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.636*** 4.660***</td>
<td>4.689*** 4.662***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importer</td>
<td>1.105*** 1.140***</td>
<td>1.134*** 1.083***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.017*** 3.126***</td>
<td>3.108*** 2.953***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active_fdi</td>
<td>3.787*** 3.947***</td>
<td>3.884*** 3.911***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44.124*** 51.772***</td>
<td>48.638*** 49.950***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_product</td>
<td>0.155 (0.227)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_proc</td>
<td>0.569** (0.240)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.167</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_org</td>
<td></td>
<td>0.470* (0.276)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.599*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_new_market</td>
<td></td>
<td></td>
<td></td>
<td>0.473* (0.263)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.604*</td>
</tr>
<tr>
<td>Constant</td>
<td>-5.288*** (0.743)</td>
<td>-5.270*** (0.723)</td>
<td>-5.178*** (0.725)</td>
<td>-5.300*** (0.719)</td>
</tr>
<tr>
<td>Observations</td>
<td>612</td>
<td>612</td>
<td>612</td>
<td>612</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.297</td>
<td>0.304</td>
<td>0.301</td>
<td>0.301</td>
</tr>
</tbody>
</table>
While interpreting the model estimation results provided in Table 24, it should be concluded that product innovation does not have a statistically significant impact on the export capability of enterprises. This is a surprising finding. By contrast, process and organisational innovation proved to be statistically significant. It was found that the probability that a given firm is an exporter is about 77% higher if it has introduced process innovations during the past 3 years, as compared to a similar firm that has not introduced any such innovations. The declared organisational innovations increase the probability that a given firm is an exporter by c. 60%.

Those firms that declared that they had, over the previous 3 years, successfully implemented product innovations that were novel in the market (innov_new_market), stand a significantly better chance to be engaged in the export activity; in this case, the probability is 60% higher than for other similar firms.
Table 24 – continued

<table>
<thead>
<tr>
<th>Variables</th>
<th>(M13) exporter</th>
<th>(M14) exporter</th>
<th>(M15) exporter</th>
<th>(M16) exporter</th>
</tr>
</thead>
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<tr>
<td>Importer</td>
<td>1.116***</td>
<td>1.090***</td>
<td>1.115***</td>
<td>1.074***</td>
</tr>
<tr>
<td></td>
<td>(0.229)</td>
<td>(0.228)</td>
<td>(0.227)</td>
<td>(0.228)</td>
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<tr>
<td></td>
<td>3.051***</td>
<td>2.974***</td>
<td>3.048***</td>
<td>2.927***</td>
</tr>
<tr>
<td>Active_fdi</td>
<td>3.858***</td>
<td>3.856***</td>
<td>3.830***</td>
<td>3.770***</td>
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<tr>
<td></td>
<td>(0.945)</td>
<td>(0.955)</td>
<td>(0.957)</td>
<td>(0.953)</td>
</tr>
<tr>
<td></td>
<td>47.350***</td>
<td>47.291***</td>
<td>46.059***</td>
<td>43.377***</td>
</tr>
<tr>
<td>Patents</td>
<td>0.624**</td>
<td>0.184**</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.281)</td>
<td>(0.0784)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.866**</td>
<td>1.201**</td>
<td></td>
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<tr>
<td>Changes</td>
<td>0.071</td>
<td>0.071</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.229)</td>
<td>(0.0784)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.073</td>
<td>1.073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_declar</td>
<td>0.071</td>
<td>0.071</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.229)</td>
<td>(0.0784)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.073</td>
<td>1.073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innov_extent</td>
<td>0.137**</td>
<td>0.137**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.065)</td>
<td>(0.065)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.147**</td>
<td>1.147**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-5.261***</td>
<td>-5.316***</td>
<td>-5.222***</td>
<td>-5.314***</td>
</tr>
<tr>
<td></td>
<td>(0.731)</td>
<td>(0.728)</td>
<td>(0.729)</td>
<td>(0.721)</td>
</tr>
<tr>
<td>Observations</td>
<td>612</td>
<td>612</td>
<td>612</td>
<td>612</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.302</td>
<td>0.304</td>
<td>0.297</td>
<td>0.302</td>
</tr>
<tr>
<td>Accuracy rate</td>
<td>0.778</td>
<td>0.786</td>
<td>0.773</td>
<td>0.781</td>
</tr>
<tr>
<td>LR</td>
<td>228.3</td>
<td>229.4</td>
<td>223.9</td>
<td>228.3</td>
</tr>
<tr>
<td>LR Prob</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
</tbody>
</table>

Notes: 1) Three numbers correspond to each variable in the successive models, viz.: estimation of the model’s structural parameter, in brackets under the parameters – robust errors, odds ratio figures in italics, under the robust error figures.
2) Significance of parameters and odds ratios: *** p < 0.01, ** p < 0.05, * p < 0.1.
Source: authors’ own calculations using STATA 14.

Table 24 shows the results of estimations for subsequent models which, among explanatory factors, include variables concerning innovation. For firms which are patent holders, the probability of becoming an exporter is much higher (by 87%) than it is the case with firms which do not have patents. It should be borne in mind that holding a patent considerably strengthens the firm’s competitive position, and in effect it enjoys a temporary monopoly on the commercial application of knowledge (as a rule a 20-year period). This, however, requires extensive expenditure and this is the reason why the intensity of patenting in Poland is low. The introduction of any kind of change during the past 3 years (changes) that shows the attitude to such a change considerably increases the probability of internationalising a firm’s operations by means of export.
More aggressive market behaviour, associated with making \textit{ad hoc} or ongoing changes, and therefore acting as the market leader, seem to be positively correlated with acquiring an exporter status.

\textbf{Concluding remarks}

The main idea underpinning the study at hand was to combine information from two sets: annual accounts for individual business entities and surveys conducted in the form of direct interviews. One strong argument in favour of such an approach is the possibility it offers to analyse the interrelationships between export (understood both as the process itself and its intensity) and many variables which, according to theory and empirical research inspired by the new new trade theory, are identified as export determinants. Ultimately, the questionnaire survey comprised 709 businesses. Financial information was obtained from \textit{InfoCredit}, the provider of data from Poland to \textit{Amadeus}.

The respondents identified intense competition on foreign markets as the primary barrier to either starting or expanding export activity. The category of “intense competition” is very broad. As regards the overall findings from the questionnaire survey, it can be concluded that the basic policy directions that could lead to an improved competitiveness of exporters from Poland vis-à-vis their competitors include: higher productivity as a consequence of an expanded scale of operation, finding a foreign investor, and innovation activities.

Other barriers described by the respondents included currency risk and insufficient support to export activity. As regards the currency risk, the main change expected by businesses engaged in the export activity is the introduction of the euro in Poland as this would successfully eliminate the currency risk in trade relations with a major trade partner, i.e. the Eurozone. On the other hand, Poland’s staying outside the Eurozone in the first years of the 2008+ crisis allowed adjustment through changes (depreciation) in the exchange rate of the zloty against the euro (and the dollar), which considerably helped maintain and/or improve the competitiveness of Poland’s exports. Indisputably, from the perspective of the respondents having some experience of operating in the markets of better-developed EU Member States, the support that they can hope for in Poland is relatively limited. Comparison of industrial policy expenditures in Poland and e.g. Germany leaves no doubt as to the enormous differences between the two countries. Therefore, it is of paramount importance to ensure that export promotion in Poland, given the budgetary constraints, is as effective as possible. Some support measures should be implemented at the regional level in order to better understand the needs of exporters or potential exporters. Furthermore, cooperation with other entities should be encouraged, based primarily on disseminating the advantages of such cooperation.

As regards the competitive pressure felt by the respondents, the answers offered by exporters and non-exporters were significantly different statistically. Exporting firms identify their competitors both in Poland and in the markets abroad (mainly in the so-called “old” EU Member States). In contrast, non-exporting firms feel a competitive pressure mostly from other businesses operating in Poland. The highest level
of competitive pressure was reported by non-exporters, which indirectly proves that export activity, in a confrontation with a highly competitive environment, forces implementation of a number of adjustment measures and in effect improves competitiveness, as a result of which the competitive pressure felt by these businesses is reduced.

With respect to Poland’s EU membership, in the respondents’ opinion positive effects prevail over negative ones. A wider range of benefits, mostly due to access to the EU Single Market, was reported by exporters. On the one hand, crisis phenomena adversely affecting the situation of exporters are transmitted via export activity, but on the other exporters are able to detect potential dangers and mobilise more resources to combat the effects of the crisis. Moreover, exporters are in a position to diversify business risk by selling their products or services outside the domestic market.

The econometric verification with the use of the logit approach basically corroborated the hypotheses formulated by contemporary theoretical literature associated with the new new trade theory, i.e. heterogeneous firms theory. Mainstream literature holds that exporters differ from non-exporters in size, productivity, innovation – that is, the competitive potential. Higher productivity (measured by total productivity) is the crucial factor that determines the probability of Polish firms penetrating foreign markets. This corroborates the main thesis of the Melitz model (2003) and its extensions. The probability of export activity is visibly higher for larger firms that can tap the potential offered by the increasing returns to scale and diverse resources, allowing them to transcend the higher barriers to foreign market entry. Increased share of foreign capital is translated into increased probability of export activity. Other forms of internationalisation are also strongly correlated with export activity. Both imports from abroad and running branch offices abroad considerably increase the likelihood of being engaged in export. Thereby, the results corroborate e.g. the thesis formulated by Vogel & Wagner (2010) on learning from importing. Likewise, the impact of innovation on a given firm becoming an exporter can easily be observed.
Part Three

Economic policy and the challenges of globalisation.
Possible use of trade support measures
Introduction

This Chapter’s considerations revolve around selected aspects of economic policy linked to impacts on exports. As was noted when theoretical aspects of export activity (and especially the most recent) were discussed; and as reference was made to the concept of the heterogeneity of business entities; action to promote exports is now connected ever less closely with the exports per se, instead being more and more related to support for competitiveness (including productivity), innovativeness and favourable conditions for the pursuit of economic activity in the most general sense. A clear shift of interest on the part of researchers considering the issue of exports from countries to individual business entities – as commenced with in the work by Krugman and Melitz – serves to extend the scope of possible analysis still further, given that it also takes in the regional level. This is in fact a level of study only perceived a short time ago. “Between” two possible extreme approaches (of the country on the one hand and the individual entity on the other), there is and remains something more. These are the sectors, and of course a sectoral approach to economic and commercial policy has been known for many years. It is frequent for this to be rivalled by a horizontal approach. However, there are also the regions, and their significance has increased, including in regard to support for entrepreneurship and exports. Contemporary export policy is pursued by those who make use of a diverse array of instruments (support for innovation and competitiveness and trade per se), as well as on different levels (i.e. those of individual entities, sectors, regions, countries and the European Union).

For the above reasons, a chapter seeking to deal with the policy of support for export activity has to be multi-stranded in nature. And, while the approach involved may give the impression of being rather eclectic, it is clear that today’s world is a complex place with – on the one hand – a transfer of decisionmaking competences from countries to supranational structures like the EU, and – on the other – an increase in significance for regions, to which activity in line with the subsidiarity principle ensures a greater scope of decisionmaking powers, as well as funding (e.g. within the framework of Structural Fund payments), but also greater accountability and answerability. Remaining unresolved in the meantime is the academic debate surrounding horizontal or sectoral approaches to industrial policy, with the latter gaining in importance in times of crisis.
To be presented at the outset are the conditions set with regard to the pursuit of EU commercial policy, *i.a.* as they reflect: the autonomy of EU law, the division of competences between Member States and the bodies of the European Union, the rules associated with the Common Commercial Policy and entrepreneurs’ prospects for developing exports out of Member States. Dealt with after that are the conditioning and shaping of industrial policy, while a final part of the Chapter is then devoted to matters of the regionalisation of commercial policy and analyses regarding exports.

**Sylwia Majkowska-Szulc**

6.1. Legal conditioning of the development of export by Polish enterprises within the framework of EU economic policy

6.1.1. Introduction

Within the overall framework of the European Union’s economic policy, various measures are taken in support of the development of trade. However, appropriate adjustment of those measures to the objectives set requires analysis based on factual data concerning turnover. Equally, the very obtainment of reliable and comprehensive statistical information is becoming ever-more difficult, thanks to ongoing globalisation and its consequences. Activity on the part of supranational entities, above all corporations, is thus harder and harder to measure, given the complex capital structures involved. The Common Commercial Policy furthermore remains an exclusive competence of the EU, and it is on that basis that common rules on imports and exports were established, in line with the supreme principle of freedom of movement. This means that restrictions or limitations on the said freedom are permissible in exceptional cases only, as foreseen in EU law in respect of such matters as the trade in works of art or products of dual application, torture implements or seal products. The other means by which support for exports can be achieved at EU level entails efforts and measures in the name of economic and social cohesion, or else in support of corporate social responsibility. There is thus a surprising diversity of ways in which exporters can be backed at EU level, but these are only likely to be truly effective if there is constant adjustment to changing economic realities.

Globalisation processes on the one hand favour international trade, while on the other ensuring that analysis and precise measurement of transboundary flows comes to represent a greater and greater challenge. At the same time, comparable, up-to-date and reliable information on the structure of the economy, and on the development of the economic situation of different Member States and regions, will be essential if there is to be effective pursuit of the EU’s economic, social and regional policies.¹ For these reasons, statistics need to be collected with a full awareness – and with account taken – of the factors capable of causing distortion.

6.1.2. The concept of trade in goods and services

Within the European Union, the export of goods and services embraces transactions involving goods and services by way of sale, barter or gifting that are entered into by residents to the benefit of non-residents. The export of goods takes place where there is a transfer of right of economic ownership between residents and non-residents, irrespective of whether there are movements of goods over a border that corresponds with these transactions. Exporting of services in turn includes all services rendered to non-residents by residents.2

While the definitions presented in this way might seem to explain this particular trade phenomenon to an adequate extent, a wealth of case law of the Court of Justice of the European Union offers a great many examples of cases in which it proved problematical to determine the provisions having application. This reflected difficulties with qualifying particular transactions as typical for one or other of the EU’s four freedoms. For example, only superficially does the process of distinguishing between the freedom of movement of goods and of services seem like a simple, unambiguous matter. The same applies as one seeks to separate the scope of application of the freedom of movement of capital and freedom of establishment.

Economic research into the nature of international trade in principle confines itself to trade in goods, with the study of services therefore excluded. However, postulates calling for services to be taken account of in international trade are arising ever more often. For example, at regional level, services are seen to represent an opportunity for levels of exports to be increased. In the economic sciences, services are “by their very nature” treated as “non-tradeable”, though the degree of “tradeability” associated with them is clearly rising. Meanwhile analysis of legal aspects of commerce leaves no doubt whatever that services are encompassed alongside goods. For the purposes of the EU Treaties, services are rendered – usually for remuneration – in a scope not encompassed by provisions on the free movement of goods, capital or persons. They take in, in particular, activity of an industrial or commercial nature, activities of craftsmen and activities of the professions.3 In this way the Treaty provides that services are the subject of trade, while, moreover, a service in the meaning of free movement provisions includes anything not qualified to one of the other EU economic freedoms. In spite of this clear regulation, unambiguous assignment of defined products or activities to one or other of the categories of freedom remains complex.

The concept of the good was first defined by the Court of Justice in a 1968 judgment concerning Case 7/68 of the Commission v Italy.4 The context was customs duty imposed on works of art being exported from the territory of that country. The duty had been applied, notwithstanding the Customs Union in place between the Member States of the then Community.

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3 Art. 57 TFEU.

The nub of this case involved the determination of whether works of art could be considered ordinary goods or could instead come under some permissible exception invoked by Italy with a view to it affording its national heritage greater protection. In the event, the Court of Justice adopted a concept of the good in the meaning of provisions on the free movement thereof. By goods there had to be understood products which could be valued in money and which were capable, as such, of forming the subject of commercial transactions. In consequence, works of art that could be valued in money and so be the subject of commercial transactions were deemed to be goods for the purposes of provisions on the freedom of movement of goods, meaning that the trade in them might not be restricted through the imposition of export tax.

Finally, the Court of Justice declared that Italy, by continuing to levy the progressive tax on the export to other Member States of the Community of articles of an artistic, historic, archaeological or ethnographic interest, had failed to fulfil its obligations under Article 16 of the Treaty Establishing the European Economic Community.

In fact, the situation would have been and would be different where works of art were actually protected by law, and thus represented national heritage in a formally recognised sense. But a work of this kind does not have value expressed in money terms, given that it is in principle priceless, and may not be sold, on the basis that it represents the property of the given nation, in whose name a Treasury body exercises appropriate custodial supervision. It is this type of work that is to be found in national museums, for example, and does not represent a good in the meaning of EU law.

In connection with the securing against external transfer of Europe’s cultural goods, the export thereof beyond the area of the Customs Union requires an export permit. Thanks to this fact, it has proved possible to introduce uniform checks at all the EU’s external frontiers. The term “cultural good” embraces inter alia:

1) archaeological items more than 100 years old, 2) items forming an integral part of artistic, historical or religious monuments where these have been dismantled, where these are more than 100 years old, 3) pictures and paintings done entirely by hand using any kind of material of technique whatever, where the work concerned is more than 50 years old and is not the property of the artists, 4) books more than 100 years old, and 5) means of transport more than 75 years old. Export permits are issued in response to an application from the interested party, by the appropriate organ within the Member State. In the case of Poland the said organs are in principle the Voivodship Offices for the Protection of Monuments as well as the National Museum in Wrocław and the Department charged with providing opinions on works of art at the National Museum in Warsaw. This is, by the way, an example of “European” tasks being performed by domestic bodies, given that the issued permit is valid throughout the EU.

In accordance with Regulation (EC) No 638/2004 on Community statistics relating to the trading of goods between Member States, “goods” are “any moveable property,

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including electric current”. The said electricity was qualified as a good as early as in 1967, when the Court of Justice ruled in the landmark Case 6/64 Flaminio Costa v E.N.E.L., the subject thereof being nationalisation of the production and distribution of electricity in Italy. Naturally, the qualification of electricity as a good ensured that provisions on the free movement of goods would from then on apply to the production and transmission of electrical power. As a result the Court further held that the provision related to State monopolies of a commercial character and applies to situations in which the national authorities are in a position to control, direct or appreciably influence trade between Member States through a body established for that purpose or a delegated monopoly. Analogous regulation has application in the case of the trade in gas. Transactions on the market for electricity and gas are not in fact so easy to identify, given the complex relationships pertaining between component elements to the structure of the European energy market.

Regulation 638/2004 further sets out a category of “goods in simple circulation between Member States”, which are taken to be “Community goods dispatched from one Member State to another, which, on the way to the Member State of destination, travel directly through another Member State or stop for reasons related only to the transport of the goods”.

The definition of a good also includes animals that are traded in, though few statistics are of a scope that encompasses the trade in animals. Consistently with the definition, pet animals accompanying natural persons are not goods, given the latter’s assumption of responsibility for the former, at least where the transfer does not represent the pursuit of a commercial transaction. In contrast, a homeless dog taken from one Member State to another for the purposes of adoption is a good, and a charitable organisation dealing with such transboundary adoptions is regarded as an entrepreneur. The concept of ‘dealers engaging in intra-Community trade’ within the meaning of Article 12 of Directive 90/425 on veterinary and zootechnical checks of animals and products of animal origin for intra-Community trade, must be interpreted as meaning that it extends inter alia, to a charitable association which transports stray dogs from one Member State to another in order to give those dogs to persons who have agreed to adopt them after they have paid a sum covering in principle the costs incurred for that purpose by that association. Since the trade in animals is subject to provisions on the free movement of goods, it is not permitted to subject such exchanges between

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8 Judgment of the Court of 15 July 1964 Flaminio Costa v E.N.E.L. Case 6-64. ECLI:EU:C:1964:66.
11 Judgment of the Court (Fourth Chamber) of 3 December 2015 Pfotenhilfe-Ungarn e.V. v Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein. Case C-301/14, point 52. ECLI:EU:C:2015:793.
Member States to restrictions. For instance, Belgium has failed to fulfil its obligations under Article 28 TEC by denying traders the opportunity to obtain exemptions from the prohibition on keeping indigenous European birds placed legally on the market in other Member States. 12

In the light of Regulation (EC) No 638/2004, “specific goods or movements” are goods or movements which, by their very nature, call for specific provisions, and in particular industrial plants, vessels and aircraft, sea products, goods delivered to vessels and aircraft, staggered consignments, military goods, goods to or from offshore installations, spacecraft, motor vehicle and aircraft parts and waste products. 13 The inclusion of a given type of product within a group of specific goods or movements does not preclude the application to this kind of good of provisions concerned with the free movement of goods. It merely means the need to introduce special provisions that would regulate the trade therein.

Wastes serve as an interesting example. Council Regulation (EEC) No. 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community 14 has application in regard to shipments of waste within, into and out of the Community, as the name shows. Thus, if someone intends to ship waste for disposal from one Member State to another Member State, he shall notify the competent authority of the destination. 15 This requirement obviously constitutes a certain kind of restriction on the free movement of the goods that wastes in this case represent, but the curb was introduced by virtue of a Council Regulation and is binding upon all EU Member States. The Regulation is of course justified on account of the requirement that the environment be protected. Council Regulation (EEC) No 259/93 provides for the possibility that the authorities in the destination Member State will take measures to prohibit generally or partially, or to object systematically to, shipments of waste, and to raise reasoned objections to planned shipments thereof, and this is in order to give effect to the principles of proximity and self-sufficiency at Community and national levels. This possibility does not justify the introduction of domestic provisions of a discriminatory nature where entities engaged in the transboundary trade in wastes are concerned. For instance, Article 90 TEC precludes a national tax provision which exempts from the levy imposed on the long-term depositing of waste at waste disposal sites in the Member State deposits of waste derived from the rehabilitation or safeguarding of disused hazardous sites or suspected contaminated sites located in that Member State alone, but excludes exemption of deposits of waste derived from the rehabilitation or safeguarding of sites

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12 Judgment of the Court of 10 September 2009 Commission of the European Communities v Kingdom of Belgium, Case C-100/08. European Court Reports 2009 I-00140. 
located in other Member States.\textsuperscript{16} Wastes are an ever-more important element in the free movement of goods, and the subject of international trade, but they are rarely taken account of in overall trade statistics.

A television programme recorded on the carrier that a DVD represents is a good, but the same programme broadcast as a television signal has the status of a service.\textsuperscript{17} In turn, a book is a good, but its dematerialised form made available in electronic form (as an e-book) and then as a file to be downloaded or received via streaming from a website is again a service, with this kind of definition being of key significance, not least from the point of view of the rate of VAT that has to be imposed.\textsuperscript{18} Categorisations of this kind obviously have serious legal consequences, hence the need to pay attention to the existence of autonomous definitions of different concepts in EU law, as well as the fact that the said definitions can differ markedly from those adopted in domestic legal systems. Those analysing statistics regarding the trade in goods and services need to take account of the specifics of today's international trade, and the case law of the Court of Justice of the European Union (ex ECJ) proves especially helpful in this respect.

Moreover, it needs to be stressed that the collection of statistical data by statistical offices is much impeded at present, as is reflected in the ever-lower efficiency with which full data can be obtained. One of the more important phenomena here is the increasing share of international transactions made by transnational (i.e. supranational) enterprises, where these are entered into beyond state borders, between parent or daughter companies and branches or affiliates. What is more, an obstacle when it comes to defining the degree of mobility lies with the determination of the value of imports and exports by reference to transfer prices between dependent entities. A factor capable of further distorting the picture may be an increase in the fee associated with the processing of goods, where the goods are the subject of international trade that does not entail change of ownership (via the so-called “processing trade”, as well as “merchanting”). Also hard to identify are international transactions entered into via the Internet, including the trade in intellectual property assets. In contrast, not subject to the obligation to maintain statistics at all are personal transfers entailing the remittance of sometimes considerable earnings by persons working abroad to their families living back in the territory of another Member State.

6.1.3. The specifics of functioning of transnational enterprises

Transnational enterprises or corporations organise their activity beyond the borders of states in order to maximise production efficiency and minimise overall tax burdens, with the result that enterprise structures not necessarily reflecting the economic reality

\textsuperscript{16} Judgment of the Court (First Chamber) of 8 November 2007 Stadtgemeinde Frohnleiten and Gemeindebetriebe Frohnleiten GmbH v Bundesminister für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft. Case C-221/06. European Court Reports 2007 I-09643.
\textsuperscript{17} For instance the judgment of the Court of 30 April 1974 Giuseppe Sacchi. Case 155-73. European Court Reports 1974 - 00409.
\textsuperscript{18} Judgment of the Court of 5 March 2015 European Commission v French Republic. Case C-479/13. ECLI:EU:C:2015:141.
can come into existence. At the EU level also, employers have brought in supranational forms of activity by way of European company law. An example that can be cited here concerns the Societas Europea, with a seat in one EU Member State and activity in various different states, without a necessity to set up branches or affiliates.19

The gathering of statistical data is also impeded by the use of funding mechanisms of the offshoring type, including the so-called “special purpose entities” (or vehicles) founded as a way of supporting global activity financially. In most cases it is very difficult, or even impossible, to identify the level at which the re-exporting of goods is occurring, and within the EU the so-called quasi-transport of goods between Member States.

Intensified linkage between instances of foreign direct investment and the need to identify and allocate flows thereof20 represents one reason for the Treaty of Lisbon to provide that FDI is now brought within the scope of the Common Commercial Policy. This by the way increased the competences of the European Parliament in respect of trade, because, from the time of entry into force of the Lisbon Treaty, the European Parliament has been a co-decider with the Council when it comes to the law on commerce.

6.1.4. The European Union’s Common Commercial Policy

The EU’s Common Commercial Policy entails the introduction across the Union of uniform principles in fields such as the level of customs duties, the concluding of customs and commercial agreements as regards the trade in goods and services and trade-related aspects of intellectual property, foreign direct investment, unified liberalisation measures, export policy, and trade protection measures – including those taken against dumping or subsidies.21 In all of these areas, the EU alone may now create law, and adopt binding acts, while the Member States can do likewise solely with EU authorisation or with a view to EU law being implemented.22

Regulation 2015/47923 provides for common rules for exports on the basis of freedom of movement, and also lays down procedures intended to introduce supervisory or protective measures. The subject scope of Regulation 2015/479 takes in all products, be they industrial or agricultural. In the meaning of the principle of freedom of movement, export to third countries is free, in the sense that it is not subject to any quantitative restrictions, save the derogations foreseen in the Regulation, though without prejudice to measures Member States are permitted to resort to in accordance

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21 Article 207 TFEU.

22 Art. 2 TFEU.

with the Treaty. The Regulation under discussion sets out the procedures whereby the EU can introduce (as necessary) essential supervisory and protective measures. The EU information and consultation procedure may apply in two situations: where a Member State considers that extraordinary changes on the market make protective measures essential (in which case it informs thereof the Commission, which will then inform remaining Member States) or where the Commission demands that Member States supply it with statistical data on changes on the market for the given product, with a view to the economic and commercial situation being described or determined, or else engage to this end in the surveillance of exports in line with national legislation or the procedure laid down by the Commission. Then the Member States undertake necessary measures to meet the demands of the Commission, submitting the required data, prior to the remaining Member States being supplied with information by the Commission. The EU information and consultation procedure anticipates that the Commission will receive the support of the Committee on Safeguards.

Regulation 2015/479 provides for the European Commission to introduce protective measures, which is to say that the export of a particular product is made subject to the production of an export authorisation. The protective measures may be introduced in three circumstances: for preventative purposes, i.e. to prevent a critical situation from arising owing to a shortage of essential products; to remedy a situation of this kind where it has already arisen; or to address a circumstance in which the interests of the Union necessitate immediate protective action. The Commission may introduce protective measures at the request of a Member State or on its own initiative. Where the action is taken in response to a request from a Member State, the Commission takes the decision a maximum of five working days following receipt of that application. The authorisation for export is assigned in line with principles – and within limits – set by the Commission under the so-called examination procedure. The measures in question take effect immediately.

Effective checks or inspection as regards exports from the European Union can for example concern products of dual application. Such products (where the definition thereof extends to programming and technology) are capable of being put to both civilian and military uses, and take in all the kinds of goods that can be used to generate explosions, and/or in any way contribute to the production of nuclear weapons or other equipment used to achieve nuclear detonations. Such products can only be exported where the exporter is in receipt of permission.

There is a possibility of quantitative restrictions on exports being introduced at EU level, in connection with trade relationships involving third countries. In such cases, the Commission publishes in the Official Journal an announcement setting quotas
and at the same time laying down the selected method by which that quota is to be allocated, the conditions under which applications for the issue of appropriate export authorisations can be accepted, the deadline for the submission of such applications and the list of relevant domestic bodies to which such applications are to be addressed. The export authorisation entitles an exporter to export products subject to a quota and is valid throughout the Union, except in situations where the said quota was confined to one region or several regions of the EU, under which circumstances the permits in question are only valid in Member States of that given region.30

Every trade agreement, Cooperation Agreement and Association Agreement concluded between the EU and third countries includes a clause concerning respect for human rights. It is also seen as imperative that the export of equipment with no other practical use than in the carrying out of the death penalty, or in torture, or in other cruel, inhuman or degrading treatment or punishment should be proscribed.31 In turn, the export of goods that are assumed not to be – but might be – put to this kind of use are subject to the issuance of a permit, irrespective of that equipment’s origin.

A total prohibition on the trade in seal products is in force in the European Union, while regulations in the Member States in this regard have been harmonised by virtue of Regulation 1007/2009 on trade in seal products.32 Trading in seal products by virtue of an exemption from the said total ban is permitted solely where the products in question arise out of hunts engaged in in the traditional manner by Inuits or other indigenous communities, and contribute to their subsistence. Further conditions provide that import of an occasional nature can be permitted, where goods are for the personal use of travellers and their families, or else where what are involved are by-products of hunting that is regulated by national law and conducted for the sole purpose of the sustainable management of marine resources. In both of the last two cases, neither the nature nor the quantity of the seal products involved can be such as to indicate placement on the market for commercial reasons.33 The harmonisation as regards trade in seal products achieved by the EU is widely regarded around the world as a breakthrough measure where the protection of animals is concerned (Lurié & Kalinina 2015, p. 444).

The Common Commercial Policy is not the only measure by which exports gain support at the EU level. A key element in EU policy is achievement of the Treaty objective entailing the ensuring of economic, social and territorial cohesion in the European Union. In turn, from among the remaining measures extending such support, it is possible to distinguish the insuring of export credits, support for corporate social responsibility (CSR), aid to developing countries when it comes to their benefiting

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31 Council Regulation (EC) No. 236/2005 of 27 June 2005 concerning trade in certain goods which could be used for capital punishment, torture or other cruel, inhuman or degrading treatment or punishment, OJ EU L 200 of 30.7.2005, pp. 1—19.
33 Art. 3 of Regulation 1007/2009 on trade in seal products.
from trade, fair trade and the non-governmental systems of sustainable development in association with trade, foreign direct investment, support for the internationalisation of SMEs, export tax breaks, and the system of refunds for exports of agricultural products. All of these measures are to serve the goal of ensuring better market access for European exporters.

EU activity in the name of economic, social and territorial cohesion requires that concrete measures be resorted to by local and regional authorities. A good example of local communities in which these three levels of cohesion are closely dependent on one another is provided by Europe’s cities. The cities of the future, successfully facing up to the challenges likely to be thrown at them, will be those that become places of far-reaching social progress, with a high level of social cohesion, socially sustainable housing, welfare and health services, and generally accessible schooling on an appropriate level. The recent economic crisis magnified the effects of market processes, and even Europe’s richest cities have had to face up to the problem of social and spatial segregation. The development of cities should be sustainable, if these urban areas are not to fall victim to their own economic success, as the example of Frankfurt makes clear. As one of the most prosperous German cities, Frankfurt was not in general especially affected by the consequences of the last global economic crisis, in spite of the fact that the city experienced a marked fall in revenues. The overall tax take fell by more than 22%, from €2.13bn to 1.65bn in the years 2008 and 2009, on account of failings among the main sources of revenue into the city budget, which is to say tax imposed on legal personalities. However, up to the end of 2012, the city hardly made any cuts at all. Later, awareness grew that the surplus was on the point of being exhausted, which led the city to plan an increase in charges for the services rendered by the public utilities, as well as a lowering of current expenditure (including on childcare, education and public transport) by €87M, and a reduction of outlays on investment of €97M. An increase in rental costs, a lack of affordable housing and a lack of large projects for the city’s further development all led to intensified protests against the absolute dominance of business interests, and against attempts to engage in urban regeneration by virtue of the expulsion of the poor from several quarters in the city centre area. Beyond even that, the opening of a new runway at Frankfurt Airport did not go down well in districts (mainly of southern Frankfurt) inhabited by the middle class, largely because of a new flightpath and attendant aircraft noise. All of this led to unexpectedly strong social and political disquiet and disturbances, even among the traditionally conservative sections of the population. The example of Frankfurt shows clearly that economic cohesion can only be achieved in full where there is balanced and sustainable social and territorial development introduced at both the local and regional levels.

6.1.5. Corporate Social Responsibility

Corporate Social Responsibility (CSR) is a concept whereby enterprises decide to go beyond minimal legal requirements in their efforts to take the needs of society into account. In the relevant global conceptualisation, the point of reference for CSR is a tripartite declaration of principles concerning multinational enterprises and the social policy of the International Labour Organization, OECD guidelines for multinationals and the UN Global Compact. The European Commission also supports CSR at the global level where the field of international trade is concerned, by way of action to promote restrictive environmental standards in the international arena (Pyć 2006, p. 8). Currently, the Commission attaches great importance to sustainable development and support for basic labour standards in bilateral agreements, as well as in trade negotiations with entities from outside the EU. This in turn offers an excellent example of the popularisation of EU objectives and values in external relations. Moreover, the Commission is responsible for the deployment of trade incentives as a means of encouraging compliance with key international agreements in the field of human rights (including workers’ rights), as well as environmental protection principles and those concerning responsible government.

The practice where CSR is concerned is that there is no panacea here, no substitute for essential political activity, but nevertheless a chance for the achievement of certain policy goals to be contributed to, where these concern investment in the raising of qualifications, lifelong learning and the securing of work skills essential if competitiveness on the knowledge-based global market is to be retained and solutions found to such problems as the ageing society in Europe; as well as more achieved in regard to innovation – especially that serving to solve social problems. All of this will result from more intensive cooperation with interested parties externally, as well as the creation of a working environment more favourable to innovation.35

6.1.6. The internationalisation of small and medium-sized enterprises

Support for the internationalisation of SMEs is first and foremost associated with Commission activity to encourage SME access to the markets of third countries. To allow SMEs to find partners in third countries, the Commission has called European Business Centres in such pioneering markets as India and China into being. These cooperate with the chambers of commerce domestically, as well as directly with representatives of the world of business. The Commission has inter alia sought to use the Small Business Act initiative to appeal to Member States and institutions alike to engage fully with application of the “Think small first” principle. Evidence of this principle in action comes with the existence within the EU of very competitive SMEs that are world leaders in highly-specialised niche markets. Means from the European Regional Development Fund are used to co-finance special programmes supporting the internationalisation

of SMEs. In the years 2007-2013, around €70bn was allocated to structural funds in support of enterprises, primarily SMEs. Thanks to some 200,000 projects financed from the ERDF, around 78,000 business entities have commenced with their economic activity, while at least 268,000 permanent jobs have been created in SMEs, and it has proved possible to maintain still more.

6.1.7. Tax exemptions relating to trade

Harmonisation in EU law has been applied to value added tax (VAT). The basic legal instrument in this regard is Directive 2006/112 on the common system of value added tax. In principle, exports from EU Member States to countries outside the Union are free of VAT, and this exemption relating to exports is the subject of the Directive’s Chapter 6. What is more, in the case of exports, exemption from VAT applies, while the right to deduct for it is retained. This means that a 0% rate of VAT is levied, but the entire amount of VAT paid in respect of directly-connected purchases of goods and services can still be written off. This solution is also true for selected financial services addressed to clients outside the EU. A certain company engaging in economic activity in Hungary concerned with the production and sale of canned foods sold goods designated for sale via purchasers in third countries. Hungarian law made the right to an exemption from VAT on sales of goods for export beyond the EU dependent on a condition that the time elapsing from the sale to the day of export from Hungarian territory was of no more than 90 days. However, the Court of Justice ruled that the Hungarian regulations failed to comply with the aforesaid Directive. Proper implementation and application of domestic regulations transposing EU provisions on VAT represents a key condition if export is to be engaged in without disruption, while limitations on the right to tax exemption in the case of exports, as recognised by EU law, are held to be non-compliant with that law.

6.1.8. TBR – the Trade Barriers Regulation

In the context of ongoing liberalisation of world trade in goods and services, a key issue has been to ensure that there are appropriate trade-policy instruments in place to leave the markets of third countries open to exporters from the EU area. As international trade grew, the private sector very often encountered barriers that no longer reflected, for example, high tariffs, but rather the increasing diversity of legal solutions imposed by states around the world (Gómez-Tarragona & Gómez-Altamirano 2015, p. 371). It was for these reasons, among others, that the Council adopted the 1994 “Trade Barriers” or “Obstacles to Trade” Regulation, i.e. Regulation 3286/94 “laying down Community
procedures in the field of the Common Commercial Policy in order to ensure the exercise of the Community’s rights under international trade rules, in particular those established under the auspices of the World Trade Organization.” This is the TBR or Trade Barriers Regulation.39

The TBR is a legal instrument extending – to EU enterprises, branches of industry and branch associations, as well as the Member States – the right to submit complaints to the European Commission, which will then check and determine if there is evidence confirming infringements of international trade rules that have given rise to consequences unfavourable for trade, or else to actual harm. The ultimate aim is of course to ensure that the markets of third countries are opened up through the elimination of obstacles or barriers to trade facing those seeking to export from the EU area.

Recent years have nevertheless seen the appearance of new barriers to trade with strategic partners. For example, in February 2013, the Chinese authorities took a decision to check spirits and wines from the EU for their phthalate content. This despite the fact that products exported from the EU comply with Community regulations that ensure the effective protection of the health and safety of Europe’s consumers. So far, China has not completed its risk assessment seeking to establish legal restrictions in regard to the phthalate content of products for consumption. Moreover, in June 2013, China began anti-dumping and anti-subsidy proceedings in the matter of wines exported to it from the EU, and with a view to anti-dumping or countervailing measures being imposed in respect of the said wine. The Commission has taken preventative action in this regard. In turn, in India, extra duty has been slapped on new high-class cars (from 75% to 100%), as well as on new motorcycles of engine capacities greater than 800 cc (from 60 to 75%). These measures – together with increased import duties on other products – form part of a wider policy aim that is hard to reconcile with policy commitments taken on by India in the G20 context (promising to cease adopting protectionist measures of any kind). These activities make it clear that, where foreign trade is concerned, India’s transformation process still has a long way to go (Shaffer, Nedumpara & Sinha 2015, p. 595).

Concluding remarks

The consequence is that the Commission, wishing to continue with its efforts to eliminate barriers to trade in third countries, commits itself to the use of all instruments at its disposal via market access strategies (including trade-related diplomatic activity), high-level bilateral meetings and WTO Committees, and the enforcement of third-party obligations by way of appropriately addressed dispute resolution procedures.40

At the same time, in the face of the ever-greater difficulties experienced with obtaining reliable statistical data, the depiction achieved officially may depart somewhat from the real situation regarding commercial linkages. International trade in services remains a “black box” to a considerable degree, and – where trade barriers are concerned

– it is worth noting that, even where these are not very tangible for “trade as a whole”, they can be unfavourable for particular regions, for example, where these support a concentration of the branches particularly affected by the barriers. It needs to be stressed that the Common Commercial Policy is a genuinely “common” policy, being among the EU’s exclusive competences. However, at the current point in the development of EU law, it is impossible to preclude, for example, actions seeking to support exports in regions, not least in line with the imperative that regional cohesion be achieved, and support extended to SMEs.

Krystyna Gawlikowska-Hueckel

6.2. Industrial policy

Despite the increasing internationalisation of the services sector, it remains industry that best determines export potential, and is most subject to the said internationalisation. There is therefore full justification for presenting the industrial policy concept and the way that it has evolved over time. It should be recalled that, in line with the concept of the heterogeneity of economic entities, support for export activity is more and more associated with innovation. The role of industrial policy in increasing exports cannot be overestimated, first and foremost on account of its high “tradeability”.

6.2.1. A review of the literature on industrial policy concepts and instruments

Industrial policy evolved from an approach entailing intervention to help different branches, via action to favour the establishment of conditions for growth, with transparent laws and the promotion of free competition, to an attempt to bring together these two options. The transformation was achieved thanks to changes of approach to economic policy, and was in line with them (Hryniewicz 2013). As is clear, there have indeed been different stages to the policy, with the overall shape and the particular instruments used relating to the economic doctrine holding sway in the given period.

Even the definitions of industrial policy have changed in line with economic theory. For example, Krugman and Obstfeld (1991) define it as: “an attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth”.

Rodrik (2004) in turn defines industrial policy as “the activity which creates a favorable environment for European business in general, the manufacturing sector and its industries in particular”. Such an environment is put in place by a process participated in by both government and the private sector together arriving at a diagnosis regarding the sources of development, and the barriers standing in its way, and jointly working to solve the attendant problems (Rodrik 2006, p. 24).

Table 26 cites definitions of industrial policy proposed by UNCTAD and the World Bank, along with two suggested by the European Commission (in the years 2000 and 2012). Juxtaposition of the last two concepts makes quite clear the change of approach on the part of the EU, with later recognition of the value of certain important thrusts
to activity that are new, in the sense that account was not taken of them previously. The EU’s change of stance can be seen to reflect several factors, of which the most important obviously include the economic crisis unfolding since 2008 and its numerous knock-on effects. The breakdown of previously favourable economic and trading conditions brought about a revision of many assumptions previously underpinning the action taken, first and foremost with a re-evaluation of the attitude to the far-reaching deregulation that had permitted financial institutions to bring instruments on to the market that had no grounding in assets actually possessed. There was also a change in the paradigm idolising the role of services as the main motor of growth, again pointing to the importance of industry, and stressing its crucial relevance to real output, and in the R&D sphere. The change of approach was also influenced by an ongoing process of deindustrialisation in Europe that manifested itself in steady falls in the share of GDP accounted for by industry. A desire to restore the industrial sector to its proper place underpinned a mobilisation of all possible measures available at European Union level. These in fact encompassed the Single Market, commercial/trade policy, and policy as regards SMEs, competition, the environment and scientific research – all in the name of increasing the competitiveness of Europe’s enterprises (COM 2012, p. 3).

### Table 25. Different definitions of industrial policy

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<td>Industrial policy is a concerted, focused, conscious effort on the part of government to encourage and promote a specific industry or sector with an array of policy tools.</td>
<td>Government efforts to alter industrial structure to promote productivity-based growth</td>
<td>The main role of industrial policy (…) is to proactively provide the right framework conditions for enterprise development in order to make the EU an attractive place for industrial investment and job creation</td>
<td>Industrial policy needs to be understood in a wider sense, not only encompassing those spheres concerned directly with the costs, prices and competitiveness of industry and particular sectors thereof, but also having regard to the influence of all other policy initiatives on competitiveness.</td>
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Source: author’s own elaboration.

### 6.2.2. The evolution of industrial policy

In general, the literature suggests that the phases to industrial policy have been three in number (Owen 2012, Warwick 2013, Bianchi & Labory 2011, p. 134), or else four (Pryce 2012).

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41 The process of deregulation began in the United States during the Reagan Presidency, only to be continued by Bill Clinton.
In the view of Pryce, the first stage saw governments identify “winners”, and become involved in their assistance. On the other hand, they also nationalised the enterprises that were inefficient. The second stage was in turn dominated by a reverse approach seeking privatisation and deregulation. However, industrial policy of the third generation came along, and it sought to put right imperfections in the market and to eliminate barriers to growth. This was seen to justify a rather sector-by-sector approach. Finally (to date), the fourth “edition” of industrial policy has been dominated by a comprehensive approach in which a key feature is the establishment of new kinds of partnership between the private and public sectors.

It should be emphasised that the instruments brought into action within the industrial policy framework (or else put out of use) were coherent with the paradigm of development that held sway in the given period. It was thus in a consistent manner that industrial policy made use of tools whose aim was to support particular branches (via a selective policy), or else to abandon these in favour of horizontal activity, with packages of measures that sought to put in place a business-friendly climate overall, with transparent law and competition rules. What is also characteristic is that the “change of track” affecting policy (the shift of levers) was achieved thanks to a complex of events which combined together to affect policy decisions. What was usually involved here was an unsatisfactory balance between achievements and failures of European industry to achieve an improvement in its condition, representing a basis for outlays and results of policy to be set one against the other. The process of evaluation that took shape brought in independent experts and intellectuals who prepared reports (exemplified by the 1994 Bangemann Report on “Europe and the Global Information Society”) to assess the impacts of actions taken. Problems were then discussed at EU-wide fora, and more often than not it was made clear that different Member States had divergent interests. The final phase probably (though not inevitably) entailed changes of policy.

It is worth recalling that the background to the ongoing debate involved fundamental changes in the functioning of integration. A decision of key significance was of course the one establishing the Single Market in 1992, in line with a legal basis and framework set out in the Single European Act. Art. 130f, point 1 of the SEA includes the following wording where industry is concerned: “The Community’s aim shall be to strengthen the scientific and technological basis of European industry and to encourage it to become more competitive at international level.” (SEA, 1986). In turn, point 3 of the same Article provides that: “In the achievement of these aims, special account shall be taken of the connection between the common research and technological development effort, the establishment of the internal market and the implementation of common policies, particularly as regards competition and trade.”

More attention was paid to industrial policy in the Treaty establishing the European Community, and in particular in Title XVI (“Industry”) thereof, wherein Art. 157 provides as follows:

“1. The Community and the Member States shall ensure that the conditions necessary for the competitiveness of the Community’s industry exist. For that purpose, in accordance with a system of open and competitive markets, their action shall be aimed at:
– speeding up the adjustment of industry to structural changes,
– encouraging an environment favourable to initiative and to the development of undertakings throughout the Community, particularly small and medium-sized undertakings,
– encouraging an environment favourable to cooperation between undertakings,
– fostering better exploitation of the industrial potential of policies of innovation, research and technological development.\footnote{42}{The further provisions of Art. 157 relate to means of acting and divisions of competences between the Member States and supranational bodies, and are worded as follows:

2. The Member States shall consult each other in liaison with the Commission and, where necessary, shall coordinate their action. The Commission may take any useful initiative to promote such coordination.

3. The Community shall contribute to the achievement of the objectives set out in paragraph 1 through the policies and activities it pursues under other provisions of this Treaty. The Council, acting in accordance with the procedure referred to in Article 251 and after consulting the Economic and Social Committee, may decide on specific measures in support of action taken in the Member States to achieve the objectives set out in paragraph 1.

This title shall not provide a basis for the introduction by the Community of any measure which could lead to a distortion of competition or contains tax provisions or provisions relating to the rights and interests of employed persons.”

43}{The Directorate General for Industrial Policy was established in 1967.}

It is worth noting how Art. 157 includes a provision emphasising the role of policy on innovation and technological development.

The role of the European Commission remained relatively limited during the first stage of development.\footnote{43}{The Directorate General for Industrial Policy was established in 1967.} DG Industrial Policy mainly exercised a coordinating role as regards competition, while taking action to increase industrial productivity and levels of employment. The lack of a Community industrial policy ensured that the DG had no separate set of instruments to deploy, basing itself instead on those applied in respect of other policies, primarily commercial and competition policies.

The approach in place at that time sought mainly to eliminate market failures, to protect state ownership, to support special rules in respect of the so-called “infant industries”, and to take action over the restructuring of the industrial base. In this regard, it must be remembered that the 1960s saw many traditional sectors of industry eclipsed and failing, with efforts at that time being made to “rescue” them with the aid of systems of subsidies that did not in fact succeed in restoring anything back to rude health. The sheer ineffectiveness of the assistance given provided one very clear and sound reason for the subsequent change of approach predicated on the abandonment of such interventions.

The second (1970-1990) stage saw attention drawn to the fact that government failures were more serious and injurious than market failures, with selective industrial policy generating losses rather than benefits. It was also noted how dangerous the spread of the attitude known as “rent-seeking” had become. It was therefore considered that the package of desirable activities within the framework of industrial policy should encompass liberalisation of trade (exports), privatisation, efforts to attract FDI, action to achieve a macroeconomic stabilisation and minimisation of government intervention as a basic requirement relating to growth and industrialisation.
The stimulus for the formulation of new expectations as regards industrial policy came first and foremost with the lack of progress on productivity, and hence increasing distance between the EU and its main competitors, the USA and Japan.

An attempt to respond to growing competition and global challenges was the formulation of the long-term strategy for the EU’s development that came to be known as the Lisbon Strategy. Here the main strategic goal expounded was: to have in place by 2010 “the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion”.

In 2002, the European Commission brought out its *Industrial Policy in an Enlarged Europe* (COM 2012). This emphasised opportunities ushered in by EU enlargement, making the unambiguous statement that “the competitiveness of manufacturing industry is a cornerstone of the EU’s sustainable development strategy”. Also stressed was the equal importance of the three pillars upon which the industrial sector is founded, i.e. the economic, the social and the environmental.

In 2004 a further Communication from the Commission issued under the title “Fostering structural change: industrial policy for enlarged Europe”. (COM (2004) 274) identified three key spheres in which actions taken were to improve the situation of European industry. These were:

- better lawmaking that adjusted regulations to the needs of enterprises,
- joint action with other policies (or synergies between policies) for a better impact on competitiveness and better use of knowledge,
- a need to take account of the specifics of given sectors as horizontal measures are implemented.

Just a year later, in 2005, it became clear to all that full implementation of the Lisbon Strategy in its original shape, and in accordance with the timetable assumed, was not going to be possible. It was therefore proposed that the Strategy be ‘relaunched’, and this was found to entail a reduction in the number of tasks, which would now be encompassed by a single National Growth Plan. However, no improvement in the EU’s competitive position was forthcoming, so implementation was finally resigned from altogether, with the attention then switching rapidly to an alternative strategic document entitled the *Europe 2020 Strategy*.

This Strategy presents an industrial policy whose goals say much about the change in the Commission’s approach to the industry sector. This is manifested in the way that horizontal actions (as regards intelligent regulation, public procurement, competition rules and standards) are accompanied by a return to concepts of sectoral intervention (support for the restructuring of sectors finding themselves in difficult situations, in order that these might head in the direction of more promising activity).

The new approach to industrial policy, and the qualitatively new areas of intervention, found their reflection in COM (2012). The key features of the new option are:

- application of an individualised approach to each sector,
- account taken of the whole of the value and supply chains (of which some links lie beyond Europe),
- regular supplying by the Commission of information on the implementation and pursuit of European policies on competitiveness and industry.
The 2020 Strategy emphasises cooperation between “business circles, trades unions, academia, NGOs and consumers’ associations”. Legal regulations must take the real circumstances of today into account, first and foremost the fact that production is divided up and takes place by way of an international value chain, stretching through from raw materials to post-sales services.44

Effective achievement of the Strategy’s goals will be possible through the linkage of factors that are “hard” (relating to the construction and maintenance of transport and logistics systems at a level allowing the EU’s industrial sector to access the Single Market and international markets effectively) as well as “soft” (taking in promotion in society and corporate responsibility – as a key element securing the long-term confidence of employees and consumers alike).

To recapitulate, the new approach can be seen to encompass two thrusts to action: it combines within it both horizontal and sectoral interventions, of the kind that had earlier been resigned from. However, the interventions are to have been well thought-through and entail the promotion of “certain sectors” only. Promotion should involve the mobilisation of specific initiatives that are addressed to given sectors. And the latter would be the car industry, transport accessories, the power-supply industry, chemicals and food (European Commission, 2005).

According to COM (2012), the coming of the Third Industrial Revolution45 obliges us to usher in new solutions and emphases as regards the development of the following markets:

1. Markets of advanced manufacturing technologies as regards recycling and clean production.
3. The market for bio-based products (bioplastics, biolubricants, biosolvents, etc.).
4. Construction and raw materials46 standards and requirements as regards equipment, and seabed mining.
5. Clean vehicles and vessels; alternative fuels.
6. Smart grids and energy storage.

Conclusions need to be drawn from the ineffectiveness of much of the action taken previously. First, goals cannot be set in an abstract manner inappropriate to the level of development of a given country and its resource structure. New objectives need to

44 The Europe 2020 Strategy also emphasises the need for an effective European space policy to be drawn up, with this allowing the Galileo project to be implemented, as well as global monitoring of the environment and security. In fact, certain other provisions do not relate to the industry sector sensu stricto, but rather to services activity, not least increased competitiveness of Europe’s tourist “industry”.

45 Riffkin (2011) points to five integrated pillars on which the “Third Industrial Revolution” will be built, i.e. the transition from fossil to renewable energies, the transformation of all buildings into mini generating plants, the development and build-up of energy storage technologies and capacities (e.g. hydrogen), capitalisation of the internet technology for the development of a smart and bi-directional (peer-to-peer) energy-sharing-grid, and the transformation of the transport system to electric plug-in and fuel cell vehicles.

46 In this paragraph, the COM (2012) document has a clear reference to cohesion policy: “Moreover, it is proposed that a significant share of the Structural and Cohesion Funds will support the shift towards the low-carbon economy.” (p. 11)
take comparative advantage into consideration, with this being denoted by endogenous resources. This in turn denotes that decisions as regards industry must take national and local specialisations into account, with this then allowing the said comparative advantage to be taken advantage of, with greater effectiveness of industrial policy also assured in this way. Beyond that:

1. Industrial policy should follow or track the market, rather than overtaking or outpacing it.
2. Industrial policy should concern fields in which the greatest experience and competence is already possessed (e.g. the military sector, power supply) (Stiglitz, Lin & Monga 2013).
3. Where interventions are considered, it needs to be recalled that entrepreneurship and production are these days both “international on many levels”. Proceeding in line with this kind of awareness and approach, the supporting of sectors that are “not of great significance” may be avoided.
4. The innovations that must be regarded as key are those that are the main motor force behind productivity, increased energy- and materials-efficiency, goods and services of better quality and the founding of new markets. The new industrial policy as regards innovation will favour faster development and introduction to the market of goods and services, in order to ensure that it is EU firms which come on to that market first, in this way raising their level of competitiveness.
5. Better governance as regards industrial policy is important, with simultaneous strengthening of coordination and cooperation between EU Member States (European Commission 2011), as favoured by the introduction of intelligent regulation (European Commission 2010).

In the view of Aiginger (2014, p. 24), a new approach to the industrial policy ought to be associated with new measures (“yardsticks”) by which its effects might be assessed.

- In the first place, reference should be made to a range of indicators beyond just those associated with GDP (or GDP growth), which is to say that account needs to be taken of such aspects as satisfaction with life, happiness or expectations regarding longevity,
- In the second place, there should be a downgrading or abandonment of assessment based around low costs or low unit labour costs. “Competitiveness should be defined as ability to achieve beyond-GDP goals.”
- In the third place, countries seeking to raise the level of wellbeing (not merely achieve GDP growth) may pursue an “cheap” (low-road) strategy that emphasises low costs, taxes and social and environmental standards, or else pursue a “high-road” strategy based around research, skills, ambition as regards the environment, an empowering employment policy and excellent institutions.

If highly-developed countries want to retain what Aiginger dubs “their frontier position”, they will need to opt for high-road strategies. And that means (in the fourth place) that high-income countries will need an industrial policy selecting instruments and measures that allow the aforesaid ‘high-road competitiveness’ to be achieved.

How does industrial policy in Poland look in the context of these changes? An answer to that question is to be found in different government documents, of which the most important include:
- **Założenia do Strategii Innowacyjności i Efektywności Gospodarki** (Assumptions underpinning the Strategy for an Innovative and Efficient Economy, Ministry of the Economy, 2010),
- **Foresight technologiczny przemysłu – InSight2030. Strategia efektywności i innowacyjności gospodarki. Dynamiczna Polska 2020** (Strategy for Innovation and Efficiency of the Economy, Ministry of the Economy, 2013),

![Diagram]

**Figure 72.** Horizontal and sectoral activity under the European Commission’s new approach to industrial policy.

Source: author’s own elaboration based on the Europe 2020 Strategy.

The strategic document *Dynamiczna Polska 2020* (MG 2013) includes a definition of industrial policy that – in an era of globalisation – acts in support of a strong, diversified and competitive industrial base in Europe that offers well-paid jobs. A modern industrial policy is taken to promote entrepreneurship, exerts an influence that raises the level of competitiveness of industry and services, strives to draw maximum benefits from
globalisation and creates an environmentally friendly economy”. In turn, the aforesaid 2010 “Assumptions” include (on page 3) a clear point to the effect that industrial policy will have horizontal principles to the fore on every level of activity and in each area. These two definitions offer a clear indication of the type of policy being applied in Poland.

The documents referred to relate to objectives whose achievement will ensure a favourable climate for the development of industry. These include the promotion of innovation, the founding of partnerships, improvements in the business environment, and improved quality of social capital. However, there are no entries to stress the key role of industry, and no reference to the use of a sectoral-type toolkit that would play a more major role in an attempt to achieve reindustrialisation.

The above-mentioned Foresight technologiczny przemysłu – InSight 2030 (of 2013) in turn points to areas that might bring about dynamic growth of the Polish economy. These include: industrial biotechnology, photonics technology, microelectronics, advanced manufacturing and materials systems, nanotechnologies, ICT, cogeneration technologies and means of rationalising the use of energy, technologies for the recovery of natural resources, public health and the green economy (Gawlikowska-Hueckel 2014).

There can be no doubt that the fields referred to feature a high level of technology, and that the innovation associated with them may encourage growth in other branches, as well as favourable structural change. However, there is no indication of the instruments that might be deployed to allow the ambitious objectives referred to to be achieved.

A careful reading of government documents entitles one to conclude that Poland is unable to “keep up” with the changes the EU proposes – a truth that is attested to by a provision included in the aforementioned Assumptions underpinning the Strategy for an Innovative and Efficient Economy, which refers to the fact that industrial policy will: “at each level of operation and in every area be guided by horizontal principles” (Ministry of Economy 2010, p. 3).

It is worth noting that two publications from independent experts have appeared both stressing the need for a change of approach to industrial policy in Poland, with its nature being transformed into one that is selective and strategic. The first report is entitled “A Competitive Poland” (Konkurencyjna Polska) (Hausner 2013); while the second (Kiewra, Darteyre et al. 2011) was commissioned by “Solidarity”. These works present rather different views when it comes to the identification of the sectors having the greatest potential for growth, though both feature a conviction that the aforesaid change of approach to industrial policy is essential.
6.3. The regionalisation of commercial policy and of export-related analyses

6.3.1. The justification for and conditioning of regional-level analysis of international trade

In its classical and traditional conceptualisation, international economics focused attention on countries (nations). Theoretical concepts seeking to interpret international relations thus sidestepped regional issues. Determinants of trade were also defined at the level of nations. Issues forming the subjects of interest of international economics like the commercial base, absolute or comparative advantage, endowment with the factors of production, commercial policy, exchange rate systems, and the flow of foreign direct investment (FDI) were all ignored in their regionally-differentiated aspects, as well as their internal spatial aspect, notwithstanding the way in which countries are clearly more than just points in space. And economic activity is quite obviously not distributed evenly, but is rather subject to the processes of agglomeration and concentration.

On the other hand, there are geographically-orientated approaches, like the so-called regional science that Isard represents, through which all manner of inter-regional flows are addressed, but with considerations not extending beyond the area of any one given country. In the case of the USA this can somehow be justified by reference to the fact that the significance of exports to the economy (i.e. as a fraction of GDP) is low. There is thus some justification for not addressing external (i.e. international) economic relationships as what happens at regional level is modelled.

Reading of the classic works from the aforesaid regional science, as well as concepts where the location of economic activity is concerned – provokes the reader into questioning why international issues as well as those revolving around the locating of activity – have been looked at in relation to one another – and in an integrated way – to such a very limited extent. A partial answer for this was provided by Cieślik (2005, p. 114), in reference to the central place theory as a localisation concept going unnoticed in the Anglo-Saxon tradition. Cieślik notes that, up to the 1950s, the German output as regards localisation theory was inaccessible to readers not knowing that language. In contrast, the theories regarding international trade emerged within the Anglo-Saxon tradition.

As Blaug (1994, p. 994) noted, economists tend rather to concern themselves with “how to produce?“, or in other words with what proportionality there should be between the different factors of production; as opposed to dealing with the “where” that production is supposed to take place. On the other hand, Ohlin (1933) – as co-author of the model of relative endowment with the factors of production (as one of the key theories of international trade) – perceived the similarity between this and location determinants. While it is true that one of the basic assumptions underpinning the Heckscher-Ohlin theory concerns the immobility of factors of production between nations, Ohlin was aware that the treatment of countries as so-called non-dimensional compositions is a serious limitation of theories of international trade. In Ohlin’s opinion,
a theory of international trade cannot be understood fully unless consideration is also given to general localisation theory.

In his work *Geography Lost and Found*, Krugman (1996) drew attention to many aspects of – and consequences arising from – the omission of elements of the international economy from concepts regarding economic location. For example, a shortfall of the so-called German geometry (in which the Launhardt-Weber location problem lies in the determination of the optimal combination of transport costs and production costs in conditions of perfect competition) is the failure to take account of the role of demand, now modelled as the “home market effect”, as well as the omission of ownership structure of entities taking decisions in the matter of localisations. These are often foreign direct investors, who are guided by specific motives conditioned by the operational strategy of a transnational corporation. Dunning and Lundan (2008) classify these motives as the search for resources, markets, efficiency and strategic assets and capabilities. Decisions taken by foreign direct investors are often incomprehensible from the point of view of a given region or country in which activity is being pursued. Their consequences may for example entail a limiting or cessation of production, or else its relocation to another country. However, they can be better understood if the wider or global contexts to the corporation’s activities are taken account of.

Today there are theoretical bases in place allowing for the ever-fuller understanding of the links between international trade and issues of localisation. These are most visible in the new economic geography, which is applied in interpreting the specialisation in output and trade that countries or regions engage in, but also in the modelling of regional development processes, especially the agglomeration of economic processes. The determinants of this agglomeration at given points in space are factors whose origin lies in the relations between countries, i.e. the costs of international trade, the degree of advancement of integration processes, the degree to which foreign investors (especially the multinationals) are active, and the existence or nature of trade of the intra-industry type.

There are certainly many reasons why issues of international trade need to be considered at regional level, and among these the following may be regarded as the most important:

- There has been an increase in the role regions play as participants in economic processes, with regional economies becoming more and more open, due to processes of globalisation and European integration (under the circumstances of the freedoms on the Single Market).
- There has been a polarisation of regional development processes, with these acting intra-regionally as well as inter-regionally (e.g. when there are differences in export potential or inflow of FDI between the core of a metropolis, the area supplementary to it and the remaining part of a given province-region beyond the metropolis altogether).
- Subsidiarity is of importance, and is understood as a rule by which relations between countries, regions and EU structures can be built up, but also as an incentive for decentralisation, albeit with continued adherence to the principle that greatest efficiency of action be sought.
• Both debate and empirical study on competitiveness have been “transferred” to the regional level.

6.3.2. A synthetic review of research on foreign trade for regions in Poland and in the world

More and more analysis is being addressed to Poland’s foreign trade as addressed regionally. Among the relevant work to arise in recent years is the 2013 study by Maćkowiak, which analyses differences in the structure of foreign trade (especially exports) that point to a distinct concentration thereof. The study also characterises the role of such trade in respect of the economies of Poland’s different voivodships (province-regions), as well as the significance to foreign trade of foreign direct investments. Umiński (2012) in turn offers a comprehensive treatment of the nature, competitiveness and causes of export activity assessed at regional level, as linking up with localisation theory, foreign direct investment, competitiveness and foreign trade. In turn, by way of a review study, Umiński (2014a) makes a theoretical and research-based presentation of key concepts and selected analyses where international trade at regional level is concerned. Gawlikowska-Hueckel and Umiński (2014a) in turn analyse trends and patterns in exports from Poland’s regions in the years up to 2011, i.a. considering the concentration of exports, as well as intra-industry trade. Trade of the latter type was considered from the point of view of its being a factor integrating regions of Poland with other EU Member States by Umiński (2014b). In turn, Komornicki (2012) and Komornicki et al. (2015) report on analysis of how resistant local economies are to global economic factors. Ciżkowicz, Rzońca and Umiński (2013) estimated export determinants for Poland’s regions.

Rodríguez-Pose, Winkler and Farole (2013) used the example of Indonesia as they sought to analyse the determinants of export activity of regions, albeit with reference being made to (a) the microeconomic level (with features of business entities being studied) and to (b) the macroeconomic level, as this de facto concerns regional disparities. The title of one of the sub-points in the text in question reads: “firms, regions and exports” – with this offering a good reflection of the kind of work carried out. The authors draw attention there to the fact that it is more and more frequent for analyses of international trade to be pursued at the regional level. A further valuable feature of the work cited is that it is firmly-rooted in the terminology and concepts of (new) economic geography. At the level of the individual business entity, exporting is positively correlated with already-incurred costs of entry onto foreign markets, the share of foreign capital in a firm, and high capital intensiveness as well as high TFP. As regards first-nature geographical factors, the reference is to conditioning that is taken as given. The authors do not claim that greater distance separating a region from the coast (or a port) exerted an influence on exports. The positive influence of agglomeration processes was identified by reference to the link between the share of exporters among all firms and exports as such. When it comes to the second-nature determinants, exports depend in a positive sense on the level of education of a region’s society, but also on the level of education in neighbouring regions. Good transport
access is also important, though shortfalls may be made good or supplemented by good access in neighbouring regions. The authors (Rodríguez-Pose, Tselios, Winkler & Farole 2013, p. 236) conclude that factors of the second-nature type have a greater influence as determinants (these relating first and foremost to agglomeration effects, good transport infrastructure and education).

The so-called Dutch disease was the subject of many analyses, relating to countries above all. Umiński (2012) describes work on Dutch disease devoted to regions, while Beine, Bos & Coulombe (2012) point to the often-omitted cost of extraction of raw materials, which is the Dutch disease, above and beyond the costs of polluting the environment. Appreciation of the Canadian currency brought about by an increase in income from the export of raw materials from Alberta, has negative consequences for the development of other provinces, and above all for Ontario and Quebec. The consequence of the Dutch disease may be for regional disparities to grow. The authors pay much attention to matters of exchange rate variability (between the US and Canadian dollars), to determinants of the changes therein, and to estimation of the influence a change in the exchange rate of the Canadian dollar had for the level of employment in different branches of industry.

Boschma, Minondo & Navarro (2012) used data on the structure of exports from Spanish provinces (NUTS-3 regions) to estimate the influence of related product variety. This is a reference to the thesis advanced by Jacobs, that cities of differentiated production structure – which give rise to increased innovation, creativity and productivity – develop more rapidly. This thesis is augmented by the cited authors, to include the linking of branches of industry via relationships of a technological nature, with this in turn relating to the work of Porter (2003), as well as Frenken, van Oort & Verburg (2007). As the authors themselves state, it is not an ideal solution to work on the basis of trade data, given that not all sectors are export-oriented, while export structure does not offer a direct reflection of production structure. On the other hand, it is export-oriented industries that, given their high level exposure to international competition, make the largest contribution to the generation of innovation and the dynamising of economic growth (Boschma, Minondo & Navarro 2012, p. 250). The conclusion from the analyses these authors carried out was that regions whose industrial structure is characterised by a related product variety are characterised by a higher growth dynamic for added value, as well as higher employment.

Cassey and Schmeiser (2012) carried out research on processes of agglomeration among Russian exporters, in relation to the directions exports were being sent in, or countries they were being sent to. Taking account of agglomeration effects, and applying spatial econometrics, the authors were able to obtain better results for the model estimations in comparison with those obtained with a traditional model based around gravity (and excluding agglomeration). Russian exporters targeting their exports at the markets of particular countries show trends towards colocalisation. Having taken account of the concentration around harbours, as well as differences in GDP, the authors concluded that it was possible to identify specific spillover effects that were characteristic for exports to particular countries.
Cassey and Schmeiser (2012) also note how the above effects arise predominantly out of economies of scale relating to the transaction costs that exporting entails. Given the limited value of individual export transactions, the small number of exporters from different Russian regions to any given destination country, and the low mass of different packages or loads sent, it becomes profitable to group the loads together. The work described here proves an interesting synthetic study of Russia's exports as conceived regionally. And, as has already been mentioned, the modelling was done in line with gravity, albeit with agglomeration effects also taken into account.

Cassey (2014) – for many years an analyst of foreign trade making reference to the regional level – is also the author of a publication devoted to foreign trade representatives in different states of the USA. This is a very interesting subject for research, worth noting from the Polish point of view for sure, with an expectation that similar analyses might be carried out, to supply assessments, not only of the promotional activeness of foreign representative offices (rather limited thus far), but also of the influence of EU funds on the internationalisation of entities located in different regions. Cassey sees benefits associated with the promotion of exports, at the level of reductions in transaction costs. The situation in the USA is different from that in Poland, on account of the particular nature of the US federal system. The author offers a de facto model for decisionmaking in respect of the countries in which – from the point of view of any given state of the USA – it is worth opening or keeping open a trade representation.

Similar subject matter is dealt with in another publication by Cassey (from 2011), in which there is modelling of the probability that a state of the USA will set up a trade office in a country to which products or services are exported, taking account of the structural breakdown of what is exported, and especially the share of homogeneous or diversified products.

Cassey, Holland and Razack (2010) compared models of the input-output type, as well as the computable general equilibrium (CGE), as they analysed the influence of exogenous export shocks on the economy of Washington state (specifically its levels of output and employment, and the income generated by labour). The authors concentrate on modelling the consequences of changes in grain exports, taking account of the multiplier effects ongoing in that region's economy. A fundamental objective of the analysis in question was to compare the two types of modelling referred to. What is also worth noting at this point is the broad scope of the statistical data available at state level in the USA.

Kerem Cosar and Fajgelbaum (2013) analyse foreign trade regionally, and by reference to the example of China. The authors base their work around the dual economy concept, whereby regions close to ports are characterised by the presence of a large share of export-oriented sectors; while those more distant from ports do not engage in foreign trade so intensively. The publication makes broad reference to the classical theory of foreign trade, the comparative advantage concept and new economic geography, as well as theories relating to the locating of economic activity. The authors conclude that export activity leads to an increase in regional disparities, as well as to the locating of economic activity where China enjoys a comparative advantage – in coastal regions.
An interesting item offering broad treatment of trade matters relating to regions and cities is the book “The Region and Trade: New Analytical Directions” (Batabyal & Nijkamp 2014). The book’s first part reviews concepts arising out of theories of international trade, and may also be applied in interpreting trade between regions. Further chapters deal with more detailed questions, like empirical analysis of the spatial structure to US internal trade, as well as the influence of the opening-up of markets to trade, as exemplified by the most important cities in 84 different countries. A gravitation element is also taken up – in an empirical conceptualisation relating to Turkey, and as regards the development of that country’s trade infrastructure. As Nijkamp states in his description of the book, as well as in its key premise, after the period of more than 300 years in which economists have dealt with trade between countries, it is perhaps high time to deal with trade between regions, and its consequences; given that these have become a key aspect to regions’ participation in real economic processes.

Soukiazis and Antunes (2011) take up the matter of the influence of foreign trade on regional growth in Spain. They ask questions concerning the degree to which the openness of a region’s economy, share of GDP accounted for by exports and trade balance can impact upon growth (in the case of the regions at NUTS-3 level). The estimation model makes reference to the concept of Barro, with account taken of the variable “foreign trade”. The authors arrive at the conclusion that openness to trade has a positive impact on the economic growth characterising particular regions, albeit with trade relations with EU Member States being of greater significance than those with countries not belonging to the European Union. In the case of coastal regions whose economies are more open than those “in the interior”, positive influence of foreign trade on growth is relatively greater. Also achieving statistical significance is the positive influence on regional growth exerted by a positive balance to trade with the EU countries. The authors also point to a beneficial inter-regional multiplier effect that arises out of export-led growth, as well as to a significant link between the resources of human capital in a given region and its competitiveness where exports are concerned.

The subject of research by Hirose and Yoshida (2012) was in turn regional differentiation as regards foreign trade in Japan. The authors reveal how the rate of growth of Japan’s partner countries as regards foreign trade exerted an influence on region-to-region differences in production structure in Japan, with exporting being the channel via which the changes involved were induced. The authors base their work on the classic Heckscher-Ohlin concept, paying attention to the attendant consequences for change in production structure in regions, in conditions of an asymmetry of trading costs, given that some regions of Japan lie closer to the foreign markets for the country’s output than do others. The empirical model the authors present has a reliable theoretical underpinning. Hirose and Yoshida (2012, p. 9) reveal that changes in demand on foreign markets lead to a reallocation of production from one Japanese region to another. Regions located close to “rising export markets” are also experiencing growth.

For their part, Volpe Martincus and Blyde (2013) studied the influence of earthquakes on Chile’s exports. From the point of view of our considerations concerning exports examined regionally, the study in question is an interesting one for two reasons.
First, by way of the unique kind of natural experiment that an earthquake represents, it is possible to present the negative influence on exports exerted by changes in transport infrastructure (rising transport costs). Second, it shows what precise statistical data can be made available on the subject of exporting at regional level – to the point where this work could serve as a model for other countries (including Poland) regarding possible changes in the way regional-level data are gathered and made available to researchers.

6.3.3. Internationalisation as a new dimension to differences in regional development – an empirical analysis

As has been noted, the internationalisation of regional economies is not a matter that has been the subject of analysis for very long, especially where foreign trade is concerned. The issue of openness has first and foremost been studied in relation to investment attractiveness and inflows of FDI. However, there is no more widely adopted standard used in measuring openness to trade. A problem – not confined to Poland – is the poor accessibility and quality of statistical data. A further matter for discussion is the level of analysis – should this be the voivodship (province-region), or should it be the county-level poviat? Then there is the matter of how to interpret internal differentiation, within the province-region. The following analysis of internationalisation as regards the regions does not pretend to be comprehensive, but rather has as its goal the presentation of more major differences on a regional basis.

Figure 73. *Per capita* value of exports (in ’000 euros) by Polish voivodship in 2013 (by reference to the seats of the exporters)

Source: author’s own elaboration on the basis of Customs Chamber data.
One of the main measures of openness is the value of exports per capita. In 2013, the highest value for this (of €5700) characterised Dolnośląskie voivodship (i.e. Lower Silesia). The value is also high (in the range €3900 to 4800) in the cases of Lubuskie, Mazowieckie, Śląskie, Wielkopolskie and Pomorskie voivodships. The lowest values for exports per inhabitant (€1500 or less) in turn characterise the Podlaskie, Świętokrzyskie and Lubelskie voivodships.

Where the value of exports is related to the areas of voivodships, Śląskie voivodship is again seen to stand out. There, exports per km² of land area are at a level above €1700. This is a reflection of the high industrial and export potential present in a voivodship of relatively small size, inter alia with a high level of activity of entities with foreign capital in the car industry (i.e. where the unit value of exported products is high). The lowest value (below €200 per km²) in turn characterises Zachodniopomorskie, Świętokrzyskie, Warmińsko-Mazurskie, Lubelskie and Podlaskie voivodships.

Figure 74. Value of exports per km² characterising Polish voivodships in 2013 (by reference to the seats of exporters)
Source: author’s own elaboration based on Customs Chamber data.

In the regional configuration, we are dealing with a differentiation of the geographical structure of exports reflecting the locations of regions, the proximity of large markets for output, and different product structures. Familiarity with the structure of trade linkages with different countries has its key practical dimension, since effective promotion of exports is conditioned by knowledge of the specifics of target markets. Furthermore, recalling the anticipated adoption of the euro by Poland, assessment of the
strength of linkages with the Eurozone provides for an approximate determination of the scope of benefits associated with currency integration, as these reflect the elimination of the exchange-rate risk. In interpreting export linkages of a voivodship-country configuration the gravity concept may prove a useful one. Under this, the intensity of commercial linkages is taken to be determined by a combination of the distances and sizes of markets. On the other hand, factors specific to each region need to be pointed to as well, with these including the product structure of the export offer and the role of FDI, as well intra-corporation cooperative linkages. No matter which voivodship is concerned, the entities seated there have EU Member States as their most important export partners. However, considerable differentiation is found to be present where old as opposed to new EU Member States are concerned. Export dynamics in the wake of Poland’s accession to the EU point to integration representing a powerful impulse in support of exports. However, in the case of the southern voivodships in particular, the dynamic was greater for exports to the new Member States, as compared with the old.

Figure 75. The geographical structure of exports by entities with their seats in Poland’s voivodships (in 2013, as expressed in percentage terms)

Source: author’s own elaboration based on Customs Chamber data.

Figure 76 presents the share of revenue from total sales in 2012, accounted for by the sum of exports and imports. The minimum and maximum values relate to
poviats (county-level administrations) within the given voivodship (province-region) that display the lowest and highest degrees of openness respectively. The mean value depicts the share of total revenue – for the voivodship as a whole – accounted for by the sum of exports and imports. Calculations were carried out on the basis of data contained in F01 financial reports. A general regularity to be noted is that the highest degree of openness characterises western and south-western voivodships. However, two voivodships in the eastern group displaying a high level of openness are Warmińsko-Mazurskie and Podkarpackie, whose specific feature is the presence (within a region of average or low competitiveness) of an export-oriented branch with a high share of foreign capital (i.e. the manufacture of tyres in Warmińsko-Mazurskie and the aviation industry in Podkarpackie). It is also worth noting how voivodships with a low average level of openness (Lubelskie, Małopolskie and Kujawsko-Pomorskie) do include poviats in which a high share of the sum of exports and imports in overall revenue from sales is observed.

Figure 76. The percentage share of overall revenue from sales in the Polish voivodships accounted for by the sum of exports and imports in 2012

Source: author’s own calculations based on data in F01 reports. Mean value – for the voivodship overall. Minimum and maximum values – for the poviats in a given voivodship.

To produce a relativised version of the aforementioned intra-regional differentiation, the standard deviation for the share of overall income accounted for by the sum of exports
and imports was calculated in the case of each voivodship. The greatest differentiation was found to characterise Dolnośląskie, Lubuskie and Mazowieckie voivodships; the most limited those of Świętokrzyskie, Warmińsko-Mazurskie and Łódzkie.

Figure 77. Standard deviations for the share of total revenues in different voivodships in 2012 accounted for by the sums of exports and imports, as based on poviat-level data

Source: author’s own calculations based on data in F01 reports.

It is worth noting the positive correlation between the share of overall revenue accounted for by the sum or exports and imports and the standard deviation characterising this share by poviat or voivodship. This leads to a conclusion that a high degree of openness applies to just a few poviat in each voivodship, and that a role in international trade may be a factor polarising regional development.

Figure 78. The correlation between the percentage shares of overall revenue accounted for by the sum of exports and imports in the different voivodships in 2012, as set against the standard deviations for these shares

Source: author’s own calculations based on data in F01 reports.
One can see how the abovementioned differences are important on the example of the research done within the framework of the “Strategy for the Development of the Gdańsk Metropolitan Area up to 2030” (Gawlikowska-Hueckel and Umiński 2014b). The poviats (county-level administrations) within just a single province-region are here seen to differ greatly as regards the share of overall revenue exports account for, the per capita value of exports, and the role in exporting that entities with a share of foreign capital play. Export activity (in absolute terms, as measured in terms of the value of exports – for example in euros) is concentrated in a natural way in the core of the metropolitan areas. In the cases of the Metropolitan Area of Gdańsk, Gdynia and Sopot, the trend is reinforced by the product structure of exports, in which the maritime branch takes a major share (building of vessels, platforms and so on). On the other hand, the portrayal of disparities as regards the shares of revenue accounted for by exports, per capita export and the role of FDI does not allow any simpler conclusions to be drawn. A high share of revenue from total sales accounted for by exports is characteristic for the poviats beyond the core of the Metropolitan Area. It is highest in the poviats of Tczew and Lębork (and also high in those of Puck and Nowy Dwór).

Map The share of the overall revenue of enterprises in 2012 accounted for by exports, in the cases of the poviats (“counties”) of the Gdańsk-Gdynia-Sopot Metropolitan Area, as based on F01 reports

Source: Gawlikowska-Hueckel and Umiński 2014b, p. 28.
The poviats of Tczew, Puck and Lębork are at the same time characterised by a high share of exports being accounted for by entities with foreign capital. As can be concluded from the brief above description relating to a particular metropolitan area, differentiation can reflect the interaction or entanglement of a number of factors, as detailed in the following points:

- In a strong poviat with diversified economic structure, a high concentration of export potential does not have to be associated with a high share of overall revenue accounted for by exports. The manufacturing base is diverse, the poviat displays a high level of resistance to economic shocks, and declines in exports do not have more serious consequences for the economy (including for the labour market). The fact that a low(er) share of all revenues is accounted for by exports may not be interpreted unequivocally as a manifestation of low(er)-level competitiveness, since the latter is also verified by reference to sales on the domestic market.

- In a poviat whose economic fabric is weak, and there are not a great many business entities, the commencement and pursuit of exporting by one or a few larger examples thereof ensures that the share of all revenues accounted for by export may be very high. However, this is a reflection of the activity of just a couple of firms, such that a worsening of their condition due, for example, to a fall in demand, can carry with it very negative consequences for the given region.

- Many factors may interact here. The “inheritance” of a favourable manufacturing base linked with low labour costs, the proximity of an agglomeration, good transport access and influxes of foreign capital (often on the basis of cumulative causation) all ensure that the share of revenue accounted for by exports is very high, and – what is more – this will tend to be a stable situation.

6.3.4. Subsidiarity as a justification for the pursuit of an export-oriented policy at regional level

The aforementioned principle of subsidiarity may be interpreted as an argument in favour of regional engagement in the promotion of exports. While this would seem not to comply with EU law, from the economic point of view it might be justified in reference to real actions taken at regional level to support export.

In the context of export analysis conceptualised regionally, it is worth recalling the genesis of the whole subsidiarity idea. *Subsidium* in Latin means support, or assisting strength, which is to say an augmentation of the ordinary kind of strength (e.g. armed), where the latter cannot cope on the field of battle. Such an interpretation obviously seems anachronistic from the present-day point of view. However, if we treat the global market as the “field of battle” for participation on it, then it starts to look more acceptable. The authorities extend support to exporters, with the issue then left to be resolved concerning the level on which this support is to be granted.

The essence of subsidiarity is that the role of a higher instance can be left secondary to that of a lower-order instance. In the opinion of Millon-Delsol (1998, p. 31), the idea entails that kind of socio-political order in which “competences or capacities to act are ascribed to social actors in the first place”. Only where their activity emerges
as inadequate are actions taken by more-complex instances. Where the latter prove ineffective, competences and actions pass into the hands of the state, or – next after that – to the supranational EU bodies. This is an illustration of the bottom-up conferment of decisionmaking competences, albeit with the argument in favour of this kind of transfer being that higher-order action can sometimes be the only way of ensuring greater efficacy of action. On the other hand, a transfer of commercial policy to the regional level represents the reverse direction, given that competences are handed down to a lower level, with the central authorities as it were consenting to the idea that part of the activity entailing promotion should undergo decentralisation.

Subsidiarity can thus be interpreted as an argument for competences over the promotion of export activity being passed down to the regional level (i.e. downwards) – and hence to the level nearest to the one at which the problem of support for exporters (or more precisely the need for them to be supported) arises. Recalling first that the decisive criterion when it comes to conferring decisionmaking competences upon a region, or else upon EU bodies at the other extreme, is indeed effectiveness/efficiency, let us then note that the sine qua non condition if a high level of efficiency of this kind of support is to be guaranteed is the proper recognition of exporters’ needs. This in turn requires a well-functioning system by which to monitor the economic situation in a region, cooperation between regional authorities and the business sphere (exporters or potential exporters), and access to statistical data depicting circumstances and trends where foreign trade is concerned, as well as the condition businesses in the given region find themselves in.

Cappellin (1996) considers the principle of subsidiarity in the context of processes of networking, decentralisation and federalisation, seen as new approaches to regional policy, albeit with the boosting of exports regarded as one of the main priorities. The several arguments in the name of decentralisation that gain a mention note that:

- limited distancing from regional or local production systems allows for a flexible and efficient response, also in regard to changes in the priorities underpinning policy pursued (i.e. a rapid reaction to changes whose rates in the global economy are accelerating),
- easier access to information (lower transaction costs and coordination payments as well as access) allows for the more effective identification of strengths and weaknesses of business entities, as well as the opportunities and threats lying ahead of them,
- local actors (be they private or public) are easier to mobilise into joint activity in the name of the development of a region (Cappellin, 1996, pp. 15 and 16).

Reich (2009) makes use of the subsidiarity concept in interpreting the nature and complexity of trade agreements reached between the WTO and regional trade groupings. The message to be read from the work by the author mentioned may boil down to an incentive for wider use to be made of a bilateral approach as trade agreements are negotiated; where a multilateral approach has failed to prove its worth (given a lack of success with negotiations at the WTO forum); and where certain countries are de facto having a “free ride”.

By reference to the subsidiarity principle, Gilroy, Seiler and Schreckenberg (2013) ponder the optimal degree of decentralisation of decisions as regards trade integration
and (more widely) economic integration. They are of the view that the centralisation of decisions on trade is not in line with the idea of subsidiarity. The specific question they pose concerns the manner of determining which level of trade integration is optimal, in line with the compromise between economic freedom and the unification of rules on trade. Also noteworthy is a review of the often opposing views expressed in litt. as regards the true nature of that very principle of subsidiarity. This runs to the effect that it provides for a considerable variety of interpretations, that its application in the real world is very much limited, that it is nothing less than “dangerous”, and so on. A read of the work by Gilroy, Seiler and Schreckenberg (2013, p. 16) in turn offers confirmation that the discussion surrounding the true nature of the principle is ongoing. In the field of trade integration, consideration is given to arguments both for and against centralisation of the decisionmaking process, albeit with the model conceptualisation treating the consumer’s wellbeing as the category most determining the scope of centralisation. Overall, the authors cited conclude that high negotiating costs necessitate the existence of a limit beyond which multilateral trade negotiations become counterproductive. For that reason, thought needs to be given to some modification of the subsidiarity principle.

Ederveen, Gelauff and Pelkmans (2008) consider the advantages of centralisation and decentralisation, advancing arguments in favour that are concerned with: economies of scale (where fixed costs are incurred only once, as opposed to many times by each of the partners), external effects (activity on the part of a single partner exerts an effect – often unanticipated – on other partners, to the extent that coordination can be argued for) and networking (with partnership in networks being important in a global economy that is changing dynamically). In turn, what speaks in favour of decentralisation is diversity, i.e. adaptability to local conditions and the possibility that other partners may be learnt from (as best practices are sought).

Portuese (2010-2011) interprets subsidiarity as a principle of economic efficiency, thus emphasising the controversy associated with it, as well as the fact that it can be used as an argument for both centralisation and decentralisation, as regards the division of competences both between Member States and the EU and within countries. Subsidiarity is considered in terms of the costs and benefits arising from decentralisation and centralisation, within the framework of a model from Tiebout, who points to the benefits arising out of the former phenomenon. Portuese (2010-2011, p. 236) makes reference to Hayek’s “knowledge problem”, suggesting that an argument in favour of decentralisation concerns reduced costs of information gathering, given that such costs are very high where the (regulatory) activity is engaged in in a higher-order way by a central authority. On the other hand, where the decisionmaking process involves local or regional structures, these are in a position to maximise the utility of decisions taken. This reflects the fact that local actors have their own special kind of comparative advantage vis-à-vis the taking of decisions regarding services on offer. Where consideration of the issue of support for exports is concerned, the advantage in question needs to be interpreted first and foremost as effective recognition of both the needs and the shortfalls characterising businesses where export potential is concerned. Benefits accruing from decentralisation ought to be set against the benefits arising out
of centralisation – first and foremost the economies of scale. The author concludes that the subsidiarity principle should be interpreted in a purely pragmatic way, as a weighing up of the arguments for and against centralisation, with a view to maximal efficiency of action being achieved.

Cappellin (1996, p. 20) points to limitations on the principle of subsidiarity as a domain in which regional development policy can be pursued, in the circumstances of a changing global environment in which business entities can be described as “local but also global”. This limitation is linked with hierarchical features that reflect the nature of the social relationships presumed to exist, and considered to justify the subsidiarity formula. This hierarchical character is not very much in line with the flexibility of the network conceptualisation, which is in turn suited to the interpretation of modern economic relations, in the transboundary dimension in particular.

The subsidiarity principle is also invoked in the considerations of James and Cato (2014), as regards the concept of the so-called “resilient region” as well as the bioregion. This would seem to represent a very far-reaching interpretation of the message that arises out of the said principle, in spite of the fact that the word “subsidiarity” as such appears just 6 times in the text. The author’s considerations address the nature of the said “resilient region”, as well as the relationship between that category and the so-called “bioregion”. A bioregion is in fact understood as a development of the resilient region, while the latter now represents a widely-discussed concept, given both the crisis, and the need to adapt to dynamic change ongoing in the global economy. This also links up with the idea of some kind of “separation” from the global economy, or at least with a conferring of “immunity” as regards that economy’s negative impact. In the view of Martin (2012), the said “resilience” has four component elements, i.e. (1) low sensitivity, and resistance to economic shocks, (2) renewability – understood as a region’s capacity to head back to the path to growth, or else to enter along a new growth path (3) rebuilding – i.e. the capacity of a regional economy to “come round” after a shock, and (4) reorientation, i.e. the economy’s capacity to adapt to change. In the context of the “resistant region”, subsidiarity boils down to a region of this kind being more self-sufficient (with a great part of industrial output and food production being achieved locally), with diverse economic structure and the strategic decisions taken giving a great deal of consideration to the local and regional context.

6.3.5. Internationalisation as a priority of regional development policy

In the next few years, the main source of funding of regional policy will be the EU funds, as disbursed within the framework of the Operational Programmes. From the point of view of considerations of the nature and dynamics of export activity as related to regions, what needs remarking upon in particular is the “Eastern Poland Operational Programme 2014-2020” (POPW for short), as well as the “Intelligent Development OP 2014-2020” (Ministry of Infrastructure and Development, 2014b, 2014a).

A read of the analysis of Poland’s foreign trade long run at regional level leaves little room for doubt that the regions of Eastern Poland, as for example compared with the country’s western regions, have a relatively low export intensity measured in terms of
the per capita value of exports, or else the share of overall revenues from sales accounted for by exports. Also attesting to the lower competitiveness of exports here are such qualitative indices as (low-) intensity of intra-industry trade, as well as the (low) share accounted for by technologically advanced products. Changes in exports from the regions of Poland are very much determined by FDI, which is in the main located outside the eastern voivodships. Equally, this does not mean that examples of export success are impossible to find in this (macro)region. Standing out against the background of the eastern voivodships is Podkarpackie, which, thanks to trade linkages generated by entities in the so-called “Aviation Valley”, is characterised by a high share of products that are advanced technologically, as well as a greater intensity of intra-industry trade.

Internationalisation of the economy is a high-ranked issue where Poland’s regional policy priorities are concerned. It is treated as an instrument whereby competitiveness (and the level of innovation) can be raised. One of the Eastern Poland Operational Programme’s measures entails the creation of new business models to achieve the internationalisation of activity on the part of SMEs (Ministry of Infrastructure and Development 2014b, p. 8). The development of the export of goods and services is treated as an instrument by which to achieve one of the detailed objectives set out in the National Development Strategy 2020, i.e. raised efficiency of the economy. A problem with entities having their seats in the eastern regions is a low level of awareness regarding the benefits associated with internationalised activity, limited familiarity with foreign markets, and a lack of devised and implemented export development strategies (Ministry of Infrastructure and Development 2014b, p. 10).

Actions seeking to internationalise enterprises in the next few years will be implemented within the framework of the “Intelligent Development 2014-2020” Operational Programme, though given its nature, the financing will be limited to a small number of enterprises enjoying the highest innovation potential.

The two key programme documents concerning regional development policy that are presented above are in the nature of general frameworks that offer directions for support rather on the macroregional scale. However, the matter of support for exports at regional level also appears at the sub-regional scale, given observed differences in levels of internationalisation from one poviat, or even one gmina (local authority area), to another (as was discussed in the case of the Gdańsk-Gdynia-Sopot Metropolitan Area).

As is made clear in strategic documents dealing with the spending of structural funding (especially via the Eastern Poland Operational Programme), ongoing internationalisation is a matter achieving a very high rank. Internationalisation is perceived in terms of its being an instrument to improve the labour-market situation, as well as raising the efficiency of organisation (i.e. competitiveness). The linkage between the phenomenon and innovation proceeds via the concept of the heterogeneity of business entities espoused by M. Melitz. A very distinct signal is therefore provided, to the effect that the matter of exports has resonated as it should in regional policy. In this respect, a reduction in disparities between the eastern and western parts of Poland regarding internationalisation must represent a crucial objective of regional policy.

A question needing to be asked concerns the possibilities for disparities in the spatial distribution of export activity to be reduced in the same way. These of course reflect
the uneven distribution of economic activity in general. In the global economy, and under the pressure that competition imposes, enterprises seek to maximise their scale of production, in this way encouraging an intensification of processes of agglomeration. The new economic geography prompts us to believe that a reduction in the costs of engaging in trade, and ongoing processes of integration, will encourage economic activity to undergo agglomeration. And in this a key role is that played by business entities with shares of foreign capital. On the other hand, there are many enterprises that have a considerable – as yet unrevealed – potential to export, offering a basis for foreign expansion if only they can receive support, for example under the structural funds. That said, it is necessary to recall a key premise arising out of Melitz’s conceptualisation – that only the most productive entities become exporters.

The POPW will be implemented in tough times, given a worldwide economic crisis that enforces even greater competitiveness on markets. The achievement of goals set (notably the aforesaid increased internationalisation) will not prove easy. And an important factor seemingly ignored by the programme is the influx of FDI into the eastern macroregion. Inflow of FDI and the activity of entities with a share of foreign capital together go a long way to determining both the growth in exports per se, in given regions, and structural changes (e.g. a shift in product structure towards goods displaying a greater degree of technological advancement). A premise underpinning action to achieve further internationalisation is the assumed favourability – for both entities and the region in which they are located – of a rise in the level of exports. This a justified premise, but it should be noted that an increase in the significance of exports leads to greater exposure to the risks that must inevitably accompany this achievement (not least those associated with exchange rates, policy on the market exported to and, independently, in connection with both, the risk that demand will dry up). This problem could be made out clearly during the period of crisis, in those regions of Poland whose economies were characterised by the greatest degree of openness (in terms of trade and FDI).

Concluding remarks

There is a shift to the regional level when it comes to the interest economic studies show in matters of international trade. In both theoretical and practical terms, this process began in the USA, though with time this kind of work has also become ever-commoner in Europe.

The level of the so-called “international awareness” is rising in the regions. It is becoming ever-clearer to people that regional economies are linked internationally, and that this is important. Of course, the crisis made clear both the positive and negative

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47 It is by the way worth referring to research considering the influence of export on regional development and the labour market (e.g. R.A. Erickson 1989; F. Hack and A. Vaidya 1995; R.M. Leichenko and J. Silva 2004; M. Polèse and R. Shearmur 2006; S. Coulombe; J.R. Baldwin and W.M. Brown 2004; D.W. Edgington and R. Hayter 1997; S. Bagchi-Sen 1999; R.A. Erickson 1989; J. Dufor and F. Murray 2004). The conclusions presented in these works are by no means unequivocal.
sides of strong and vibrant capital- and trade-related links between a region and the international economy.

What continues to dominate in Poland is an approach orientated towards the attracting of FDI and the intensification of export activity. Increased internationalisation is first and foremost treated as a chance for a region, as a means by which the level of competitiveness can be raised and new job opportunities created.

Equally, regional linkage with the international economy (via FDI or export) represents a further area or dimension to inter-regional differences and disparities. The degree of “openness” achieved by regional economies is also found to differ markedly.

Policy on regional development takes these differences into account. Increased internationalisation is seen as an important priority, especially when it is the less-developed regions that are being taken account of. A manifestation of this is the development and structuring of the Eastern Poland 2014-2020 Operational Programme, as well as the Intelligent Development 2014-2020 OP.

Support for exports and exporters extended at regional level must remain in accordace with EU regulations. Paradoxically, there is a real risk that means from the EU funds earmarked for internationalisation will turn out to be non-compliant with EU regulations on competition, state aid and commercial policy.

Recognition of needs is a basic condition for the effective promotion of exporters. The necessary reconnaissance is obviously better carried out at regional level (as opposed to centrally), since possible “bottlenecks” can also go better recognised and understood.

Provisions in the Treaty on the Functioning of the EU concerned with the Common Commercial Policy are not heeded in practice. This reflects the fact that trade policy in regard to the promotion of exports is not raised up fully to Community level – in contravention of the Treaty. Such a state of affairs may give rise to unfair competition where export promotion is concerned.

Knowledge of the legal conditioning behind support for exports at regional level should be disseminated and propagated more widely, and all the more so given the way that distinctions between intra-Community supply and export beyond the EU are hard to draw (as regards the sending and destination countries).

When applied to the promotion of exports, the principle of subsidiarity may be read in an ambiguous way. On the one hand it should not be invoked to promote exports, given that this domain is among the exclusive competences of the EU. But on the other hand, it represents an exceptionally useful concept by which to justify support for exporters at the regional level. Arguments for the promotion of exports at the level of the regions can also be construed from Treaty provisions concerned with economic, social and territorial cohesion.

One criterion underpinning the allocation of activity between regions, countries and the EU bodies is efficiency. Hence, where regional-level support for exports is concerned, it is the efficiency-related arguments that can justify promotional activity that will need to be presented.

Regional authorities can only have an indirect influence in shaping commercial policy, for example lobbying to have defined solutions introduced. In the given region – or to look at it from a wider perspective, in the given group of EU regions with similar
“problem profiles” arising out of defined industrial structure, as well as exports and imports – a “demand” may appear for the introduction of a given instrument of trade policy. In this sense at least the EU’s commercial policy also has its regional dimension, given that its shaping (instrumentation or toolkit) and consequences both have their spatial dimensions. It is also worth stressing the major role that effective lobbying and representation of Polish regions at EU fora can play, along with cooperation with regions in other countries that are similar, or have experience with similar problems.
Concluding remarks

Krystyna Gawlikowska-Hueckel

Current Poland’s trade is very much shaped by external conditioning that may be either positive or negative. The positive aspects include growing competitiveness of the Polish economy thanks to its liberalisation, as well as EU membership and the attendant pressure that has been imposed on the country’s producers – forced to raise productivity if they are to compete on the demanding international market. Also of significance is the influx of foreign direct investment, which is export-generating to a considerable degree.

The negative factors obviously include the effects of the 2008+ financial crisis. While this is now eight years old, the world has still not come back on to the path of development present “pre-Crisis”, and uncertainty remains a feature of the international markets. Furthermore, the deterioration in business conditions has encouraged at least a partial return to protectionist practices, which distort competition in an obvious way and are in contravention of international agreements. The introduction of instruments detrimental to free trade has become widespread, and the international or supranational organisations dedicated to the support of free trade (the WTO and EU) have proved unequal to the task of counteracting the wave of protectionism.

Foreign direct investment is a factor exerting a very considerable influence on exports. As is well-known, it is enterprises with a share of foreign capital that prove to be the most active exporters, also accounting for the greatest proportion of imports, and encouraging an increase in the technological level and degree of competitiveness characteristic of Polish industry. However, no analysis of the role of corporations in generating streams of trade should neglect the “dark side” of their nature. Given that the key objective of all their activity is to gain profit, they offer no guarantee of stability, particularly in the circumstances of a worsening of business conditions, let alone a complete breakdown. Moreover, within intra-industry trade, they may impose specialisation in the production of low-technology goods, in this way helping an unfavourable production structure to remain in place far longer than it ought to. Adherence to such specialisation over the longer term may threaten to “imprison” an economy in a middle-income trap.

Those seeking to evaluate Poland’s foreign trade will always need to recall how – *de facto* – it was only after 1990 that this began to develop in a “normal” environment. The limited competitiveness of the Polish economy was “laid bare” at that point, by the introduction of an official zloty-dollar exchange rate, which allowed for the first
unambiguous price-comparisons between Polish and foreign goods in a long time. There can be no doubt that the term “shock therapy”, which was assigned to the package of reforms seeking to “sanitise” the Polish economy, could just as well have referred to what was felt as the latter’s true state was made clear for all to see, along with the real levels of prices and wages and productivity, compared with those typical for the highly-developed countries.

This recollection of the time of onset of the transformation period serves its purpose, since it was only from 1990 on that any analysis of Poland’s foreign trade could be considered to make sense. In turn, considering that it was as soon as in 2008 that the most serious financial crisis for 80 years broke out – disrupting world trade in a very serious sense; it can reasonably be suggested that Poland’s exporters’ period of battling for a share of world markets, in circumstances of unsullied competition, lasted for just 17 years. Against that background, it becomes particularly significant to note how Poland’s foreign trade not only kept its position as an important factor underpinning economic growth, but actually in fact increased its role.

The period since 1990 has seen a steady rise in levels of both exports and imports (other than in the two “fall” years of 2009 and 2012). It is industrial goods that account for the greatest share of the turnover, and while low- or medium-technology goods prevail among exports, there is a slight increase to be noted in the share of products with a high-technology input. The last decade has brought a slight improvement in RCA indices characterising Poland, and the country is becoming ever more involved in inter-industry trade, first and foremost with EU Member States. Where the structure to intra-industry trade is concerned, the share taken by the horizontal component is dominant, and the last decade has witnessed an increase in the value of trade in both low- and high-quality products. What is more, it is to be expected that the significance of IIT will grow, as the gap between the level of development in Poland and that in the highly-developed countries goes on narrowing.

Where the geographical directions characterising Poland’s trade are concerned, the key partner remains the EU, and the key country Germany. The role of remaining markets for our products (in terms of the share of Poland’s exports they account for) is seen to be changing.

When trade is looked at from the point of view of volume and structure, as well as the role of intra-industry trade, this can be regarded as a type of analysis focused on results, and allowing for an assessment as to whether – and/or in what sense – its significance is changing in terms of its being a factor underpinning economic growth. Where trade at this level is concerned, a good theoretical base for research remain theories included within the traditional scientific currents, as well as those relating to intra-industry trade.

Equally, a true research challenge at this juncture is the attempt to have analysis move away to the level of the firm, so that we might identify the causes of the phenomenon whereby – within the same branch – some enterprises become exporters, while others confine their activity to the domestic market. The theoretical basis for work of this kind is of course formed by Melitz’s theory regarding the heterogeneity of firms, as well as subsequent developments on the basis of that theory.
Concluding remarks

Comprehensive and multifaceted research into Poland’s foreign trade, conceptualised in relation to both classical and contemporary models, and using a variety of different methods (not least questionnaire research and econometric models) has allowed for the positive verification of the new new trade theory. This is to say that Poland’s exporters and non-exporters are indeed seen to differ, in that the former are larger firms, and ones characterised by higher levels of both productivity and innovation. The probability of entry on to a foreign market is also greater where firms have a share of foreign capital, while a greater inclination to export is characteristic for those enterprises that are also importers. Taken together, these various traits create a certain model for the exporter that will also need to be characterised by one further feature – a willingness to take risks.

It is obviously worth noting that activity on a broader scale affords exporters the chance to develop faster than non-exporters. This reflects economies of scale, as well as increases in quality and the level of innovation, with all the consequences these have for increased competitiveness.

What – in the opinion of interviewed enterprises – are the main barriers to any entry on to foreign markets? The answers alluded to most often in response to this question relate to the fierce competition present on foreign markets, foreign-exchange risks and inadequate support being extended to (would-be) exporters. Furthermore, entrepreneurs also make the accusation that information as to business opportunities in other countries is inadequate and not forthcoming, while there is also a lack of adeptness when it comes to cooperating with other firms over foreign expansion.

It is of key relevance that the non-exporters perceive themselves to be under the greatest competitive pressures, given that these firms are in a relatively worse position. The decision to export in turn reflects, not only the crossing of some “threshold” where recovery is concerned, but also the overcoming of a certain psychological barrier that is in fact harder to deal with, given its close links with risk. For entry on to the international market necessitates a series of (aforementioned) adjustment processes that entail increases in productivity and improved competitiveness, and in consequence a reduction in the level of competitive pressure experienced.

In the context of the research results, it is worth referring to the possibility for non-exporters to be encouraged into entry on to foreign markets through the mobilisation of export support instruments. The ones accessible in this case include those deriving from commercial or industrial policies, or else policy vis-à-vis SMEs. The study reported here has confined itself to an analysis of the instruments at the disposal of commercial, industrial or cohesion policy.

It is a familiar truth that commercial policy is one of the so-called common policies, denoting pursuit at the European Union level. However, there is a certain narrow margin of free choice, which makes it possible to apply instruments not infringing Common Commercial Policy (CCP) rules. To be included among these are:

- reconnaissance as regards the needs of enterprises,
- the propagation or dissemination of knowledge and awareness as regards the legal conditions underpinning regional-level support for exporters,
- enhanced lobbying engaged in by regional authorities, and entry into alliances with other EU regions facing similar problems.
In referring to the role of the CCP, it is important to recall the EU’s efforts to devise a so-called “new approach” to commercial policy. In fact both the “traditional” and “new” approaches have the same aim, which is trade liberalisation. At the same time, it is emphasised that debate and negotiations engaged in under the auspices of either the EU or the WTO ought to be leading to the Union’s commercial policy being of “a more strategic and long-term nature” – something that must be seen as essential, given the context that global trends present.

The new approach thus seeks more effective achievement of the “old” objective involving the breaking down of barriers to trade, and the creation of new export opportunities for the Member States – with consideration also given to changes arising out of globalisation processes. Under the “new approach”, it is assumed that the effectiveness of European Commission activity will ensure: “a new decentralised partnership between the Commission, EU Member States and business on the ground in third countries, where local expertise makes trade barriers easier to identify and tackle”. The scope and scale of Commission activity should be in line with the significances of different markets.

There can be no doubt that the “new approach” constitutes an attempt to counteract the trends worldwide that threaten free trade. The EU intends to have very active engagement where the WTO is concerned, not least as regards the finalisation of the Doha Round. At this stage, it remains hard to judge whether this new policy option will prove effective enough to curb the dangerous wave of protectionism we have been observing recently.

A further opportunity to promote exports is created by the use of cohesion policy instruments, which are in line with CCP rules. As is known, there has been a policy shift as regards the EU’s present Financial Perspective (for 2014-2020) – that is so important for Polish policy. This is to say that the clear emphasis is now on competitiveness, even if this comes at the expense of cohesion. The directions intervention may assume are articulated in the general regulation from the Commission, and these are seen to include measures that may serve – at least indirectly – in the support of exports, i.e.:

- strengthened research, technological development and innovation,
- enhanced access to, and use and quality of, ICT,
- enhanced competitiveness of SMEs.

A further policy that should be mobilised in the support of exports is industrial policy. As with commercial policy, so also here, the European Commission has devised a new approach seeking to combat negative processes connected with deindustrialisation and globalisation. This links together elements of horizontal and sectoral intervention. The return to the practice of exerting impacts on a sector-by-sector basis denotes the possibility of sectors for which the opportunities are greatest being identified. This in turn opens up the chances for specific initiatives directed at given sectors to be set in motion.

The key features of the new option entail:

- an individualised approach being taken to each of the different economic sectors,

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1 It is not without reason that part of the new commercial policy is given the name Global Europe.
Concluding remarks

- consideration being given to the entire value chain and supply chain (wherein certain links lie beyond Europe),
- a regular supply of information from the Commission as regards implemented EU competition and industrial policy.

Poland's strategic government documents continue to indicate that industrial policy “at each level of action and in each field, will be inspired by horizontal principles”. This denotes an urgent need for objectives and priorities to be defined, given that the new approach offers greater chances to exert influence sectorally, even if the Polish strategy fails to refer to this.

Ultimately, it is worth relating to the level of the firm. Given the heterogeneity typical for these, should tools acting in support of exports be horizontal in nature? Or should they rather pinpoint the enterprises worth supporting? Those referring to Melitz’s theory will need to recall that exporters become such, having crossed a defined productivity threshold. On that basis, it can be concluded that help addressed to enterprises finding themselves close to the said threshold would be the most effective. And indeed, such a selective approach would seem best, because it could lead to a relatively rapid increase in the population of exporters.

Where support for exports is concerned, very important actions are those seeking to achieve greater innovation and a raised level of competitiveness, which ought to bring about an improved competitive position vis-à-vis foreign firms. A strategy aiming to attract foreign investors would also obviously be important.

To sum up, multifaceted research into Poland's foreign trade can be seen to allow for the verification of the hypotheses set for it at the outset. The analysis carried out offers a substantive basis for considering that:

- firms in Poland are heterogeneous, with only some engaged in exporting,
- Poland's streams of foreign trade are generated to a greater extent by entities with a share of foreign capital than by indigenous firms,
- 2008 and the post-crisis years have influenced the competitiveness of Polish exports, with this reflecting both changes ongoing in Poland and those affecting international markets,
- full use is not being made of policy instruments capable of being deployed in support of exports, and this is true at both the national and regional levels, in particular in the context of the new wave of protectionism.
Annex

Method of calculating the Revealed Comparative Advantages Index

The Revealed Comparative Advantage Index (RCA, or Balassa index) measures the relative specialisation in exports from country $R$ to $W$ (world) for sector $I$, and expresses the relative advantage of a given country in the international export of a given product (or group of products) in relation to the total share of global exports (or EU exports) that country accounts for.

$$RCA_{iW}^R = \frac{x_{iW}^R}{X_W^R},$$

where:
- $RCA_{iW}^R$ – revealed comparative advantage index of country $R$ to the world ($W$) in sector $i$,
- $x_{iW}^R$ – volume of exports in sector $i$ of country $R$,
- $X_W^R$ – total exports of country $R$,
- $x_{iW}^W$ – volume of exports in the sector and in the world,
- $X_W^W$ – total global exports.

The index assumes a positive value (>0). If it exceeds 1, it means that country $R$ has a comparative advantage in a given sector compared to the exports of remaining countries; this means that country $R$ is specialised in the export of specific goods, and thereby these goods are competitive. If, however, the RCA index is below 1, country $R$ has no such advantage: it is relatively unspecialised, and therefore not competitive, in the export of such goods.

For the purposes of analysis, this study compares the advantages in the exports of different EU groups to the remaining EU countries in both internal and external trade. A given country, or a group of countries, will be analysed in this way in comparison to the remaining EU28 countries, to identify the relative advantages in relation to the “EU average”, viz.:

$$fgfRCA_{ip}^R = \frac{x_{ip}^R}{X_P^R},$$

where: $RCA_{ip}^R$ – revealed comparative advantage index of country $R$ in sector $i$,
Annex

\[ X_{ip}^R \] – volume of exports in sector \( i \) of country \( R \),
\[ X_p^R \] – total exports of country \( R \),
\[ X_{ip}^{UE} \] – volume of exports in sector \( i \) in the EU,
\[ X_p^{UE} \] – total EU exports.

Additionally, index changes will be compared to assess developments taking place in consecutive periods:

\[ \Delta RCA_{ip}^R = RCA_{ip}^R - RCA_{ip}^{R(t-1)} \]

**Division of EU Member States into groups**

Owing to the heterogeneity of the EU Member States, they need to be aggregated into groups. The present study uses the categorisation based on the graph shown in Figure A1.

Currently the European Union brings together 28 Member States (EU28), including EEC member states (EU15) and the new EU countries (NMS). Of the 15 EEC member states, 12 countries are Eurozone members (EZ12) and 3 are not (EU15_n_EZ). For the purposes of this analysis, 2 separate groups are also taken into account: a first, made up of Portugal, Ireland, Greece and Spain (PIGS), whose economic situation during the economic crisis was the most adverse, and a second, which included the remaining Eurozone countries (EZ12_n_PIGS). The new Member States were divided into those from the Visegrad Group (VIS; the remaining countries were marked as: NMS_n_VIS), of which Poland is a member (POL; the remaining countries were marked as: VIS_n_POL). Table A1 provides a list of the acronyms used for these groups of countries, together with the names of countries. The present study looks at the interactions taking place between the following groups of countries:
– analysis of Poland’s overall situation in the EU: EU28 and POL,
– analysis of the EU’s overall situation: EZ12_n_PIGS, PIGS, EU15_n_EZ, POL, NMS_n_VIS and VIS_n_POL.

Table A1. Groups of countries covered by the study

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZ12_n_PIGS</td>
<td>Austria, Belgium, Finland, France, Netherlands, Luxembourg, Germany, Italy</td>
</tr>
<tr>
<td>PIGS</td>
<td>Greece, Spain, Ireland, Portugal</td>
</tr>
<tr>
<td>EU15_n_EZ</td>
<td>Denmark, Sweden, United Kingdom</td>
</tr>
<tr>
<td>NMS_n_VIS</td>
<td>Bulgaria, Croatia, Cyprus, Estonia, Lithuania, Latvia, Malta, Romania, Slovenia</td>
</tr>
<tr>
<td>VIS_n_POL</td>
<td>Czech Republic, Slovakia, Hungary</td>
</tr>
</tbody>
</table>

Source: authors’ own elaboration.

**Division of EU’s trade partners into groups based on trade agreements**

As part of its Common Commercial Policy, the EU enters into regional trade agreements (RTA), whose main objective is liberalisation of the flow of goods, particularly hi-tech products, and of services. Using the RTA criterion, EU trade partners can be divided into 4 groups of countries. The first two groups include countries with which the European Union has concluded: a customs union (CU) or an economic integration agreement (EIA). Another group is one with which the EU only has created a free trade area (FTA); and the last group includes the remaining countries (ROW). Economic integration theory suggests that strong economic cooperation should be established primarily with such countries.

**Databases used in the study of trade product structure**

The data used in the study were derived from Eurostat, and mainly covered the years 1999–2013. Comext, Eurostat’s commercial database, served as the source of bilateral data comprising all the EU countries, broken down into types of products (about 15,000 products altogether for 8-digit CN codes), which were aggregated to the level of sections, product groups and groups of countries.

The study makes use of the NACE classification (cf. Table A2).
### Table A2. Aggregated NACE Rev. 2 sections by technological advancement

<table>
<thead>
<tr>
<th>Product group</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-technology manufacturing (LT_indu)</td>
<td>manufacture of food products and beverages</td>
</tr>
<tr>
<td></td>
<td>manufacture of tobacco products</td>
</tr>
<tr>
<td></td>
<td>manufacture of textiles</td>
</tr>
<tr>
<td></td>
<td>manufacture of wearing apparel, leather and related products</td>
</tr>
<tr>
<td></td>
<td>manufacture of wood and paper products</td>
</tr>
<tr>
<td></td>
<td>printing</td>
</tr>
<tr>
<td></td>
<td>manufacture of furniture</td>
</tr>
<tr>
<td>Medium-low-technology manufacturing (MLT_indu)</td>
<td>reproduction of recorded media</td>
</tr>
<tr>
<td></td>
<td>manufacture of coke and refined petroleum products</td>
</tr>
<tr>
<td></td>
<td>manufacture of rubber and plastic products</td>
</tr>
<tr>
<td></td>
<td>manufacture of other non-metallic mineral products</td>
</tr>
<tr>
<td></td>
<td>manufacture of basic metals</td>
</tr>
<tr>
<td></td>
<td>manufacture of metal products except machinery and equipment</td>
</tr>
<tr>
<td></td>
<td>manufacture of ships and boats</td>
</tr>
<tr>
<td>Medium-high-technology manufacturing (MHT_indu)</td>
<td>manufacture of chemicals and chemical products</td>
</tr>
<tr>
<td></td>
<td>manufacture of weapons and ammunition</td>
</tr>
<tr>
<td></td>
<td>manufacture of electrical equipment</td>
</tr>
<tr>
<td></td>
<td>manufacture of machinery and motor vehicles</td>
</tr>
<tr>
<td></td>
<td>manufacture of other transport equipment excluding ships, boats, air and spacecraft</td>
</tr>
<tr>
<td></td>
<td>manufacture of medical and dental instruments</td>
</tr>
<tr>
<td>High-technology (HT_indu)</td>
<td>manufacture of basic pharmaceutical products and pharmaceutical preparations</td>
</tr>
<tr>
<td></td>
<td>manufacture of computer, electronic and optical products</td>
</tr>
<tr>
<td></td>
<td>manufacture of air and spacecraft</td>
</tr>
</tbody>
</table>

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This is a multi-dimensional analysis of the characteristics, trends, problems and challenges that Poland’s foreign trade is facing. Part One deals with globalisation processes and the 2008+ crisis. Part Two offers a review of international trade theories, with a focus on new new theories; combining it with an empirical analysis related to major contemporary research areas: firm heterogeneity, intra-industry trade and gravity. Part Three discusses broadly conceived trade and industry policies, tackling such issues as export promotion at regional level and legal aspects of foreign trade.

The authors look at Poland’s foreign trade during the difficult time of a financial crisis. What makes this publication unique in Polish economic literature is that it analyses the underlying causes and structure of Poland’s trade on the basis of the information collected from a survey of several hundred enterprises, both exporters and non-exporters. In effect, the authors come up with quintessential profiles of Poland’s exporting firms and those that place their products on the local market.

Prof. Elżbieta Czarny