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Welcome to number 40 of our Journal, the last one in 2013. The end of the year is an occasion to thank our Authors for submitting interesting manuscripts and the Referees for their insightful and so valuable reviews. We would not be able to issue our Journal without both groups of our Partners. We do appreciate their cooperation, and we count on continuing our relations in the future. We wish our Partners and our Readers realizing their personal and professional plans in the New Year 2014.

As to this issue, we include eight regular papers.

The first paper, by Anna Zorska, *Knowledge development and transfer in foreign subsidiaries and their parent transnational corporations*, explains the tendency of increased participation of foreign subsidiaries in the knowledge development by TNCs, which influences parent firms and host economies. The article proposes the valuable conceptual ideas for further research of the phenomenon.

The second article by László Csonka *Innovation and internationalization of Hungarian SMEs in the IT industry* refers also to a problem of relations between companies’ internalization and knowledge development resulting in innovations, but this time with a focus on SMEs. Its author analyses the major barriers in internationalization of the Hungarian SMEs.

In the next paper, *Bitcoin – new virtual global currency?*, Elżbieta Chrabonszczewska describes the new virtual currency called Bitcoin and discusses its economic role, its benefits and weaknesses. The author concludes that the Bitcoin does not eliminate problems of traditional currency but adds new risks for its users.

The fourth article by Agnieszka Domańska and Dobromir Serwa, *Factors of the European economies’ vulnerability to external shocks – an empirical analysis. The example of 2008–2009 crisis costs* is focused on empirically analyzing the subprime crisis’ impact on economies of European countries. The authors conclude that the recession only highlighted and enhanced many problems and unfavorable tendencies which were observed in the European countries long before it started.
The paper by Michał Ziółkowski, *Rebalancing the eurozone troubled economies*, presents the evidence suggesting that the efforts to rebalance economies of Ireland, Portugal, Spain, Italy, Greece, Cyprus turned to be mostly ineffective. In some cases they resulted in very small positive changes while other economies continued to fall out of balance.

Economic problems of European states are also discussed by Konrad Kubacki and Agnieszka Słusznia in their article, *Economic development path of Poland: innovation and competitiveness in light of the situation of Southern European countries*. The authors describe the development paths of the major Southern European countries to suggest a new development path for Poland. They indicate that unless Poland introduces the important reforms it may not avoid serious consequences, similar to the ones suffered by the Southern European economies.

The seventh article takes the readers away from Europe and its economic problems. Paweł Wieprzowski in the paper *Copper in Chile – when the resource “curse” becomes a blessing* presents an evidence that Chile has been able to cope with the resource “curse” by developing proper institutions and diversifying the structure of its foreign trade and has been successfully dealing with the resource abundance problem over several decades.

The issue ends with an article by Marcin Bągard, *Female employment and parental leave: the case of Poland*. The paper focuses on determining the impact of eligibility for child-raising allowance on the parental leave length and the impact of parental leave duration on female job tenure.

We hope you will enjoy reading these varied and surely interesting papers.
Anna Zorska
Institute of International Studies
Warsaw School of Economics

Knowledge development and transfer in foreign subsidiaries and their parent transnational corporations

Abstract

The article aims at analysis of knowledge-oriented growth of TNCs’ foreign subsidiaries, their transformation and evolving participation in knowledge development by parent transnational corporations (TNCs). The author’s concept of increasing involvement of foreign subsidiaries in leveraging knowledge in TNCs’ organizations is presented with a focus on a new process of “creative transition” by corporate foreign subsidiaries and its implications for the parents and host economies. The research method is based on integration of concepts, elements and instruments used in international management and international business to investigate the evolution of the knowledge development process in TNCs’ cross-border organizations.

The analysis of knowledge development and transfer in TNCs, and growth of their foreign subsidiaries as well as key factors of expanding their knowledge-oriented activities reveals the “creative transition” process which is underway in the subsidiaries. It leads to their increased participation in the knowledge development by TNCs and implies some results for parent firms and host economies. It is concluded that the knowledge-oriented activity of foreign subsidiaries can result in possible capturing valuable knowledge co-created by domestic entities what can imply weakening innovativeness and competitiveness of the host economies.

The problem of knowledge-oriented activity of TNCs’ foreign subsidiaries and its domestic impacts has not been investigated in Polish publications yet. The article offers a conceptual basis for further theoretical and empirical research with a focus on impacts in a host economy resulting from the knowledge-oriented activity of TNCs’ foreign subsidiaries and shows a necessity to work out a fair approach to sharing benefits of knowledge creation and utilization in the host economy.

Key words: foreign subsidiaries, transnational corporations, knowledge

Introduction

Managing development, transfer and implementation of knowledge in large firms has become a crucial, complex and challenging task nowadays. The complexity stems from approaching knowledge development at the same time in four areas: value creating functions (R&D and others), one of the key processes (implementing innovations) and set of instruments being operated as well as intra-firm institutions involved (units, teams, positions). Specific features of transnational corporations (TNCs) make their knowledge management even more complex, difficult and challenging for reasons of global competition, differentiated corporate networks (hundreds of subsidiaries and branches), geographical dispersion (dozens of countries) and diversity of various foreign locations.

To enhance knowledge development and implementation by foreign subsidiaries more and more significance is attributed by TNCs to knowledge-augmenting locational advantages in host countries.

The article aims to portray an increasing significance and contribution of corporate foreign subsidiaries in building up knowledge resources of their parent TNCs. To investigate these problems a wider perspective to cross-border knowledge development in TNCs is adopted which combines some selected issues of strategic management and key aspects of international business. The latter includes foreign direct investment (FDI) inflows to host countries which effects are well researched. As much less attention is drawn to activities of TNCs’ subsidiaries, it has become very important to focus investigation on their knowledge-oriented business in host countries. New issues concern a process of “creative transition” underway in many corporate foreign subsidiaries which activate their own research efforts as well as expansion of knowledge-augmenting relations and linkages in host countries.

The author puts forward hypothesis that the present growth of TNCs’ knowledge resources depends considerably on changes in the knowledge development and transfer by corporate foreign subsidiaries and their “local embeddedness” in host countries. To support verification of the hypothesis and explain gathering arguments, the author has created a new model illustrating participation of foreign subsidiaries in knowledge development and transfer of parent TNCs including access to knowledge-augmenting locational advantages in host countries by the subsidiaries. The author’s method combines both approaches of international management and international business to provide a wider perspective of TNCs as a cross-border, knowledge-oriented organizations which units (foreign subsidiaries) can grow, evolve and develop their specific knowledge owing to the expansion and “embeddedness” in host economies. And the impacts concern both the organizations and the economies.

For an in-depth explanation of the mentioned problems following four sections are structured. Section 1 deals with changing knowledge development and transfers in TNCs, mostly relating to growth of TNCs’ foreign subsidiaries. Section 2 investigates external
and internal factors affecting evolution and intensification of knowledge development in corporate subsidiaries. Section 3 explains “creative transition” of foreign subsidiaries in building up their own stocks of knowledge, technology and innovations, thanks to their own R&D efforts and cooperation based on “local embeddedness” in host countries. Some effects of the “transition” process for subsidiaries, parent corporations and host countries are discussed in section 4. Conclusions are focused on changing participation of foreign subsidiaries in the knowledge development by TNCs and possible impacts on knowledge endowment and utilization in host economies.

Knowledge development in TNCs and transfer to foreign subsidiaries

The approach of strategic and international management to knowledge in a firm is primarily rooted in resource-based theories which have been developed since 1980s by prominent researchers, e.g. Wernerfelt [1984], Barney [1991], Grant [1996], Nonaka and Takeuchi [1995]. Firms are endowed in heterogeneous knowledge in both intangible and tangible forms. For that reason knowledge application – altogether with other resources and capabilities – can result in different, firm-specific core competencies, competitive advantages and unique competitive strategies, as theorized by Hammel and Prahalad [1994], Porter [1986], Kogut and Zander [1992]. New questions have emerged with much increased significance of knowledge as a key strategic resource of firms under the growth of knowledge-based economy.

Firms’ rivalry on the global market requires not only successful strategies but also a cross-border structure of organization which is based on corporate units located on local markets. As stated by Bartlett and Ghoshal [1989], the units – foreign subsidiaries and branches – need to be integrated and coordinated within cross-border corporate networks. The TNCs’ network structures have become differentiated and heterogeneous due to including diversified resources (and linkages) of subsidiaries as well as many independent entities (companies) employed for execution of various tasks on behalf of the leading firm, as stated by Nohria and Ghoshal [1997]. The networks have become very useful for the conduct of TNCs’ knowledge-creating activities, especially since information technologies and networks (internet) have been introduced, as emphasized by DeMan [2004]. Knowledge management in large, heterogeneous networks of TNCs have become a key capabilities of firms, underlying their effectiveness and competitiveness on the global scale.

As conceptualized by Chakravarthy et al. [2002, pp. 305–322], managing knowledge in an organization relates to three processes: knowledge accumulation (creation and/or acquisition), protection (legal and organizational) as well as leverage of knowledge (its application and further transformation). Knowledge accumulation and leveraging
can be regarded as a knowledge development, if new competencies and competitive advantages can be created. Such activities are executed in a coordinated and integrated manner, at different levels of organization, by its various units and specialized teams. In a broad sense, they are engaged in working out new knowledge, converting it into particular technologies or other solutions and implementing them as innovations in products, processes, value adding functions, business infrastructure, etc.

Knowledge development in TNCs is initiated with enlargement of the resource what can result from conduct of R&D in own organization, engagement in technological alliances with other entities (firms, research centers), acquisition of new technology on the market (licensing) or unfair imitation of innovations. Due to strategic importance of knowledge, TNCs’ headquarters are usually involved in its management unless some tasks are delegated to other units. A new knowledge can be used separately or in combination with pre-existing knowledge and/or the acquired one. Learning of new or combined knowledge and its application in organizations are activated. Many corporate units are included to internalize the transferred knowledge and commence adapting it and exploiting [Zorska, 2007, p. 157]. The involvement in exploration of new knowledge in corporate subsidiaries can be initiated with their own R&D activity or technological cooperation conducted abroad. If so, a new round of knowledge leveraging and learning – from a bottom of organization – gains momentum.

The growth of knowledge-oriented activity led by TNCs is usually portrayed as the result of conducting R&D activity in the whole organization. A long-term increase in R&D spending by the group of 1000 largest corporations has been recorded and its growth rate exceeded 9% in the recent two years, reaching US dollars 603 billion in 2011. The most research-oriented are three industries: computing and electronics, health and automotive which account for 65% of total R&D spending (and industrial equipment as a fourth one). Although the USA and their corporations remain the leaders by value of R&D spending, the highest growth rates of spending are reached by China and India. Nearly half of the investigated companies confessed a slow growth of effectiveness in idea and knowledge generation, and a need to improve internally-focused mechanisms for converting those ideas to products [Booz&Company, 2012, pp. 6–20]. Such results indicate that much remains to be done in enhancing the whole innovation activity led within TNCs’ networks. As far as foreign subsidiaries (including factories and research centers) make the core of corporate networks, it is worth to portray their activity which relates to creation and leveraging knowledge, technologies and innovations.

A foreign subsidiary can be defined as any operational unit which is controlled by equity ownership hold by the investing company and located outside its home country. Referring to value functions or operations, in the group of foreign subsidiaries one can find factories (with research, technology or innovation departments), R&D centers, sales outlets and other units. Each foreign subsidiary makes a specific unit of corporate organization, due to its resources, capabilities, position in network, linkages, relations
and location in a host country. For that reason they make differentiated networks of corporate units. Their activity is usually complemented by “inputs” of independent units, i.e. local companies and centers, and subsidiaries of other TNCs.

Growth of each foreign subsidiary is featured with some individual “paths”, due to a form of investment (acquisition or green-field project), endowment in production factors and capabilities, and locational conditions. Much depends on characteristics of a given sector. Foreign subsidiaries in manufacturing industries usually follow four-stages “paths”, although particular stages can differ considerably. In modern IT-based services corporate subsidiaries can be placed closer to or just on the final (fourth) stage and conduct activity for a whole global corporate network and/or in niches of the global market.

Alongside each “path” and moving up the ”ladder” by subsidiaries, intra-firm knowledge transfers do occur and tend to evolve on particular growth stages. Basically, the sequence of four stages can be usually distinguished in a long-term “life” of TNCs’ foreign subsidiaries [Birkinshaw, Hood, 2003, p. 196]:

1. Growth initiated by a parent company when transfer of knowledge and other resources and capabilities is executed
2. Growth induced by internal factors in a subsidiary when development of its specific knowledge is initiated and expanded
3. Growth supported by a knowledge-augmenting locational advantages in host country and subsidiaries’ effective “local embeddedness”
4. Growth accelerated by linkages in TNCs’ cross-border network and competitive forces in the global environment.

Passing through subsequent growth stages involves changing knowledge flows between a foreign subsidiary and its parent TNC and among various corporate units. A large transfer of knowledge (and other resources) from the parent initiated at the stage 1 can be gradually limited at stages 2 and 3, while subsidiary’s own knowledge resource increases (especially at the stage 3). If the knowledge of high value-creating potential is developed by a subsidiary, than at the stage 4 it reaches a position of “center of excellence” and becomes a source of specialized knowledge, technology or innovation transfers to some other corporate units and possibly to independent entities. The position of “excellent” subsidiary in a TNCs’ network is raised considerably from local to global corporate innovator. It should be stressed that passing stages is accompanied by raising activity of foreign subsidiaries as participants of corporate cross-border networks, executing various functions and attempting to boost innovativeness and competitiveness of the organization.

Innovation networks of TNCs make cross-border structures which enable integration and coordination of R&D tasks and further knowledge development by corporate units and other entities (as the nodes of networks). Their activity is orchestrated by some leading TNC called integrators ³. The knowledge-development activity is specialized and
distributed in many units/entities due to their competencies and locational advantages in given host countries. Diversified participants, their linkages and interactions in the innovation activity add systemic character and special qualities of the structure and coin its new term, i.e. innovation systems of TNCs. The systems undergo some evolution towards open innovation what means e.g. more cooperation in innovation activity, accepting external knowledge, participation of various entities and inter-organizational knowledge transfers, emergence of knowledge brokers [Chesbrough, 2006, pp. 8–11].

Nowadays the corporate innovation systems are well developed, diversified and integrated, so four models of them have been worked out [Kao, 2009, pp. 110–112]. They range from linkages of own corporate R&D units in a given host country, to more diversified linkages and cooperation with local entities engaged in research work, further to much diversified linkages and relations with entities of all origins in a given country and finally to building up a large-scale innovation ecosystem. The ecosystem model is featured with penetrating well-advanced national or regional innovation systems in those host countries which lead in growth of the knowledge-based economy.

It should be stressed that globally dispersed and integrated corporate innovation systems are managed under increasing influence of multiple factors of diversified origins: within TNCs and beyond them – in the global environment. Systemic linkages in the corporate innovation networks enable transmission of the factors to knowledge-oriented activities of TNCs’ subsidiaries in various countries.

Factors affecting knowledge development in TNCs’ foreign subsidiaries

Nowadays TNCs’ subsidiaries – like all other companies – face pressures to upgrade their resources, capabilities, innovativeness, various linkages and relations at much higher rates than 15–20 years ago. Concerning resources, it is indicated that knowledge development in TNCs’ foreign subsidiaries and their increasing participation in knowledge transfer within corporate networks are affected by the following groups of factors:

1. External factors rooted in the global and/or regional environments
2. Internal factors stemming from the corporate system
3. Endogenous factors acting in a given subsidiary
4. “Local embeddedness” of TNCs’ subsidiaries in networks operating in host countries.

Although some interactions of the factors and their changing impacts on subsidiaries do happen, at the moment only basic aspects of influence will be discussed. Understanding of the factors enables comprehension of forces and changes in the activity of the subsidiaries both by their managers as well as local entities and Governments in host countries.
External factors emerge from a large complex of the contemporary economic, technological and institutional changes which can be gathered and synthesized as key processes: globalization and growth of the information- and knowledge-based economy. External factors generate forces changing conditions and courses of economic activity at all levels: micro, mezo and macro. In case of firms, emphasis is put on a complexity of knowledge-leveraging and value-creating processes, and a necessity to rely on constantly evolving innovation and business networks, partly focused on key entities outside TNCs’ systems [Ryall, 2013, pp. 81–87]. Within this line of considerations there are put down some key pressures on the activity of TNCs’ subsidiaries which include:

- Support of parent firms’ competitiveness on the global market with knowledge-based, specific advantages developed by their foreign subsidiaries
- Access to the best locational advantages in host countries and first of all to new R&D results and knowledge, talented staff, supportive infrastructure and institutions
- Cooperation with local partners and participation in external innovation networks
- Taking advantage of some economic arbitrage on the global scale (e.g. differences in wages, rates, taxes, new regulations or FDI incentives)
- Adjustment to dynamics of business activity on the key markets and to technological developments outside the Triad countries, mostly in Asian countries.

In technologically advanced and globalized sectors (e.g. information, pharmaceutical, telecom equipment) knowledge development of firms and their subsidiaries is affected also by evolving industry-specific factors of technological, economical and institutional character [Van Egeraat, Breathnach, 2012, p. 1164].

Internal factors are shaped by the functioning and activity of TNCs, and related to changes in their business models, value creating chains, structures and strategies, foreign expansion, innovation systems, various relationships, etc. In knowledge development by TNCs, special roles are played by intra-firm functional linkages and relations among all units (starting with R&D function) and by modes of effective knowledge transmission (through FDI and other channels). If intra-firm process of knowledge leveraging is well managed, than higher effectiveness of TNCs’ external linkages for knowledge acquisition is also recorded [Fang, Wade, Delios, Beamish, 2013, p. 36].

Under the accelerated technological progress and intensified competition, changes in TNCs are introduced constantly, so a faster process of their “creative destruction” is acknowledged. Of special importance for knowledge development in corporate foreign subsidiaries are the following internal changes inside their parent organizations:

- Intensification of the R&D activity (own and in cooperation) as well as generating, leveraging and transmission of knowledge
- Outsourcing and offshoring of value-creating functions (mostly of business services)
- Changing cross-border strategies and structures towards globally or regionally integrated networks
- Reconfiguration of global or regional value chains or supply chains
New knowledge-oriented FDI projects (both acquisitions and green-field investments)
Changing the innovation activity towards more open and cooperative models
Supporting initiatives for building multicultural teams and staff training.

Remarks on the factors affecting knowledge development in corporations lead to sketching out a model of foreign subsidiaries’ participation in knowledge development and transfer in TNCs which is presented on Chart 1.

**CHART 1. Participation of foreign subsidiaries in knowledge development and transfer by parent TNCs**

Notes: FSs – foreign subsidiaries; TNCs – transnational corporations

Source: own study

The two groups of factors (external and internal ones⁴) can stimulate knowledge development in subsidiaries (block I) and give a rise to their further involvement in the process of knowledge “production” and transfer, and some changes in their functioning and activity (block II). More on the transformation of knowledge-oriented activities of subsidiaries is given in the next section.

**Endogenous factors** relate to functioning of (and introducing changes in) subsidiaries themselves, in three domains of knowledge management: a/ its transfer from TNCs’ headquarters or other corporate units; b/ own, complex efforts to develop new, valuable knowledge; c/ capability to cooperate with external entities. Much depends on a particular stage of subsidiaries’ growth (as discussed in section 1), position and tasks in a corporate network and access to resources and capabilities outside a given
subsidiary. Taking it into account, one can list the following main processes and trends affecting creation and application of knowledge inside TNCs’ subsidiaries:

- Absorption of knowledge transferred to a given subsidiary (from inside and outside of TNCs), including primarily its effective implementation in products and processes
- Creation of new knowledge, resulting from own R&D and ability to convert it into technologies and innovations which can be successfully commercialized
- Ability of a given subsidiary’s staff for conducting multi-cultural communication, supportive cooperation and effective organizational learning
- Ability to enforce new initiatives leading to the expansion of a given subsidiary
- Ability to target long-term growth and plan subsequent actions to raise position in a corporate network.

Differentiation of foreign subsidiaries is initiated with unequal resource transfers from the TNCs’ headquarter and it can be increased considerably owing to capability for absorbing knowledge transferred to them (at stages 1 and 2, see section 1). Absorption means ability to identify value-creating potential of new knowledge, assimilate it with possessed resources and implement effectively for commercial actions. The absorption process depends not only on subsidiaries’ resource endowment but also on their ability and strong involvement in knowledge leveraging and organizational learning. Earlier good experience, close relations and strong linkages of subsidiaries with knowledge transferring corporate units or other organizations (firms) can facilitate the absorption process and further subsidiaries’ own knowledge development [Park, 2012, pp. 554–555]. Moreover, TNC parents can promote subsidiaries’ absorptive capacity by some organizational mechanisms and instruments, especially if the local sales markets are competitive [Schleimer, Pedersen, 2013, pp. 664–665].

“Local embeddedness” is a specific feature of TNCs’ foreign subsidiaries and it emerges if they are able to develop extensive local linkages and relations, and/or permeate into local networks for capturing more benefits of locational advantages in a given host country. “Local embeddedness” stems from interactions between characteristics of foreign subsidiaries and advantages of foreign locations. For the former, there are important motives of FDI placing, investment form (acquisition or green-field investment) and value-adding function executed in a given subsidiary. In case of knowledge-oriented subsidiaries, to increase their “local embeddedness” there are significant knowledge-augmenting motives, green-field projects and executing R&D functions (possibly linked to R&D-based production). For the latter, global attractiveness of foreign locations is important. It should be stressed that a present approach to choosing foreign locations requires to consider TNCs as border-crossing enterprises which seek both advantages of particular countries (to capture trans-border effects, e.g. in resource diversification) and of particular places or agglomerations within particular counties (to take advantage of spatial heterogeneity within a given country, e.g. location of business clusters or universities) [Beugelsdijk, Mudambi, 2013, pp. 420–421].
The most attractive foreign locations for knowledge-oriented TNCs’ subsidiaries should offer valuable knowledge and/or new technologies, skilled labor and modern infrastructure, specialized business clusters, developed local innovative entities (R&D centers, universities, companies) and institutions of good quality. Most of them can be accessed by corporate subsidiaries via local market or obtained by participation in local networks. Local networks can much facilitate access to national institutions and tapping to domestic flows of information, knowledge, technology or talented and creative personnel, which can be accessed from networked local entities or subsidiaries of other TNCs. Therefore, foreign subsidiaries can benefit at the same time from advantages of internal (corporate) and external (local) networks in host countries [Collinson, Wang, 2012, p. 1502, Fig. 1].

Chart 2 refers to the participation of foreign subsidiaries – as a focal unit – in both internal (corporate) network and external ones (in a host and other countries). In fact, it is “dual embeddedness” – a unique attribute of corporate subsidiaries.

**CHART 2. Local „embeddedness“ of TNCs’ foreign subsidiaries in corporate internal network and external network in a host country**

Source: Collinson, Wang, 2012, p. 1502, Fig. 1
The focal subsidiary – e.g. a “center of excellence” – can develop relationships and linkages with various units and entities in order to take advantage of their knowledge-related resources and capabilities. Special importance is attributed to knowledge-creating entities in a given host country.

The involvement of corporate foreign subsidiaries in expanding abroad their “local embeddedness” is driven by the following processes and forces which take place at present:

- Combined pressure of all external, internal and endogenous factors on upgrading competitiveness of the subsidiaries and their parent firms on the global market
- Evolving geographical and sectoral patterns of FDI flows which are more and more directed towards non-Triad countries (e.g. BRIC countries) and services (mostly modern business services, including R&D)
- Changed attitude of TNCs to choice of foreign locations which leads to a focus on the most attractive foreign locations in the world and use of a global “locational portfolio” for facilitating implementation of locational strategy and global configuration
- Liberalized access to foreign locations and large improvement of locational advantages in the non-Triad countries (especially in Asia), including stocks of knowledge, technology, skilled labor, infrastructure, institutions, FDI incentives, etc.
- Reorientation of Government policies in many countries towards supporting domestic innovation activity, especially within national and/or regional innovation networks
- Capture of benefits by foreign subsidiaries owing to recombination of knowledge from various sources: own R&D projects, corporate organization and external networks.

The last point refers to a fact that “local embeddedness” can be turned into “dual embeddedness”, if TNCs’ foreign subsidiaries are able to enter, manage and take advantage of two network structures, i.e. corporate (internal) network and local (external) network. Owing to numerous locally embedded foreign subsidiaries, the globally competing TNCs are able to access and integrate knowledge resources in many foreign locations. For this reason, TNCs can be engaged in a “multiple embeddedness” by means of their foreign subsidiaries located in many countries, and can access their knowledge resources and institutions, and permeate into their innovation systems. However it can imply problems with knowledge management in dispersed foreign locations, running cross-border innovation networks, facing many risks, exposure to erosion of competitive advantages, needs of protecting intellectual rights, etc.

As exhibited on Chart 1, the external and internal factors do affect growth and knowledge flows of TNCs’ subsidiaries (block I) what leads to substantial changes – coined as “creative transition” – in their functioning, growth and participation in the process of knowledge enlargement of parent companies (block II). The discussed factors to some extent affect also growth of foreign subsidiaries’ potential for knowledge development by own means and cooperation with external (local) partners.
“Creative transition” of foreign subsidiaries

Changes in the knowledge-oriented activity of corporate subsidiaries concern the process of R&D internationalization carried out by TNCs. The process has gained momentum since 1990s and at that time it was well investigated by UNCTAD [2005]. Since that prominent publication, aggregated data on FDI flows in the R&D sector have not been published but experts are convinced of a long-term upward trend related to the expansion of such investments [Veliyath, Sambharya, 2011, p. 408]. The conviction is based on value of FDI flows and numbers of R&D centers published by particular host countries as well as some reports of corporations themselves (see below). The R&D internationalization is also conducted by means of non-equity forms (various agreements and contracts between foreign parties) and their number and contract value grow more rapidly than industries in which they operate [UNCTAD, 2011, p. 133].

The R&D internationalization process is confirmed by value of R&D expenditures made abroad by TNCs. The overseas research expenditures of TNCs have increased in almost all developed home countries, with a leading value and share held by US corporations [Veliyath, Sambharya, 2011, p. 408]. As reported from another side, in many countries research expenditures of foreign companies increase and make considerable input to domestic expenditures. Most of the countries in the world recorded externally funded R&D share of 5 to 15 per cent in 2005 – with a few higher, like Ukraine, Greece, UK – and the upward trend is maintained in a long term. The share of externally funded R&D in Poland accounted for 5,74 per cent in 2005 what makes a humble result against Czech Republic with 13,69 per cent and Hungary 10,67 per cent [Hall, 2011, pp. 4, 22, Annex Tab. 2]. TNCs originating in the USA make a leading group of companies placing R&D expenditures in other countries. Foreign subsidiaries of American corporations executed research programs worth over US dollars 40 billion what made as much as 14,3 per cent of the R&D performed by all US businesses in 2009, against 10,9 per cent in 1997 [Anderson, 2012, p. 223, Tab.10]. The leading host country for the American offshored research activity and facilities is Switzerland, followed by other Western European countries. However, a growing share of the non-Triad countries reached 12,5 per cent in 2009, with China and India as a main recipients of the American offshored R&D centers [ibidem, p. 223, Tab. 11]. In general, the transfer of foreign research capabilities to host countries is usually regarded by them as a favorable process supporting expansion of a domestic R&D sector.

A complementary view on the R&D internationalization is offered by knowledge management in corporate innovation systems. The evolution of activity led by TNCs’ foreign subsidiaries has become a significant component of changes in corporate innovation systems. It has been initiated by withdrawing from passive application of knowledge or technology transferred from TNCs’ headquarter. Then subsidiaries started to increase their capabilities to absorb knowledge more effectively, expand better
adaptation of technologies to local needs and as well as upgrade or modernize received technologies [Birkinshaw, Hood, 2001, pp. 132–137]. At the same time subsidiaries have become more involved in creating and implementing R&D results from their own projects or joint projects with local partners. Introducing innovative solutions has contributed to expanding their participation in the development of TNCs’ knowledge resources and expansion of whole innovation systems [Castellani, Zanfei, 2006, pp. 47–50]. At the same time the subsidiaries increased their innovation-oriented linkages within corporate networks and outside them – in host countries.

The increasing activity of foreign subsidiaries proceeds under enlarged scope of their autonomy in decentralizing corporate organizations. It means more freedom for initiatives and actions of subsidiaries’ managers in evolving structures and relaxed formal dependence from regional or global headquarters of TNCs. Good execution of obligatory value-added functions and tasks leading to a market success can raise trust of supervisory units and their acceptance of new initiatives, and lead to granting greater autonomy for a given subsidiary to take decisions and actions on its own account. It is stressed that having become more independent, foreign subsidiaries are able to set up more relations and expand new linkages both inside and outside the corporate networks, according to their plans of knowledge-oriented expansion. In general, the engagement of foreign subsidiaries in new, successful initiatives and actions for leveraging corporate knowledge and competitiveness is appreciated as a manifestation of internal entrepreneurship in TNCs.

The changes in the subsidiaries’ innovation activity have been recognized as a new process and termed a “creative transition”. The process has developed considerably in the recent 10 years. “Creative transition” underway in many TNCs’ foreign subsidiaries consists in a process of developing their resources and capabilities, in particular creating new knowledge (by own R&D effort) or modernizing applied technology, engaging in research cooperation with local partners, reverse knowledge or technology transfer to corporate headquarters and its recombination with a knowledge resource owned by parent TNCs. The activity of foreign subsidiaries contributes to improving innovativeness and competitiveness of the whole parent corporation, and supports key changes in its strategy and organization aimed at adjusting to new trends in technology and competition on the global market.

The significance of foreign subsidiaries as a source of knowledge and innovation created in the TNCs’ organizations is indicated by the following main processes and trends [Zanfei, Castellani, 2006, Chapters 1 and 2]:

- The acknowledged process of increasing internationalization of R&D activity which is conducted by most of the TNCs
- The acknowledged process of raising share of foreign financing in total and business R&D expenditure in many countries
- The rising share of technologies worked out abroad in the whole pool of technology application in TNCs
• The importance of outsourcing and offshoring which are focused on business services – including R&D – in the process of restructuring TNCs’ organizations

• The predominance of own corporate internal network as a basis for innovations introduced in TNCs.

The “creative transition” of foreign subsidiaries and their increasing significance in the TNCs innovation systems should not be portrayed as a steady and continuously proceeding process of changes in corporate organizations. To some extent the course of process depends on motives, modes and patterns of allocating resources (capital, knowledge, skilled labor force) which is undertaken by corporate headquarters. The specialized motives concern in general building up the knowledge resource needed by TNCs or in particular augmenting their home-base knowledge (i.e. created in home country of the corporation). More FDI flows are directed to those countries which support growth knowledge-based economy and succeed in upgrading their resources, capabilities, institutions and other locational advantages [Veliyath, Sambharya, 2011, pp. 410–411]. Host country knowledge can be critical to scale and quality of innovations introduced in foreign subsidiaries while knowledge accessed in corporate network may not lead to increased innovativeness of some subsidiaries. However it should be stressed that much depends on sourcing and combinative capabilities of subsidiaries and their drive to knowledge development which seems to be significant for a “creative transition” potential [Phene, Almeida, 2008, pp. 913–914].

The support of TNCs’ headquarters for transition of foreign subsidiaries depends on characteristics of these particular units and general adjustments in the organization. Foreign subsidiaries which are based on acquisition of local companies sometimes receive more resources than subsidiaries set up as green-field projects. Such decisions are justified by larger adjustments needed in the former group for adapting to conditions of corporate organization. Older, larger and distinguished foreign subsidiaries – especially those appreciated as “excellence centers” – are more eagerly equipped with resources by their parent TNCs. A good reason for a priority of a given subsidiary in the headquarters’ resource allocation are its wide intra-firm linkages as far as it implies a larger diffusion of knowledge, technology and innovation in a whole corporate system [Dellstrand, Kappen, 2012, p. 239]. The increasing attractiveness of a given foreign country (e.g. its large innovation program) seems also to be a good reason for granting more resources to expand activity of a particular existing subsidiary.

As a consequence of diversified resource transfers from TNCs’ headquarters, the potential of foreign subsidiaries to advance “creative transition” and leverage knowledge is different in terms of a course and dynamics of the process. Moreover, external conditions in host countries are also important. It concerns access to valuable locational advantages and possibility for successful “local embeddedness”. On the other hand, innovation success is not guaranteed and foreign subsidiaries face certain risks. For instance, they arise from danger of leaking unique knowledge, new technologies or innovations out to
the other firms – possible imitators and competitors – on domestic and other markets. Poor protection of intellectual property rights and extensive imitation of new solutions in a host country becomes a real threat to innovative subsidiaries and their parents.

Implications of the “creative transition” process

The discussed changes in the knowledge-oriented activities of corporate subsidiaries affect their current operations and far more. The results of “creative transition” proceeding in TNCs’ foreign subsidiaries can be traced in three following domains:

• Particular subsidiary
• Corporate organization
• Host economy.

The successful “creative transition” of a particular subsidiary can bring about growth of its specific knowledge resource and improved capabilities, growth of size and market share, expansion of relations and linkages, increased position in corporate innovation system [Zorska, 2007, pp. 236–239]. For the discussed questions the most important is growth of own valuable knowledge resource enabling creation or improvement of competitive advantages being specific to a particular subsidiary. Its place and participation in the process of knowledge development by TNCs’ foreign subsidiaries is demonstrated as blocks III and IV on Chart 1. The new advantages can leverage a business and performance of the subsidiary, and trigger other favorable changes. That can be illustrated with passing by innovative subsidiaries from ordinary exports to technologically advanced activity in exports of manufactures and services to more developed countries. Becoming a strategic, international expansion arm of the parent TNC is quite possible [Pananond, 2013, p.1].

For TNCs’ organization a “creative” subsidiary can bring in a new knowledge which makes a kind of its “input” to a pool of corporate knowledge resource. If a subsidiary becomes a new innovation center, then a corporate innovation network must undergo adjustment, including all or some units (nodes) and linkages with the increased position of distinguished subsidiary. It can also imply changes in the total resources allocations, company’s business model, competitive strategy, alliances, global configuration (with changing foreign locations), etc. For the discussed questions, crucial changes relate to flows of knowledge within TNCs’ organization and in particular the emergence or growth of reverse knowledge or technology transfer from foreign subsidiaries to headquarters of parent TNCs. The reverse transfer is distinguished as block V on Chart 1.

The reverse transfer of knowledge or technology relates to successful results of knowledge-augmenting activity led by foreign subsidiaries (including R&D centers) which can be distinctive, relevant and valuable, and can be easily absorbed by parent TNCs. To engage in reverse knowledge transfer, foreign subsidiaries should be well-
motivated and possesses ability to conduct such actions. However, large cultural differences among countries can affect reverse knowledge flows across TNCs’ cross-border organization [McGuiness, Demibarg, Bandara, 2013, p. 190].

At first, the reverse technology transfer occurred among corporate units located in the Triad developed countries where good locational advantages favored expanding R&D activity by foreign (Western) TNCs and their subsidiaries. The reverse knowledge and technology flows were concentrated almost entirely in the group of developed countries. Two new trends draw attention in the recent years. The first one consists in the reverse technology transfer which is directed to the Triad home countries from corporate subsidiaries located in less developed countries, mostly BRIC. It is linked to the “creative transition” process in TNCs’ foreign subsidiaries. The second trend relates to a new reverse transfer from developed to developing countries which results from the FDI expansion in the Triad led by emerging TNCs from less developed countries [Kedia, Gaffney, Clampit, 2012, pp. 170–171]. Foreign subsidiaries of the emerging TNCs located in the Triad strain to acquire knowledge or technology abroad and send it back to corporate centers in the home countries. Foreign subsidiaries of the emerging TNCs usually do not leverage new knowledge abroad but transfer it back for working out product innovations to be introduced on domestic and global markets as quickly as possible [Di Minin, Zhang, Gammeltoft, 2012, pp. 196, 200]. In both cases of reverse technology transfers to developed and developing countries, the TNCs’ technology practices can result in draining host countries of new knowledge.

The “creative transition” of foreign subsidiaries can bring about mixed consequences for host economies. In general, the effects of FDI inflows and activities of foreign subsidiaries can generate some changes in a host economy, including markets of production factors and products, externalities for local firms and spillovers as well as some impacts on national institutions and systems [Zorska, 2007, pp. 282–315]. Referring to the knowledge-oriented activity of foreign subsidiaries, both knowledge inflows and outflows should be considered. Large knowledge or technology transfers from parent TNCs to a host country occur mostly at the initial stage of subsidiaries’ activities or at other stages, if some modernization is conducted in TNCs. Following “creative transition”, a new knowledge is created in corporate foreign subsidiaries. In both cases a national pool of knowledge located in a host country is enlarged. However, the transferred or created knowledge is owned by foreign companies (TNCs) and utilized to generate benefits to them and not necessarily to a given host economy.

Being established in a host country, TNCs’ knowledge-oriented subsidiaries can affect the domestic economy considerably. The national economic activity expands, including mainly increased production and exports (with changing structures), employment, tax revenues, various spillovers, externalities for local firms, their raising technological capabilities, etc. Much depends on orientation of subsidiaries towards serving domestic or foreign markets and their “local embeddedness”. However, the expansion
of knowledge-oriented foreign subsidiaries can also imply some unfavorable effects for host economies. Implementing new knowledge or technology, foreign subsidiaries can attract skilled and talented labor (e.g. from domestic entities) and raise wages, draw finance from public institutions, buy out local innovating firms, acquire attractive real estate properties, undercut domestic firms with their stronger competitive advantages, boost prices of some goods and services, etc. The effects may concern also the activity led by TNCs and their subsidiaries in national innovation and regional (sub-national) systems which are under a threat of leaking new knowledge and competitive advantages out from the national economy [Cusmano, Mancusi, Morrison, 2010, pp. 248–249].

An analysis of the Chinese ICT sector shows that R&D offshoring by Western TNCs to their foreign subsidiaries in China has a positive effect on the R&D efforts of domestic firms located within the same city or cluster. However, the positive impact diminishes as the geographical distance between foreign (corporate subsidiaries) and domestic companies increases [Qu, Huang, Zhang, Zhao, 2013, pp. 502, 513]. The relocation of TNCs’ research capabilities to their foreign subsidiaries in China has contributed to the accelerated increase of technological and competitive advantages of Chinese firms in the ICT and other sectors. However, imitation practices made a part of this process to the detriment of the subsidiaries.

Different results have been reached from empirical research of Spanish firms. The analysis focused on industry and firm levels of inward FDI and its impacts on innovative performance of domestic firms. As concluded, FDI inflows are negatively related to the innovativeness of local firms in Spain. After investing in the country, TNCs’ foreign subsidiaries introduced innovations transferred from their parents and their home countries what resulted in crowding out domestic innovations from productive use in Spain and/or relegating domestic firms to less profitable market niches [Garcia, Jin, Solomon, 2013, pp. 231, 242]. As otherwise written by the Authors: “Inward FDI blunts domestic innovation” [Ibidem, p. 242]. For this reasons national innovation system can become weaker.

Analysis of national innovation system (NSI) reflects another approach to assess the impacts of TNCs’ foreign subsidiaries on knowledge endowment and innovativeness of host countries. “Local embeddedness” of foreign subsidiaries implies close relations and linkages of the subsidiaries with domestic entities networked in a given NSI what results in their access to new knowledge and its diffusion in the system. TNCs’ foreign subsidiaries are well positioned to identify business potential of new knowledge and are able to capture it quickly for their use and/or transfer to parent TNCs. At the result new knowledge will not generate competitive advantages and new businesses to the benefit of given host country.

A broad view of such changes holds that national innovation systems become more “open”, prone to internationalization and co-existence in the global system of innovation [Chang, 2009, pp. 1199, 1220]. Therefore, a domestic sector can benefit from knowledge
links and transfers, if the country’s NSI is open to external or global relationships and linkages. However, in some cases knowledge generated in national innovation system can leak out to entities networked in the global innovation system, mostly to TNCs and their subsidiaries. As concluded: “Systems of innovations are increasingly complex and intertwined with regional, national and international levels of innovative activities being integrated” [Ibidem]. For such integration, the knowledge creation, transmission and application with an aid of TNCs’ foreign subsidiaries is by all means the most important.

Summary

The author has put forward hypothesis that the present growth of TNCs’ knowledge resources depends considerably on changes in the knowledge development and transfer by corporate foreign subsidiaries and their “local embeddedness” in host countries. To support verification of the hypothesis, a new model illustrating participation of foreign subsidiaries in knowledge development and transfer of parent TNCs is elaborated to illustrate the way of thinking. It can be stated that the author’s hypothesis is supported by the following findings:

1. Recognition of knowledge as a strategic resource of a firm and growth of knowledge-oriented activities conducted by TNCs have resulted in the expansion of their cross-border innovation systems based on networks of foreign subsidiaries and other entities

2. Activation of knowledge development in TNCs’ foreign subsidiaries is driven by four groups of factors internal to the corporate organization and external to it, with more significance attributed to “local embeddedness” by the subsidiaries in host countries

3. “Creative transition” underway in TNCs’ foreign subsidiaries stems from crucial organizational changes and new competencies which lead to the valorization of their resources and capabilities, mostly connected with own R&D and knowledge creation, and cooperation with local entities, finally leading to use of knowledge for upgrading own advantages or to initiate reverse technology transfer to the parent TNCs.

4. “Local embeddedness” in the knowledge-augmenting environment of host countries can play important role in the development of knowledge, technology and innovations in foreign subsidiaries by means of their relations and linkages with local entities, possibly those networked in national or regional innovation systems.

It can be concluded that impacts of the “creative transition” process and increased knowledge-creating capabilities of TNCs’ foreign subsidiaries imply possible changes for themselves, parent organizations and host countries. Of special concerns are some possible, unfavorable impacts for national innovation systems and host economies, so much more attention of national Governments – not only to FDI inflows – but primarily to knowledge-oriented activities of TNCs’ subsidiaries is recommended.
The author’s contribution to understanding the contemporary knowledge development in TNCs and their subsidiaries consists in applying an integrated approach to the problem. Combining theoretical approaches and empirical research results gathered from management and international business makes it possible to portray a large landscape of crucial changes underway in TNCs and the world economy. The changes are spread from TNCs’ cross-border networks to many host countries, so it is vitally important to be aware of them. The article offers such possibility and the research results are summarized below.

Rivalry on the world market has forced TNCs to sustain their competitiveness by means of changes in their strategies, organization and value chains to be oriented towards creation, application and leveraging new knowledge for upgrading competitive advantages. Such changes have been introduced or allowed by TNCs’ headquarters in their foreign subsidiaries which make efforts to increase participation in the development of knowledge resources to be owned by their parents. The increasing participation is a long-term process based on passing through growth stages and some “maturation” of foreign subsidiaries which become more autonomous and self-dependent, well-endowed in resources and capabilities, aspiring for higher positions in corporate innovation networks and linked to other corporate units and local entities in host countries.

The knowledge-oriented activity of corporate foreign subsidiaries is stimulated by four groups of factors: external, internal, endogenous and “local embeddedness”. For the activity inside foreign subsidiaries a crucial capability consists in absorption of knowledge transferred from various sources and creation of knowledge and technology by own R&D effort. Much depends also on subsidiaries’ abilities to develop “local embeddedness” in order to use locational advantages of host economy, mainly its resources of knowledge, technology and skilled labor, infrastructure, institutions, etc. The best results are achieved, if TNCs’ foreign subsidiaries participate in and benefit from two networks: internal (corporate) and external (i.e. national innovation system in host countries).

The key mechanism for increased participation of foreign subsidiaries in knowledge development by TNCs consists in activating “creative transition” in the subsidiaries. The process of “creative transition” underway at present in corporate subsidiaries stems from crucial organizational changes and new competencies which lead to the valorization of their resources and capabilities, mostly connected with own knowledge creation and cooperation (focused on R&D activity) with local entities, and finally lead to application of knowledge for upgrading own advantages or to initiate reverse technology transfer to the parent TNCs.

By means of expanding relations and linkages with local entities (firms, R&D centers, universities, public institutions), foreign subsidiaries can not only tap to knowledge-augmenting domestic resources and capabilities via market but also take advantage of knowledge or technology diffusion among networked entities within national innovation
systems in host countries. For these reasons knowledge is not only created by TNCs’ foreign subsidiaries but also appropriated from of their host environment. It usually results in the accelerated knowledge development in foreign subsidiaries themselves and in the whole parents’ systems what leads to TNCs’ increased global competitiveness. At the same time the effects for host economies are mixed and tend to evolve under changing advancement and flows of TNCs’ knowledge, and depend on its wide productive use in host economies.

More and more attention is drawn to some unfavorable effects of corporate “creative transition” generated for host countries which can suffer from draining domestic market of new valuable knowledge, high-skilled labor force (and raising wages), acquiring innovating firms, outperforming local enterprises, undercutting new industries and exports, etc. To some extent Government policies can prevent or mitigate such unfavorable impacts. Therefore, more attention, prediction and determination of host Governments are needed in approaching the activities of TNCs’ foreign subsidiaries in the age of knowledge-based economy.

Hopefully, theoretical research of the knowledge-oriented activities led by TNCs’ foreign subsidiaries can assist undertaking empirical analyses of their true effects which arise in host economies and recommending a fair approach to sharing benefits of knowledge generation and utilization rather within national borders than across borders.

Notes

1 The article is based on author’s research in the state-sponsored project "Knowledge-based Economy: Between Theory and Practice", No. KES/S/06/13.

2 By value of R&D spending, Toyota has become the world’s leader with US dollars 9.9 billion in 2012. The group of 10 largest R&D spenders includes also Novartis (9.6), Roche (9.4), Pfizer (9.1), Microsoft (9.0), Samsung (9.0), Merck&Co (8.5), Intel (8.4), General Motors (8.1), Nokia (7.8). However better financial metrics are recorded in the group of 10 most innovative companies which consists of the following firms: Apple, Google, 3M, Samsung, General Electric, Microsoft, Toyota, Procter & Gamble, IBM, Amazon.com. Only three companies appear on both lists: Samsung, Microsoft and Toyota.

3 Orchestrated innovation networks are managed by some large TNCs, e.g. Royal Philips, Hewlett-Packard, Intel, Procter & Gamble, Pfizer, Abbott Labs, Kraft Foods, 3M, DuPont, AstraZeneca.

4 To make comprehension easier, the external factors exhibited on the Chart 1 include both global (on the world scale) and local ones (explained as „embeddedness“) while the internal factors combine the ones acting in a given corporation (referred to as internal) as well as in a subsidiary itself (discussed as endogenous).

5 The research indicates a significance of higher quality institutions (e.g. for protection of intellectual property rights) in host countries for outsourcing and offshoring services – including execution of R&D projects – by TNCs [Liu, Feils, Scholnick, 2011, pp. 560, 568].
Under the increased autonomy of foreign subsidiaries, the role of their inter-organizational (external) relationships becomes more significant and brings about positive effects, as indicate results published by Gammelgaard, McDonald, Stephan, Tüselmann [2012, p. 1169].

The concept of „creative transition“ has been put forward following results of a research project on TNCs’ subsidiaries in Greece published in an article by Manolopoulos, Papanastassiou, Pearce [2005, p. 251].

Information on outstanding innovations introduced by corporate foreign subsidiaries in the emerging-market countries appear in economic journals and raise much astonishment. One of the examples relates to laboratories of General Electric in Bangalore (India) which are famous for the most sophisticated healthcare products, including a hand-held electrocardiograph (Mac 400) which is small, effective and cheap. Corporations in the Fortune 500 list have established 98 R&D facilities in China and 63 in India, in 2009 and now probably more [Wooldridge, 2010, pp. 3–7].

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Innovation and internationalization of Hungarian SMEs in the IT industry

Abstract

The aim of this paper is to look at the extent and type of internationalization among Hungarian information technology (IT) small- and medium-sized enterprises (SMEs) and the possible relationship between the degree of innovativeness and the internationalization of these companies. Information technologies play an important role in the Hungarian economy: this sector is one of the most R&D intensive industries in which many SMEs are active.

The paper reviews relevant theories of internationalization in research, development and innovation (RDI) to give a broader picture of the environment in which SMEs have to succeed. This is followed by a secondary data analysis to show the situation of the industry in Hungary, then by an analysis of the survey data and interviews designed specifically for the purpose of this research.

The new empirical results show that Hungarian IT SMEs are still at the beginning of the internationalization process: while aware of the advantages of collaborations and internationalization, they are still reluctant to venture out of their “safety zone” and therefore they collaborate only with their closest partners. Very few SMEs have decided to establish international RDI contacts.

The analysis suggests that the main barriers in internationalization of the Hungarian SMEs are due to lack of capital, appropriate managerial capabilities and innovation-friendly economic environment.

So far, most theories/empirical research have concentrated on the role and activities of multinational enterprises in the internationalization of RDI, while in the literature less relevant knowledge on SMEs is available. The aim of this paper is to contribute to this latter part of the literature by analyzing the international activities of innovative/R&D-intensive SMEs in Hungary.

Keywords: RDI, internationalization, SMEs, Hungary IT
JEL: O30, O52, F23
Introduction

Internationalization/globalization and the growing knowledge intensity of products have made RDI capabilities a key factor. Multinational corporations (MNCs) are the main drivers and the main beneficiaries of these processes. As a result, most theories of globalization, international trade or innovation management (e.g. open innovation) deal with MNCs. However, these processes have a much broader impact, affecting the whole spectrum of economic actors. Nowadays even the smallest companies may find themselves confronted with the challenges posed by internationalization or by the need for innovativeness. Their successful engagement in these activities is crucial for national economies, as SMEs represent the vast majority of entrepreneurial entities.

Information and communication technologies (ICT) play an important role in the Hungarian economy, as they exercise a combined direct and indirect impact. The direct impact of the industry’s expenditures, innovations or sales is substantially complemented by its indirect impact through productivity growth in other sectors. Furthermore, ICT is not only one of the most R&D intensive industries in Hungary – as well as in Europe – but is also inherently connected with globalization. Nowadays, internationalization activities go beyond production or marketing factors, as they have included also R&D and innovation activities, what can be seen in the performance of this industry. For these reasons the ICT sector is an ideal field in which internationalization of R&D and innovation activities can be observed. The participation in such international activities is a good measure of the international competitiveness of Hungarian enterprises.

ICT is a broad industry with various sub-sectors, each with their distinctive characteristics. Knowing these differences, this study concentrates on information technologies (IT) – leaving out communication – and more specifically on computer services and software development. These are fields in which Hungarian entrepreneurs may have some comparative advantages due to the highly skilled local workforce and because these areas do not require substantial initial investments like the hardware industry. It is also expected that the vast majority of firms in these service-like sub-sectors are SMEs, thus providing us with a large pool of RDI-intensive SMEs whose internationalization patterns we can study. So far, most of the theories/empirical research have concentrated on the role and activities of multinational enterprises in internationalization. The SMEs role in internationalization is not less important than that played by larger enterprises, but complements the latter. At the same time, the large number of SMEs is in itself a justification for a better understanding of the factors that could ensure their (international) success. The empirical research builds on the results of an online survey supported by in-depth interviews at internationally successful Hungarian SMEs, concerning such an understanding is the aim of this paper.
The structure of the paper is as follows: the next chapter gives a brief overview of the relevant theories on internationalization, R&D and innovation in SMEs, and provides the theoretical basis of the investigation. The second part characterizes the role of I(C)T industry in the Hungarian economy, which was a help in better assessment of the empirical results of our survey. The third section gives detailed information on the empirical research results, while the last part contains the main conclusions. The picture they show is rather bleak, for – despite this industry’s potential to be highly open and innovative – local SMEs show very little involvement in the more advanced type of international activities.

**General aspekts**

**Internationalization of R&D and innovation**

It was in the early 1990s, when globalization performed by multinational corporations expanded into new geographical areas and new corporate functions, that researchers began to address the issue of the internationalization of R&D and innovation [Howells, 1990; Archibugi and Michie, 1997]. Ever since, the study of internationalization has primarily remained tied to the investigation of multinational corporations, as they were the main actors driving and embodying this process. Over the last two decades, different categorizations and theories have emerged to describe the internationalization process of R&D and innovation, arguing about home base exploiting and home base augmenting strategies [e.g. Kuemmerle, 1999]. In the first case, intra-firm relations played a substantial role, while external relations remained relatively unimportant. In the second case instead external connections that are the driving forces, like supplier-customer relations, there were interactions with local players, etc. This bipolar approach has been modified and complemented from many sides what has added more details to the process of internationalization, and allowed to describe further types of foreign R&D activities. Some papers [von Zedtwitz and Gassmann, 2002; Sachwald, 2008] have identified different “levels” or degrees of internationalization, depicting a scale of international RDI activities ranging from simple adaptation to a truly global RDI system.

This phenomenon has not bypassed SMEs. In an era of knowledge-based economies, participation in the internationalization process and R&D collaborations are both very important, as they are an important source of knowledge and experience which determine international competitiveness. The growing knowledge-intensity of current products and services increase the importance of having a large and flexible knowledge base [Edler, 2003; Tödtling et al., 2009; de Jong and Freel, 2010]. While firms concentrate more and more on their core competences, this means that there is a growing need for external knowledge sources even at the largest (multinational)
enterprises. As SMEs are more limited in their human resources, they are even more in need of external knowledge sources. With the development of IT solutions, it is easier than ever for them to access outside – even foreign – sources. There is some evidence that SMEs investing in R&D and innovation activities can be more productive if they can utilize these external knowledge sources [Audretsch and Vivarelli, 1996; Cerrato, 2009]. There are various theories which try to describe the internationalization process of SMEs (from the “Uppsala-model” to network-theories) both as an incremental and as a radical process (e.g. born globals) [see e.g. Lopez et al., 2009; Sass and Antalóczy, 2011]. These theories emphasize the varied behavior of SMEs and that there is no single road to success. R&D and innovation efforts as well as internationalization in this field are also influenced by the industry in which they operate. The international literature suggests that SMEs are more active in the internationalization of their RDI activities in high-tech industries where the highly-skilled labor force plays a decisive role in determining competitiveness [Narula, 2004; Lindstrand et al., 2011]. There are also indications that SMEs in the transition economies of Central and Eastern Europe are more internationalized than SMEs from large Western European economies, although this is also influenced by managerial capabilities as well as by the geographical location of firms [Glas et al., 1999; Musteen et al., 2010]. Thus, the topic of RDI internationalization of SMEs in the Hungarian IT sector was a promising one in which there were enough target firms for our study. Measuring the extent and forms of these processes can potentially contribute to a better understanding of the international competitiveness of this industry.

The Hungarian IT industry

Information and communication technologies are the important and constantly growing parts of the economy in Europe, the US and Asia. The scope of this sector covers a broad range of activities from IT hardware manufacturing to software development and various services. In Europe, it encompasses more than 450,000 enterprises, employs over 2.5 million workers and generates a turnover of 30 billion EUR. The sector shows above-average growth within the manufacturing industry and is one of Europe’s most export-oriented industries [Schmicom, 2006], where the most important sub-sectors are communication, software, and IT services, covering 60% of the whole ICT market [epp.eurostat.ec.europa.eu]. The situation is slightly different in Hungary, because many large IT hardware manufacturers have established subsidiaries in the country, and therefore the shares of hardware manufacturing, software development and services are mutually quite balanced [HCSO, 2009]. Besides these multinational corporations, another important feature of this industry is the availability of highly skilled workforce. They are not only a target for multinationals, but have also set up a number of independent SMEs who are now successful international players (e.g. Graphisoft with ArchiCAD, or very recently, Prezi.com). As for Hungarian owned
companies, SMEs have a comparative advantage in those activities that are knowledge-intensive rather than resource-intensive (e.g. services and software development). In Hungary, there were approximately 12,700 enterprises in the ICT industry employing 52,000 people in 2007. An important feature of this sector in Hungary industry is its export-orientation and, in some sub-sectors, the high share of foreign affiliates in the industry's performance.

In OECD member countries, amount of R&D spending in the ICT sector is 2.5 to 3 times higher than in some other traditionally R&D-intensive areas (e.g. in the automotive industry). The largest enterprises devote 6% of their income to R&D and innovation [NFGM, 2009]. However, European enterprises seem to be underperforming in this field, as compared to their US and Asian counterparts, who are spending even more in this field. The largest European investors in ICT R&D are Germany, France, UK and Sweden [EC, 2010], while the Hungarian ICT industry lags behind the EU average in this respect. Although the industry’s importance in Hungary is comparable to that in other EU countries, its R&D and innovation expenditures are significantly lower than elsewhere in Europe. Even within Central and Eastern Europe, the Czech Republic spends 6-7 times more on ICT R&D than Hungary [OECD, 2008], although the R&D intensity indicators for the two countries are similar. R&D intensity in Europe fluctuates around 6%, while it is 11% in the US and Japan, and 12-16% in South Korea and Taiwan [EC, 2010]. Among European countries, Finland, Sweden and Denmark show the highest levels of R&D expenditures in the ICT industry (0.5% to 1.5% of BERD-to-GDP) while this share in Hungary is among the lowest ones (0.1%) [NFGM, 2009]. A more detailed examination shows that it is caused not only by expenditures which are limited but also by the scale of human resources. Only in Slovenia and Mexico there are fewer researchers employed in the ICT sector than in Hungary, and this picture could be only slightly better if we compare the number of ICT researchers to the total number of researchers [OECD, 2008]. Only Spain, Switzerland, Poland and Mexico are placed lower than Hungary in this respect.

An investigation of R&D activity in the Hungarian ICT industry reveals that it is higher in the manufacturing sub-sector which comprises only a smaller share of R&D laboratories (Table 1). This could be due to the fact that while there are less hardware manufacturers than in the other sub-sectors, they are much bigger in size and thus have more resources than enterprises (mostly SMEs) active in the other sub-sectors. Interestingly, the difference in the number of research labs is not mirrored in the number of employees. This number is very similar in the two sub-sectors, what also strengthens the opinion that there are more but smaller research establishments in the field of information and communication (services).

The two sub-sectors analyzed in Table 1 are responsible for 10% of all business R&D positions in Hungary, a number which could be even higher if we took into consideration those laboratories that are listed under different “sectors”, e.g. R&D in natural sciences or
### TABLE 1. Selected data of business R&D in selected sectors related to ICT, 2008

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number of R&amp;D laboratories</th>
<th>Actual number of R&amp;D employees (Headcount)</th>
<th>Number of R&amp;D employees (FTE)</th>
<th>R&amp;D expenditures (M HUF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing of computers, electronic and optical products</td>
<td>27</td>
<td>843</td>
<td>654</td>
<td>777</td>
</tr>
<tr>
<td>Information, communication</td>
<td>98</td>
<td>1 150</td>
<td>884</td>
<td>875</td>
</tr>
<tr>
<td>Grand Total*</td>
<td>1 155</td>
<td>14 043</td>
<td>9 408</td>
<td>11 373</td>
</tr>
</tbody>
</table>

Notes: * Grand Total refers to the total business sector values.


engineering that include other laboratories working on ICT projects. But even this 10% shows that the ICT industry plays a very important role in business R&D as compared to other industries. However, it also seems to suggest that multinational companies play a more significant role in the industry than the numerous SMEs.

SME-specific data on RDI activity are hardly available. The European Union Innovation Scoreboard 2009 provides data only on the macro level. According to this source, 33% of EU-27 SMEs are engaged in product or process innovations, while this share is 17% among Hungarian SMEs (there are some other Hungarian studies that underline the lower-than-average innovativeness of Hungarian SMEs [See e.g. Inzelt, 2003; Inzelt and Szerb, 2003]). If we look at organization and marketing innovations, this picture looks slightly better: 40% of EU-27 and 26% of Hungarian SMEs are involved in these kinds of activities. Among innovative SMEs, only 9.5% in the EU-27 are engaged in collaborations, while such a figure for Hungary is a merely 6.5% [EC, 2009]. There is very little evidence as to whether the ICT sector performs above or below the national average. The sparse available data [HCSO, 2006] suggest that SMEs in the ICT industry are more innovative than average and also that they establish more R&D collaborations.

Altogether, these data underline the important role of the industry in the Hungarian economy. However, it seems that the relatively low R&D expenditures in the ICT sector and the small domestic market are the two most important challenges for the Hungarian industry and, at the same time, the main obstacles in the growth of the industry. Although the ICT sector analyzed in this section covers a broader set of activities than the underlying research presented in this paper, the main statements also extend to those SMEs in the IT services on which we are focusing over here. The following parts of this paper will refer to this narrow sub-sector.
Research methodology and sample

Data

It has been already mentioned that the ICT industry covers a whole range of different activities, what hampers any attempt to “identify” and characterize this industry. What is considered as a part of the ICT industry varies from one study to another, depending on the research aim or the available statistical data. In 1998, the OECD established a widely used categorization dividing the ICT sector into manufacturing and service sub-sectors, which are related to the electronic storage, transfer and display of data and information [OECD, 2002]. Beyond this definition, one can also identify computers and parts manufacturing, products related to broadcasting as well as computer services or communication. Looking at the impact of the ICT industry in a broader sense, researchers take into consideration IT user industries in the manufacturing/service sector which rely heavily on the latest ICT developments [e.g. Némethné, 2005].

The Hungarian categorization of the ICT industry generally follows the international recommendations with a few slight differences. The Hungarian Central Statistical Office collects data in four categories: a) post and communication, b) Internet services, c) information technology services, d) use of information and communication instruments and e) content management. In this approach however, the ICT and ICT-user industries are not separated. Under the Hungarian government’s action plan, the ICT industry is broken down into three groups: a) IT hardware and software companies, b) telecommunication service providers and c) professional IT service companies [NFGM, 2009].

The definition used in this article – based on the underlying research – concentrates on those sub-sectors that potentially contain a large number of SMEs, and thereby provide an appropriate field to investigate the internationalization of their RDI activity. Therefore, according to the TEÁOR’08 (Hungarian version of NACE, rev. 2.1.) the categories which we investigated were:

- Manufacturing of computer, electronic and optical instruments (26)
- Other manufacturing (32)
- Information technology services (62).

These selected fields exclude the “C” (communication) from ICT, therefore from the next section of the paper onwards, we will refer to IT and the IT industry when characterizing the subject of the analysis. The paper will overview the R&D and innovation activities of Hungarian SMEs in the selected sub-sectors to highlight the main forms and extent of globalization in this field.

The empirical research used an online survey (mid-2009) as its main method which was complemented with in-depth interviews at some of the Hungarian IT SMEs that were the most successful internationally. A total of 230 IT SMEs were contacted by e-mail to fill in the questionnaire and at the end, there were 49 completed responses
available for analysis. The quantitative information thus obtained was enriched by six interviews, presented in an integrated way. They served to provide more details on certain aspects of our investigation and to provide some explanations other than the numbers. When we compiled the list of target SMEs for the questionnaire, we were looking for companies potentially involved in RDI activities and/or involved in any kind of internationalization. The questionnaire included various topics: innovation activity, networking, competitiveness, internationalization and motivation behind internationalization. The following part of the paper will concentrate on a) innovation activity and b) internationalization.

In the course of the research, we received 49 valuable answers from a wide variety of firms. Three-quarters of them provided us with some of their basic financial and personnel data. According to them, the income of respondents varies greatly, between 1 and 1,350 M HUF (0.004 and 5 M EUR), their R&D expenditures between 7 and 60 M HUF (26,000 and 222,000 EUR). The data show a slight increase between 2004 and 2008, but still most of the respondents left these answers blank or entered “0”. The personnel data reveals that 43% of the respondents are small enterprises, 24% of them are micro enterprises and another 24% are enterprises without employees. The small increase in the size of enterprises could be also traced in their personnel data. The majority of respondents employed 1 to 4 persons in R&D positions in 2008, but 36% of them employed none.

The vast majority of the respondents in our online e-survey are engaged in IT (computer) services. According to the relevant TEÁOR’08 categories, 94% of respondents listed information technology services as their main area of business, and 6% could be categorized as IT hardware manufacturers. This data supported our selection principles to focus on such sub-sectors where a large number of relevant SMEs could be found. It was also a sign that hardware production remains an area for large well-funded companies who can exploit the advantages of economies of scale. It is much easier to set up a new business in fields requiring less capital and where a few capable employees can utilize their knowledge and flexibility on the market. Those managers who were interviewed during the research further corroborated this statement with their own stories.

Information technology is a rapidly changing industry which is usually characterized by the consistently large number of new entrants on the market and by the high fallout rate. In our sample, almost 49% of the respondent enterprises had been established after 2001 and 16% of them even after 2008. This information seems to support the views about the short life cycles in the industry, the potential of an innovation to provide new opportunities to anybody and the danger of losing one's position if one fails to continuously adapt to changes. On the other hand, there is an almost equal number (16%) of firms that were established before 1991, what means that there are many opportunities to remain successful over time in this industry – a point
which was made by several interviewees, many of whom belonged to this category of “old” enterprises. One of the important factors of their long-standing success is – apart from the unique product/service – human resources and human resource management.

**Innovation activity**

As was expected from our sample selection methodology, the vast majority (90%) of respondents had introduced innovation in the last three years and/or in the last twenty years. Unfortunately this is not true for the Hungarian SME sector in general. Looking at the responses, it was also clear that in many cases, enterprises have introduced more than one innovation, often combining different types of innovation. The most common types were product and process innovations and the combination of these two types, while the number of cases mentioning organization or marketing innovations was much smaller. Altogether, respondents cited 30 product innovations, 41 process innovations, against 8 organizational and 5 marketing innovations (Table 2). It is not surprising that in a more service-oriented field, the number of process innovations was higher than product innovations. It is more interesting that in such a competitive environment, enterprises did not engage in organizational and marketing innovations, which could be crucial for their market success.

<table>
<thead>
<tr>
<th>Innovation developers by type of innovation (number of references)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of innovation</strong></td>
</tr>
<tr>
<td>Product innovation</td>
</tr>
<tr>
<td>Process innovation</td>
</tr>
<tr>
<td>Organizational innovation</td>
</tr>
<tr>
<td>Marketing innovation</td>
</tr>
</tbody>
</table>

*Source: KKVENT_8.*

The majority of respondents developed these innovations in-house, but a significant part of them (43%) relied on one or several external partners. This proportion was significantly higher than the national average cited in the previous chapter. If we look at the different types of innovations, it can also be seen that enterprises introduce more process innovations developed in collaboration than those developed in-house. Although we can interpret this as a small shift towards the innovation patterns seen in the most developed countries, it is still striking that respondents did not mention the purchase
Innovation and internationalization of Hungarian SMEs in the IT industry

of innovations developed elsewhere. The interviewed SMEs’ managers recounted that they “try to keep knowledge – central to their growth and development – within the organization and collaborate only if necessary.” This could also be the reason why firms are reluctant to sell their latest developments and why they prefer to do it on their own rather than buy it. In most cases, their innovations require such specific knowledge that it would be difficult to obtain it elsewhere than in-house. Apart from the unique solutions which their innovations generally require, the limited capital available to the enterprises also makes it difficult to purchase R&D results from an external partner.

Innovation is not a one-step activity, but a process in which a range of partners may play different roles at various stages. It is also possible that enterprises would sell their R&D results instead of, or besides utilizing them by themselves. Only the minority (44%) of respondent IT SMEs reported having sold their R&D results to third parties, in which case the buyers were predominantly domestic and foreign SMEs (32–32%), as opposed to large domestic companies and multinational firms. This is basically the only aspect of the whole innovation process where foreign actors play a significant role in the life of Hungarian SMEs. The e-survey asked about potential partners in idea generation, R&D, and the previously analyzed collaborations, but in most parts of the innovation process, domestic actors – like other Hungarian firms (suppliers, customers) or higher education institutions – played the role of main partners, while foreign partners were only listed after them.

The responses to the questionnaire corroborated the general impression that networking activity in the Hungarian economy remains below the average of the developed economies (see networking activity [e.g. Roijakkers and Hagedoorn, 2006]). This weakness of the Hungarian economy is even more true for the innovation systems which can also be seen among IT SMEs. Only 5% of our respondents were members of any kind of network (distribution, supplier etc.) and only 3% had joined an international network. Among domestic networks, RDI-type partnerships predominate, but they are seen less frequently on the international level where distribution-type partnerships are the most common networks. This is an important problem because RDI networks are usually a useful way to follow the latest trends, issues and developments in the industry, and to collect a wide array of useful market information. The only positive trend we can see from these data is a weak indication of learning (or at least the potential of that): domestic network memberships generally last three to five years, while international memberships are only for one to two years. This suggests that enterprises start to collaborate on the local level, and then move on to the international scene once they have accumulated some experience. The relatively short time in international networks means that it will take a few more years before we see a growing number of international RDI network-memberships. However, this does not only depend on the enterprise’s decision-making; some external factors are also needed to bring a positive contribution to this process.
Internationalization

Before analyzing the internationalization of R&D and innovation, it is useful to begin with looking at the overall extent of the internationalization of SMEs. This can take many forms: from indirect export to foreign investments/subsidiaries requiring various efforts from the SMEs themselves. The e-survey contained questions about some of the main types of internationalization in order to be able to assess their extent and relevance. These types included export/import, supply, transfer of intellectual property, and foreign investments.

An aspect highlighted by the responses was that among the main types of international activity, only exporting affects a significant (though not overwhelming) proportion of SMEs, as 31% of enterprises (15) included it in their responses. Importing is much less common among IT SMEs as compared to exporting, because only 12% reported this activity. A possible explanation for this could be that the IT software/service industry is less dependent on foreign materials and that SMEs try to perform their activities using human value-added potential rather than physical components. The main type of input that they can require from other countries is knowledge, but this is not captured by import data. An examination of the extent of export/import in the activities of SMEs shows mixed results. Exportation was accounted for under 10% of the income in one-third of exporting companies, but represented over 70% of total income in 27% of the companies. This diversity is also apparent with regards to importing: it remained below 30% of the income in half of the companies, but over 50% in the other half of the importing companies.

These data show a lower than expected rate of exporting, which conflicts somewhat with our expectations about a globalized industry. Considering the important and integrating role of large multinational companies, one would expect more interaction with such international actors or simply a more global business orientation. Interestingly, this was only seen at those SMEs who saw it as somehow natural to target the global market with their products or services. These firms had realized that the domestic market was too small to allow for growth beyond a certain level and had developed a niche product or service which could also be marketed globally, seeing this as key for their longstanding success.

Although their number is not very high, it might be interesting to take a closer look at the content of export/import deals. It seems that there are clear relationships between the type and volume of exports/imports. Respondents who were exporting at a low level mainly sold high-tech parts and intermediary products abroad. On the contrary, those SMEs who were export oriented (for whom export activities exceeded 70% of turnover) mainly sold high-tech products or services (Table 3). Interestingly, services only played an important role in exporting and were hardly mentioned as an area of activities by importing SMEs.
Responses regarding any other forms of internationalization were not convincing. Only 20% of respondents mentioned that they were suppliers of foreign or foreign-owned companies. Hungarian enterprises took part in the international transfer of intellectual property in two forms. More firms (24%) mentioned that they had purchased know-how from abroad, while a small share of respondents (10%) had developed know-how together with a foreign partner. Internationalization based on foreign direct investment is a complex and resource-intensive form which is not really typical among our IT SMEs. Among the respondents of the e-survey, only one case could be found that an enterprise had established a foreign subsidiary. Considering the size of SMEs, their limited resources and the uncertainty that is attached to a decision of this nature, the infrequency of such activities is not surprising.

In order to better judge the picture on internationalization, is it useful to know what motivates managers to go abroad – or not. SMEs rated knowledge-related factors as the most important incentives for internationalization (Table 4). The “access to new knowledge” was the most important motivation for most SMEs. Meanwhile, although the response “speed up the RDI process by accessing modern infrastructure” received a higher average rating, it was mentioned by fewer enterprises (and was therefore omitted from the table). Following “knowledge acquisition”, “improvement of competitiveness” and “access to information” were the two highest rated motivations (these factors can be classified as very important, as the average rating for all of these factors was over 2.5).

Towards the middle of the ranking, we find further factors related to competitiveness and knowledge, complemented with factors like “obtaining references” or “becoming known” for business partners. On the other hand, traditional factors like geographical proximity, cost cutting, local economic policy or other market-driven motivations are less relevant for internationalization. As was already mentioned previously, human resources are relatively competitive in Hungary, therefore it is understandable that factors related to human resources received a low rating in this ranking as well.
TABLE 4. Main motivations of international activities

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Average*</th>
<th>Very important**</th>
<th>Important**</th>
<th>Not important**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to new knowledge</td>
<td>2,6</td>
<td>18</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Improving competitiveness</td>
<td>2,6</td>
<td>16</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Access to information</td>
<td>2,5</td>
<td>13</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Access to new technology</td>
<td>2,4</td>
<td>15</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>References</td>
<td>2,4</td>
<td>13</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Following the main trends</td>
<td>2,4</td>
<td>12</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Becoming well-known</td>
<td>2,4</td>
<td>10</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Hiring highly skilled workforce</td>
<td>2,3</td>
<td>12</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Entrance into new markets</td>
<td>2,3</td>
<td>10</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Domestic economic policy</td>
<td>2,1</td>
<td>6</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Broadening R&amp;D employees</td>
<td>2,0</td>
<td>5</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

Notes: Only those motivations are listed which received response from at least 40% of our sample.
* Average of responses (3 = very important, 2 = important, 1 = not important).
** Number of firms ticking the given answer.

Source: KKVENT_8.

If we concentrate on the internationalization of R&D and innovation activities, the picture is similar, albeit with some notable differences. In this field, the most important motivation is the “development of business relationships” instead of knowledge-seeking. This is a sign that R&D and innovation collaborations, and internationalization itself are the results of a development process which is built up on pre-requisites such as trust, previously established business relationships, knowledge of one another’s capabilities, etc. Once this basic relationship reaches a certain level, R&D and innovation can be involved to further enhance the relationship with the partners [e.g. Gilsing, 2005; Csonka, 2009]. Apart from this, among the most important motivations for internationalizing RDI we find “access to special knowledge” and “broadening of financial resources for innovation” followed by two time-related factors: “quicker development” and “quicker innovation process”. This latter factor however was only of average importance while the previous four could be categorized as very important. Even less important for our respondents were human resources, as well as – perhaps more interestingly – the “availability of state support”. These were mentioned by so few respondents that we omitted them from the table (Table 5).
TABLE 5. **Main motivations of RDI internationalization**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Average*</th>
<th>Very important**</th>
<th>Important**</th>
<th>Not important**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing existing business relationship</td>
<td>2.7</td>
<td>13</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Access to special knowledge, technology</td>
<td>2.6</td>
<td>12</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Access to financial means supporting innovation</td>
<td>2.5</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Opportunity to speed-up development</td>
<td>2.5</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Speed-up innovation process</td>
<td>2.2</td>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: * Average of responses (3 = very important, 2 = important, 1 = not important); ** Number of firms ticking the given answer.

Source: KKVENT_8.

Even once a company decides to go abroad, there are many factors that influence its actual choice of where to go in order to broaden the activities of the SME. If one expects a strategic approach to this decision, it will not be fully confirmed by the answers for this e-survey. Three aspects seem to guide the SMEs’ decisions, all of which were related to the local (potential host) “capabilities”. These are the connections with research institutions or knowledge centers in the target country and opportunities for RDI collaborations. All these aspects received relatively high average ratings, but relatively few respondents mentioned them. More firms mentioned some market-related aspects (size of market, attractiveness of market) or existing partner-related considerations, but these factors received rather average ratings, which were then followed by geographical and policy-related aspects. The factors rated as least important were those related to travel, clusters and previous experience in the target country (Table 6).

Looking at the motivations is only one side of the coin. There may be other barriers that are just as relevant and worth knowing about if we examine the main reasons for the limited level of internationalization among SMEs. Based on the responses, it can be said that the main obstacles in international expansion are the high costs attached to this step along with various problems related to the local (Hungarian) economic environment. It was only after these factors that “human resources” and “lack of information” were mentioned. The SMEs were very divided as to whether or not they cited “foreign language knowledge” and “lack of appropriate foreign partner” as obstacles. Some of them rated these aspects as very important while some of them did not see them as a difficulty at all. This might be tied to the level of internationalization at those enterprises, as an aspect which was highlighted by the interviewed SMEs. They mentioned that initially, when they started to internationalize their activities they lacked human resources and their
TABLE 6. Factors affecting the choice of foreign target country

<table>
<thead>
<tr>
<th>Factors</th>
<th>Average*</th>
<th>Very important**</th>
<th>Important**</th>
<th>Not important**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship with scientific institutions</td>
<td>2,8</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Knowledge centers in the target country</td>
<td>2,8</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Opportunities for RDI collaboration</td>
<td>2,8</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Size of market</td>
<td>2,4</td>
<td>11</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Foreign invitation</td>
<td>2,4</td>
<td>9</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Attractiveness of market</td>
<td>2,4</td>
<td>8</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Existing personal relationship</td>
<td>2,3</td>
<td>7</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Existing business relationship</td>
<td>2,3</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Geographical proximity to buyer(s)</td>
<td>2,3</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Economic integration (EU)</td>
<td>2,3</td>
<td>10</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Government support, other allowances</td>
<td>2,2</td>
<td>3</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Good transport from Hungary</td>
<td>2,0</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Agglomeration, cluster issues</td>
<td>1,9</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Previous economic experiences at the target country</td>
<td>1,6</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Factors are listed here only if more than 10 respondents reflected on them.
* Average of responses (3 = very important, 2 = important, 1 = not important).
** Number of firms ticking the given answer.

Source: KKVENT_8.

foreign language knowledge was weak but that these factors soon become irrelevant after a few years of experience. Therefore it should be those enterprises that are making their first steps on the international market who consider the language barrier and the availability of appropriate partners to be an important issue, while those who have been doing business on the international market for a few years have mainly overcome these issues. Only a few firms mentioned and did not attach to much importance to factors such as the foreign exchange risk, host country economic system or the openness of human resources to work abroad (Table 7).

The interviewed successful SMEs shared their experiences that in most cases, current business opportunities drove the decision of where to appear with their products/services. Only very few SMEs had followed any kind of strategic approach in choosing to expand internationally, but once they had made the decision, they were undeterred by minor obstacles. Obviously the hiring of external experts to guide this process would
TABLE 7. Potential barriers of international expansion

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Average*</th>
<th>Big problem**</th>
<th>Problem**</th>
<th>No problem**</th>
</tr>
</thead>
<tbody>
<tr>
<td>High costs</td>
<td>2.8</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Problems with economic environment in Hungary (e.g. regulation, administration)</td>
<td>2.5</td>
<td>10</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Lack of human resources capable of driving international expansion (knowledge, experience)</td>
<td>2.2</td>
<td>7</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Knowledge difficult to obtain</td>
<td>2.2</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lack of financial resources</td>
<td>2.1</td>
<td>6</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Lack of knowledge (e.g. target country’s economy)</td>
<td>2.1</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lack of foreign language knowledge</td>
<td>2.0</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>No foreign partner</td>
<td>2.0</td>
<td>6</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Note: Barriers are listed here only if more than 10 respondents reflected on them.
* Average of responses (3 = big problem, 2 = problem, 1 = no problem).
** Number of firms ticking the given answer.
Source: KKVENT_8.

improve the position of the enterprises, but neither the interviewees nor the e-survey respondents mentioned doing so. When looking for external support, most of them relied on the domestic institutional system, which is mainly made up of professional organizations, the International Trade Development (ITDH) organization and the National Development Agency in the field of RDI. Several of the enterprises had taken part in R&D and innovation support programs, but only a few mentioned that they had applied for state support for their international expansion through the ITDH. Even less companies had requested any kind of aid from the host country’s institutional system (only 3 SMEs mentioned this). This seems to suggest that although there is an institutional framework in Hungary to support internationalization, its efficiency and/or effectiveness is not attractive enough for SMEs to draw on their services.

Conclusions

Internationalization, especially in the field of R&D and innovation, has become a key phenomenon of economic development during the last two decades. Successful enterprises who strive for sustainable growth have been internationalizing their
activities – not only multinationals but also SMEs. **Having an international presence can provide feedback on enterprises’ competitiveness, because it requires more and better capabilities than serving only the domestic market.** If a firm can face these challenges one can take it as a sign of better than average capabilities. On the macro level, an economy with many internationalized firms is potentially more competitive in the globalized world.

The IT sector is one of the most globalized industries, which is a mean and a subject of networking. Its role in the Hungarian economy is very important: the latest government programs have identified this field as a possible leading market mobilizing the entire economy. However, the statistical data regarding the growth of the industry and about its R&D and innovation activity suggest that the present situation cannot be maintained without improved efforts of the enterprises and the government. **One of the sector's weaknesses is that SMEs have largely failed to integrate within the global economy.** Analyzing the main forms and extent of internationalization and especially the R&D and innovation activities would help to better understand the present situation, to identify the main strengths, weaknesses and break-out points. The utilization of this knowledge might help to improve the whole economy’s global competitiveness.

According to theories in the international literature, R&D and innovation activities have a positive influence on the performance of enterprises, what (partly) depends on RDI collaborations. The e-survey of Hungarian IT SMEs only partially corroborated this view. The percentage of respondent SMEs who had some kind of RDI collaborations was slightly higher than the national average but the majority of these collaborations were domestic. It seems that these SMEs were still at the beginning of a process: they had become aware of the advantages of collaborations, but still preferred to remain in their “safety zone” and continue to collaborate only with their closest partners. Very few SMEs moved beyond this stage and proceeded to establish international RDI contacts. Those who did so, usually achieved sustainable success on both the national and international markets. It is promising – and a sign of the potential of the domestic research capabilities – that one can find equal numbers of domestic and international actors among the buyers of research results.

Another weakness of the RDI collaborative efforts of Hungarian IT SMEs was that those partnerships usually remained on the level of informational bilateral collaborations. There were very few respondents who reported network memberships and even less in the field of RDI. This can be a sign of the absence of a strategic approach, short-sighted management and mainly ad hoc (or periodical) collaborations. Less than one-fifth of SMEs were members of any network and less than half of these networks involved RDI. Here again is an indication of the **importance of learning, because the most important motivation to join a network is knowledge-seeking.** Accordingly, we can expect that the number of such initiatives will grow in the future.
This view is supported by the interviewed SMEs who had found a global niche market for a good product/service in order to gradually build their international business. They invested a lot to strengthen basic and core competences (like absorptive capacity, human resources), which are the key for long-term success. Their stories supported both theoretical strands in the literature: gradual or born global internationalization. The difference is partially the result of the product/service, because in some cases the Hungarian market is simply too small to support even a SME. However in either case, it required time to build up their success on the international level. Respondents to the e-survey tended to be younger than most of the interviewed SMEs, what suggests that they still have time to learn and establish an international name for themselves. They were in a pre-internationalized phase which did not go beyond export/import activities, but there were some signs that respondents had started to build relationships that might help them in the future to take part in the internationalization of RDI and other complex forms of internationalization.

Our research suggests that in order to improve the internationalization of Hungarian SMEs, it is essential to improve the availability of capital (a permanent weakness of the national economy) and the overall economic environment. It is interesting that while firms were satisfied with their professional human resources, most of them lacked the management capabilities to navigate international expansion. The higher education system has to provide enough highly skilled human resources in both fields. In addition, there is a need for further efforts to make SMEs aware of the importance of R&D and innovation: that if they start to strengthen their activities, it will launch a self-propelling process leading to the desired higher level of internationalization.

Notes

1 The research was done as part of the KKVENT_8 (Chances of Hungarian small- and medium-sized enterprises in the globalizing knowledge economy) project, funded by the National Office for Research and Technology (NKTH).

2 The SMEs interviewed were: Graphisoft Kft, IND Group, Morphologic Kft, 4D Soft Kft, NNG Kft and Balabit Kft.

3 Our questionnaire about innovation activity referred to the operation of the firms during the last three years before the survey. Therefore throughout this chapter, data on the innovativeness of the surveyed firms apply to 2007–2009.
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Abstract

The aim of the paper is to present the phenomenon of the new virtual currency bitcoin, and analyse its economic significance. The paper examines the origin, notion, functions and mechanism of emission of the BTC. The theoretical aspects of creation of the BTC and its advantages and weakness are also explained.

The results of the analysis show that bitcoin does not eliminate current problems of traditional currency but also generates new risks for its users. The risks could as well affect the central banks (the legal risk, the risk to payment system stability, and the reputation risk).

Three contributions of this paper to the problem of the BTC are worth distinguishing. Firstly, the scientific literature lacks information and data about the BTC – the main source of information is the Internet which reliability cannot be fully guaranteed. Secondly, periodical examination of development of the risk connected with the BTC is necessary. Thirdly, it is a basis to begin discussion on the new virtual currency which bitcoin is.

Keywords: Bitcoin, risk, stability, virtual currency, BTC functions, mining

JEL: E420, E510, G150

Wprowadzenie

Ostatni kryzys na rynkach finansowych zachwiał zaufaniem społeczeństwa do banków, agencji ratingowych, regulatorów rynków finansowych i instytucji nadzoru. Koszty kryzysu zostały przerzucone na społeczeństwo, które coraz mniej ufnie patrzy w przyszłość systemu finansowego i jego instytucji. Fala protestów przeszła przez kraje szcze-
gólnie dotknięte bezrobociem, jak Grecja czy Hiszpania. System bankowy i giełdy zostały poddane krytyce przez organizacje międzynarodowe, a zwłaszcza przez G-20 na szczycie w Londynie w 2009 r. Na kolejnych spotkaniach zapoczątkowano wiele działań naprawczych skierowanych do nadzoru bankowego czy agencji ratingowych. Podjęte reformy tylko częściowo przywróciły zaufanie społeczeństwa do tradycyjnego systemu bankowego i pieniądza.

Przyczyn pojawienia się wirtualnego pieniądza upatruje się nie tylko w niedostatkach tradycyjnego systemu walutowego, który nie potrafił stawić czoła licznym krzyzykom, ale także w szybkim rozwoju Internetu, dla którego bitcoiny są najlepiej dostosowaną formą pieniądza.


Specyficznym produktem rozwoju Internetu jest bitcoin (BTC) jako alternatywa dla pieniądza oficjalnego. Pieniądz ten funkcjonuje w praktyce już od kilku lat, ale dopiero w 2012 roku Europejski Bank Centralny opublikował raport na ten temat. Do tej pory banki ignorowały istnienie pieniądza wirtualnego. Ukazanie się tego raportu stanowi sygnał, że oficjalne instytucje finansowe zauważły problem i zainicjowały dyskusję na temat zagrożeń związanych z pojawieniem się BTC. Jednak trzeba przyznać, że już wcześniej, bo w 2011 r. Gavin Andersen, główny projektant systemu, został poproszony przez CIA o dokonanie prezentacji dotyczącej funkcjonowania BTC.

Celem artykułu jest przybliżenie pojęcia wirtualnego pieniądza i wskazanie na wątpliwości, jakie się z nim wiążą. Głównym źródłem informacji o BTC jest Internet. Jednak nie wszystkie zawarte tam informacje są w pełni wiarygodne. Z uwagi na szeroki zakres tematu nie wszystkie problemy zostały tu omówione w sposób wyczerpujący. Jest to głos w dyskusji, która zaczyna toczyć się nie tylko na forach internetowych.

Główną tezą jest twierdzenie, że pomimo wielu zalet bitcoiny nie tylko nie likwidują wszystkich niedogodności i rodzajów ryzyka związanych z posiadaniem tradycyjnego pieniądza, ale także rodzą nowe problemy dla ich użytkowników. Jedną z wad jest możliwość wystąpienia różnego rodzaju ryzyka dla banków centralnych, takich jak zagrożenia stabilności finansowej, stabilności systemu płatności czy utraty zaufania do banku centralnego.
Pojęcie i geneza BTC

Teoretyczne uzasadnienie powstania wirtualnej waluty można znaleźć w pracach wielu ekonomistów głównie szkoły austriackiej, która koncentrowała się na cyklach koniunkturalnych i teorii pieniądza. Przedstawiciele tej szkoły uważali, że interwencje walutowe są powodem występowania cykli koniunkturalnych. Nadmierna ekspansja kredytowa wywołana rezerwą częściową powoduje wzrost podaży pieniądza i sztucznie obniża stopy procentowe. Jest to sygnał dla przedsiębiorców, którzy podejmują decyzje często niezgodne z preferencjami konsumentów, co prowadzi do kryzysu. Rezygnacja z rezerwy częściowej w systemie bankowym oraz powrót do złotego standardu ma być, według szkoły austriackiej, lekarstwem na zbyt dużą swobodę manipulacji pieniądzem przez władze monetarne, a w konsekwencji ma spowodować złagodzenie cykli koniunkturalnych.


Powyższe propozycje znalazły swoje odbicie w systemie pieniądza wirtualnego BTC. Pieniądz ten jest rozumiany jako dobry punkt wyjścia dla likwidacji monopolu emisji pieniądza banków centralnych. Jednocześnie system BTC ma stanowić przeciwwagę dla obecnego pieniądza opartego na częściowej rezerwie i nawiązuje do dawnego złotego standardu.

Co to jest bitcoin? Istnieje kilka określeń BTC, które wskazują na jego różne cechy. Nazywany jest e-walutą drugiej generacji, kryptowalutą lub wirtualną walutą. BTC to również nazwa oprogramowania. Można spotkać też poglądy utożsamiające BTC z piramidą finansową typu Ponzi.

Idea zdecentralizowanej sieci pochodzi z wojskowości, kiedy to w czasie zimnej wojny obawa przed atakiem nuklearnym doprowadziła do powstania inteligentnej sieci informatycznej odpornej na ataki. Wojskowy system sieci (TCP/IP) jest systemem zde-
centralizowanym, co pozwala przetrwać atak, gdyż nie występuje tu punkt centralny, w który można uderzyć. Problem ten ilustrują poniższe rysunki.

W systemie scentralizowanym (rysunek 1) uszkodzenie centralnego serwera unie-możliwia porozumienie się pozostałym członkom systemu. Łączność jest więc niemoż-liwa. W systemie zdecentralizowanym (rysunek 2) wyłączenie jednego ogniwa nie po-woduje utraty możliwości dalszego porozumiewania się między ocalałymi ogniwami.

**RYSUNEK 1. System scentralizowany (serwer–klient)**

[Diagram showing a central server and multiple clients]

RYSUNEK 2. System zdecentralizowany (peer to peer)

Elżbieta Chrabonszczewska


W konstrukcji systemu BTC został wykorzystany zdecentralizowany system komunikacji między użytkownikami, co ma zapewnić bezpieczeństwo użytkownikom.

Pierwsze wzmianki o BTC pochodzą z roku 1998, kiedy to został opisany przez Wei Dai na liście mailingowej cypherpunks. BTC został oparty na idei wykorzystania kryptologii do tworzenia kontroli i przekazywania pieniędzy poza oficjalnym systemem finansowym. U podstaw leży twierdzenie, że forma pieniądza jest kwestią umowy i akceptacji oraz że pieniądzem może być dowolny przedmiot lub zapis akceptowany jako zapłata za dobra i usługi oraz dający możliwość uwalniania się od zobowiązań.


Bitcoin coraz śmielej funkcjonuje w obiegu międzynarodowym, a jego kurs szybko rośnie. Bitcoin dzieli się na 100 mln części. Ceny wyrażone w BTC mogą więc mieć 8 miejsc po przecinku. Znaczy to, że jakiś produkt lub usługa może kosztować 0,35 BTC lub też 0,0000001 BTC. Warto przedstawić najważniejsze cechy BTC.

Bitcoiny istnieją wyłącznie w Internecie i nie są używane przez banki. Funkcjonują poza oficjalnym systemem bankowym i nie są przezeń kontrolowane. Transakcje w tej walucie są rozproszone po wszystkich użytkownikach Internetu i nie są trzymane na jednym centralnym serwerze. Bitcoin to waluta peer to peer, co oznacza, że występuje w bezpośrednich relacjach pomiędzy użytkownikami sieci.
BTC jest pierwszym wirtualnym pieniądzem, który jest całkowicie zdecentralizowany. Sieć jest tworzona przez samych użytkowników – ani bank, ani oficjalna procedura płatnicza nie jest obecna pomiędzy użytkownikami BTC. Ta decentralizacja jest podstawą bezpieczeństwa i wolności.

 Ważną cechą wirtualnego pieniądza jest brak formy materialnej (banknoty, monety) oraz brak prawnego umocowania, co rodzi pewne dalsze konsekwencje. Stosunki pomiędzy pieniądzem tradycyjnym a wirtualnym nie mają żadnej prawnej regulacji, a kontrola nad tym pieniądzem znajduje się w ręku emitentów i zależy od popytu i podaży oraz istniejących już wielu platform wymiany.

 Ten nowy pieniądz ma ogólnoświatowy zasięg. BTC jest dostępny z każdego miejsca, które ma połączenie z Internetem. Każdy może zacząć „wykuwać”, sprzedawać, kupować lub akceptować BTC niezależnie od miejsca, gdzie się znajduje. Istnieją sklepy internetowe, które akceptują płatności w BTC.

 Zaletą BTC jest brak konieczności wypełniania małych druków w banku czy na poczcie. Jeżeli posiadasz BTC, możesz je wysłać komukolwiek, mając adres bitcoin. Nie ma ograniczeń, specjalnych zasad lub formularzy do wypełniania.


 Posiadanie kart kredytowych wiąże się z ryzykiem, że rachunek może być zablokowany i nie mamy dostępu do własnych pieniędzy. W przypadku BTC istnieje pewność dostępu do wirtualnego portfela, naturalnie pod warunkiem, że mamy dostęp do Internetu.

 Funkcyjowanie BTC poza oficjalnym systemem bankowym oznacza, że jego kreacja odbywa się spontanicznie, w miarę jak przybywa użytkowników w sieci, BTC jest obecny w szerokiej sieci P2P, która składa się z wielu systemów.

 BTC to program komputerowy udostępniony bezpłatnie. Po zainstalowaniu programu otrzymujemy własny adres, który pełni funkcję wirtualnego portfela. Z tego portfela możemy wypłacać BTC oraz otrzymywać BTC za zrealizowane transakcje.


 Co do opinii, że BTC jest piramidą finansową, to należy porównać definicję piramidy z systemem BTC. Według definicji EBC „piramida finansowa to defraudacja inwestycyjna, która wypłaca płatności o znaczących zwrotaх istniejącym inwestorom z funduszy pochodzących od nowych inwestorów” [European Central Bank, 2012]. Twórcy piramidy, obiecując wysokie zyski bez ryzyka, przyciągają wielu inwestorów. Wpłacone
Elżbieta Chrabonszczewska

przez nich kwoty są przeznaczane na wypłaty zysków dla wcześniejszych inwestorów oraz na osobiste wydatki bez podejmowania żadnych realnych działań mogących przy-
nieść zyski. W powyższym sensie BTC nie jest piramidą finansową. W systemie BTC nie 
ma centralnego organizatora, który mógłby zdefraudować pieniądz, nie ma też żadnych 
pośredników.

Pieniądz wirtualny a pieniądz elektroniczny

Pomimo pewnych podobieństw pieniądz wirtualny różni się od pieniądza elektronicznego. Pieniądz elektroniczny, zgodnie z Dyrektywą UE z roku 2009, jest „monetar-
ną wartością reprezentującą zgodnie z intencją emitenta: możliwość przechowywania 
elektronicznego, emitowaną na podstawie wpływów funduszy w kwocie nie mniejszej niż 
wartość waluty emitowanej, i akceptowanej jako środek płatniczy przez podmioty inne 
niż emitent”.

Podstawowe różnice ujawniono w tabeli 1. Na podkreślenie zasługuje nieregulowany 
status BTC, brak nadzoru, duże ryzyko oraz brak gwarancji odkupu waluty. Różnice te 
powodują, że pieniądz wirtualny jest bardziej ryzykowny od pieniądza elektronicznego.

<table>
<thead>
<tr>
<th>Wyszczególnienie</th>
<th>Pieniądz elektroniczny</th>
<th>Pieniądz wirtualny</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forma pieniądza</td>
<td>Cyfrowa</td>
<td>Cyfrowa</td>
</tr>
<tr>
<td>Miernik wartości</td>
<td>Tradycyjne waluty z prawnym statusem (euro, dolar, funt)</td>
<td>Nowe waluty (BTC, Linden Dolar) bez prawnego statusu</td>
</tr>
<tr>
<td>Akceptacja</td>
<td>Przez podmioty inne iż emitent</td>
<td>Zazwyczaj przez wirtualną wspólnotę</td>
</tr>
<tr>
<td>Prawny status</td>
<td>Regulowany</td>
<td>Nieregulowany</td>
</tr>
<tr>
<td>Emitent</td>
<td>Powołana prawnie pieniężna elektroniczna instytucja</td>
<td>Niefinansowa prywatna spółka</td>
</tr>
<tr>
<td>Podaż pieniądza</td>
<td>Określona</td>
<td>Nie jest ustalona (załęży od decyzji emitentów)</td>
</tr>
<tr>
<td>Możliwość odkupienia środków</td>
<td>Gwarantowana</td>
<td>Niegwarantowana</td>
</tr>
<tr>
<td>Nadzór</td>
<td>Istnieje</td>
<td>Brak</td>
</tr>
<tr>
<td>Typ ryzyka</td>
<td>Główne operacyjne</td>
<td>Prawne, kredytowe, płynności i operacyjne</td>
</tr>
</tbody>
</table>

Źródło: Virtual Currency Schemes, European Central Bank. Eurosystem, October 2012, s. 16.
Pieniądz wirtualny ma kilka odmian. W raporcie EBC wyróżniono 3 rodzaje pieniądza wirtualnego w zależności od możliwości komunikacji z realnym pieniądzem i realnymi dobrami i usługami, co zilustrowano w tabeli 2.

**TABELA 2. Typy pieniądza wirtualnego**

<table>
<thead>
<tr>
<th>Typ 1</th>
<th>Typ 2</th>
<th>Typ 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realna gospodarka pieniężna</td>
<td>Realna gospodarka pieniężna</td>
<td>Realna gospodarka pieniężna</td>
</tr>
<tr>
<td>Pieniądz wirtualny</td>
<td>Pieniądz wirtualny</td>
<td>Pieniądz wirtualny</td>
</tr>
<tr>
<td>Używany wyłącznie do obrotu wirtualnymi dobrami i usługami</td>
<td>Może być używany do obrotu wirtualnymi oraz realnymi dobrami i usługami</td>
<td>Może być używany do obrotu wirtualnymi oraz realnymi dobrami i usługami</td>
</tr>
</tbody>
</table>

**Źródło:** Virtual Currency Schemes, European Central Bank. Eurosystem, October 2012, s. 15.

Typ 1 odnosi się do pieniądza, który używany jest wyłącznie w świecie wirtualnym. Jest to pieniądz kreowany na potrzeby gier komputerowych typu Second Life i funkcjonuje w ramach określonej gry. Gracze nie mogą się posługiwać tym pieniądzem w realnym świecie.

Typ 2 dotyczy wirtualnej waluty, która może być nabywana za realną walutę po określonym kursie, ale nie może być z powrotem wymieniona na realną walutę. Jest tu jeden kierunek przepływu.

Typ 3 to waluta wirtualna, która może być kupowana za walutę realną i sprzedawana za taką walutę. Bitcoiny należy zaliczyć do tego trzeciego typu wirtualnej waluty. Ten silny związek z realnym pieniądzem oraz realnymi dobrami i usługami rodzi określone obawy.

**Posiadanie i kreacja BTC**

W posiadanie bitcoinów można wejść w różny sposób. Po pierwsze, można emitować nowe BTC (pierwotna kreacja) lub też korzystać z bicoinów znajdujących się już w obiegu.
W Internecie oferowane są dobra, usługi lub informacje w zamian za BTC. Jeżeli ktoś je nabywa, sprzedający wchodzi w posiadanie bitcoinów. Liczba użytkowników początkowo bardzo mała, w miarę upowszechniania się informacji o BTC, szybko wzrasta.

Odkąd bitcoin ma przypisaną mu wartość monetarną można na rynku nabyć bitcoiny za gotówkę, to znaczy zamienić posiadaną walutę na bitcoiny na giełdach online od innych użytkowników. Do najważniejszych giełd BTC należy zaliczyć: Mt.Gox, Bitomat, Intersango, Exchange Bitcoin com., Camp BX, Bitcoin 7. Polska giełda BTC to litecoin.

Ale zanim wejdziemy w posiadanie znajdującej się w obiegu nowej waluty, musi ona zostać wykreowana, czyli musi znaleźć się w obiegu. Możemy zostać wyłącznie użytkownikami BTC lub też włączyć się w proces ich tworzenia.


RYSUNEK 3. **Łańcuch bloków**

![Diagram of a blockchain](image)

**Rysunek 3.**  Łańcuch bloków


Do emisji (mining) potrzebny jest komputer, którego wyłącznym zadaniem jest kreacja bitcoinów, czyli rozwiązywanie nowych bloków. Do tego celu potrzebne jest również odpowiednie oprogramowanie (karta graficzna GPU). Można też nabyć lub wynająć specjalny system do kreacji BTC (Mining Rig Retailers).
Bitcoiny otrzymujemy za pracę naszego komputera przy rozwiązywaniu bloków. Rozwiązanie matematyczne bloku jest trudne do osiągnięcia i jest tylko jedno dla każdego bloku. Im większą moc ma komputer, tym większa szansa, że to nasz komputer rozwiąże blok. Za rozwiązanie 1 bloku otrzymujemy 50 BTC w ciągu pierwszych 4 lat istnienia systemu. Przy założeniu, że bloki powstają co 10 min, w ciągu 4 lat zostaje ich utworzonych około 210 000. Jednak cena za rozwiązanie bloków w kolejnych latach ulega stopniowemu zmniejszeniu. Za rozwiązanie następnych 210 000bloków otrzymujemy dwa razy mniej (25 BTC) za taką samą pracę. Kolejne 210 000 bloków rozwiązywane będzie za 12,5 BTC za blok, potem za 6,25 BTC itd. W chwili uzyskania projektowanej wielkości emisji proces kreacji zostaje wygaszony.

Istnieją zasadniczo dwa sposoby kreacji BTC: na własny rachunek lub w ramach wspólnej emisji danej grupy (mining pool). Jeżeli chcemy tworzyć BTC na własny rachunek, to musimy posiadać odpowiedniej mocy komputer i program.


Renta emisyjna

Kreatorzy BTC uzyskują rentę emisyjną, którą normalnie przy emisji pieniądza przez bank centralny zawłaszcza państwo. Jeżeli mamy do czynienia ze wspólnotą kreacji, renta emisyjna jest dzielona pomiędzy uczestników wspólnoty.

Renta emisyjna powstała w czasach, gdy władcy zorientowali się, że prawo do bicia monet daje zysk, tzw. seniorat, który pozostaje po odjęciu kosztów produkcji. Dodatkowym źródłem dochodu był proceder psucia monet polegający bądź na obniżaniu wartości złota w kruszcu używanym do produkcji monet bądź na zmniejszaniu wagi złotej monety. W czasie powstania pieniądza papierowego renta emisyjna stanowiła nadwyżkę emisji pieniądza papierowego nad zapas kruszcu.

Renta emisyjna może służyć do finansowania deficytu budżetowego przez zakup obliwacji skarbowych lub wpłatę z zysku banku centralnego do budżetu (seniorat fiskalny). Gdy pieniądz narodowy jest pieniądzem międzynarodowym, jak w przypadku dolara, mamy do czynienia z większymi dochodami z kreacji waluty międzynarodowej – większą rentą emisyjną i większymi możliwościami finansowania deficytu budżetowego. W UE dochód monetarny pod koniec roku dzielony jest pomiędzy banki centralne stosownie do udziału w kapitale EBC.

Tworzenie BTC poza oficjalnym systemem finansowym pozbawia władze monetarne tej części renty emisyjnej, która staje się własnością grup emisyjnych lub pojedynczych osób. Władze monetarne tracą również kontrolę nad ilością pieniądza w obiegu i nie mogą zwiększać lub ograniczać podaży pieniądza.

**Kurs i ilość BTC w obiegu**

Kreacja BTC ma na celu stopniową emisję do kwoty 21 milionów jednostek BTC^{11}. W miarę zbliżania się do kwoty docelowej BTC w obiegu, proces emisji będzie tracił na znaczeniu, a wzrastało będzie znaczenie wtórnego obiegu. Ograniczenie ilościowe ma wyeliminować inflację spowodowaną nadmierną kreacją BTC.

Program komputerowy kontrolujący emisję jest tak zaprojektowany, że kwota 21 mln BTC nie może być przekroczona. Kwota ta będzie wykreowana około roku 2033 (rysunek 4). Ograniczanie emisji przez pułap ilościowy budzi wątpliwości, gdyż

**RYSUNEK 4. Projektowana ilość BTC w obiegu w mln BTC**

![Diagram](http://bitcoincharts.com/)

w założeniu jest to waluta, której emitentem, rejestratorem i posiadaczem jest każdy jej użytkownik, który ma równe prawa i obowiązki. Ponieważ nie istnieje centralna instytucja emisyjna, proces kontroli ilości pieniądza w obiegu nie jest jasny.

Co prawda w publikacjach internetowych pojawia się informacja, że kreacja BTC jest kontrolowana przez program komputerowy, ale bliższych wyjaśnień na ten temat autorce nie udało się znaleźć.

Kurs bitcoina od momentu przypisania mu wartości w dolarach wzrósł wielokrotnie (rysunek 5). W styczniu 2011 r. 1 BTC stanowił zaledwie 0,51 USD. Potem nastąpił okres szybkiego wzrostu aż do 10 czerwca 2011 r., kiedy to kurs bitcoina wynosił już 29,55 USD za 1 BTC. Jest to dynamika wręcz zdumiewająca, która stanowi przykład bańki spekulacyjnej, gdyż kurs BTC w stosunku do dolara gwałtownie się załamał 11 czerwca 2011 r. Potem nastąpił okres systematycznego spadku kursu i 30 listopada 2011 r. było to zaledwie 2,91 USD za 1 BTC. Straty te były w ciągu roku 2012 systematycznie, choć wolno, odrabiane i pod koniec roku kurs BTC wynosił już ponad 13 USD.

**RYSUNEK 5. Kurs BTC w USD od 31.01.2011 do 30.11.2012**

![Diagram](https://www.bitcoinwatch.com)

W roku 2013, po krótkim okresie względnej stabilizacji rynku BTC, w kwietniu wystąpiła kolejna bańka spekulacyjna. Kurs BTC rósł bardzo szybko i 12 kwietnia osiągnął astronomiczny poziom 260 dolarów. Po znaczącym spadku kursu w połowie kwietnia do poziomu 60 dolarów nastąpił ponowny wzrost kursu, który ustabilizował się na poziomie około 120 dolarów za 1 BTC, co pokazano na rysunku 6.

**RYSUNEK 6. Kurs BTC w USD w 2013 r.**

![DiagramBTCUSD.png](attachment://DiagramBTCUSD.png)

*Źródło:* Opracowanie własne na podstawie www.bitcoinwatch.com (15.05.2013).

Przyczyn tego spektakularnego wzrostu upatruje się w zwiększeniu liczby użytkowników BTC. Od początku kwietnia giełda MtGox odnotowała gwałtowny wzrost nowych kont na poziomie 20 tys. dziennie. Gdy upowszechniły się wieści z Cypru dotyczące opodatkowania depozytów, bitcoin wydawał się bezpieczną przystanią do przechowywania kapitału. Ten wzrost popularności doprowadził do przeciążenia serwerów giełdy MtGox i wyłączenia giełdy na 12 godzin. Użytkownicy, którzy nie mogli się zalogować i dostać do swoich pieniędzy, popadli w panikę.

Powodów załamania się rynku BTC może być kilka. Może to być działanie spekulantów, którzy doprowadzili do wzrostu kursu BTC, a następnie pozbyli się nagromadzonych środków, zarabiając na różnicy cen. Może to być atak cyberprzestępców lub atak...
DDoS (*distributed denial – of service attack*), co oznacza rozproszoną odmowę usługi, czyli atak na system komputerowy lub usługę sieciową w celu sparaliżowania działania giełdy. Atak przeprowadzany jest równocześnie z wielu komputerów. Zablokowanie platformy handlowej uniemożliwia przeprowadzanie transakcji. Użytkownicy ogarnięci paniką pozbywają się pieniędzy zaraz po wznowieniu działania systemu, co prowadzi do spadku kursu.

Płytka rynku bitcoina stanowi jeden z powodów gwałtownych wahań kursu. To oznacza, że ten pieniądz nie może stanowić formy akumulacji kapitału, gdyż ryzyko niekontrolowanych wahań kursu jest zbyt duże.

**System waluty wirtualnej BTC a zasady regulujące stosunki walutowe**

W literaturze wymienia się kilka zasad regulujących stosunki walutowe. Są to [Samuelson, 1982; Lindert, 1989]:

- zasady ustalania i regulacji kursów walutowych,
- wymienialność walut,
- ograniczanie ryzyka,
- zapobieganie spekulacjom walutowym,
- swoboda dokonywania płatności międzynarodowych.

Powstaje zatem pytanie, czy system waluty wirtualnej BTC odpowiada tym zasadom. Jeżeli chodzi o zasady ustalania i regulacji kursów BTC, to nie ma wyraźnie sformułowanych zasad. Kurs ustalany jest na platformach wymiany na zasadzie rynkowej, bez ingerencji jakiegokolwiek organu nadzorczego. Prowadzi to do dużej zmienności kursów. Brak też jest mechanizmu ograniczania ryzyka kursowego i zapobiegania spekulacjom walutowym.

Wymienialność BTC na inne waluty nie jest ograniczana, co powoduje, że istnieje swoboda dokonywania płatności międzynarodowych. Po tym krótkim przeglądzie można powiedzieć, że system BTC nie odpowiada wszystkim zasadom regulującym stosunki walutowe, co oznacza wystąpienie ryzyka zagrożenia stabilności finansowej w sytuacji szerszego, globalnego użycia BTC jako waluty międzynarodowej.

Czy BTC może zastąpić aktualny pieniądz międzynarodowy? Wydaje się to możliwe w przypadku, gdy będzie pełnił on wszystkie funkcje, jakie realizuje pieniądz krajowy i międzynarodowy, zarówno w obiegu prywatnym, jak i oficjalnym oraz zdobędzie zaufanie użytkowników.

W czasach, gdy pieniądz miał ustalony parytet w złocie i był wymienialny na złoto, o wartości pieniądza decydowała cena złota. Złoto stanowiło o zaufaniu do waluty i o jej wartości. Obecnie pieniądz nie ma pokrycia w złocie, a pełna wymienialność oznacza możliwość nieograniczonej wymiany na inną walutę. O tym, czy dana waluta może peł-
nić funkcję pieniądza w wymiarze krajowym czy międzynarodowym, decyduje fakt, czy będzie on akceptowany w obiegu, tzn. czy podmioty będą miały do niego zaufanie i będą przyjmować zapłatę w tej walucie na rynku krajowym i międzynarodowym. Oznacza to możliwość wymiany w sensie wymienialności na dobra i usługi. Pieniądz, do którego nie ma zaufania, nie będzie akceptowany i nie wejdzie do obiegu. Zaufanie wiąże się z możliwością realizacji przez pieniądz kilku funkcji.

Pieniądz krajowy pełni funkcje miernika wartości, środka tezauryzacji, środka wymiany oraz środka płatniczego.


Funkcja środka płatniczego oznacza, że w zamian za określony kwotę pieniężną możemy wejść w posiadanie określonych dóbr, usług czy wywiązać się z zaciągniętych zobowiązań finansowych. Funkcja ta jest pełniona przez BTC z powodzeniem, gdyż coraz więcej dóbr jest dostępnych w Internecie za tę walutę.

Funkcja tezauryzacyjna to możliwość gromadzenia środków pieniężnych w celu ich późniejszego wydatkowania. Przy tak szybkim wzroście kursu BTC opłacalność oszczędności w tej walucie była niezwykła. Oznacza to, że jest to znakomita waluta dla oszczędzających pod warunkiem, że system się będzie dalej rozwijał i nie upadnie z jakiś powodów. Jednakże w obliczu ostatnich zawiórań kursu BTC również możliwość pełnienia tej funkcji staje się wątpliwa.

Stabilność kursu i cen jest ważnym czynnikiem wpływającym na użycie waluty narodowej w obiegu międzynarodowym. Stały kurs i ceny zmniejszają ryzyko walutowe i cenowe zwłaszcza w transakcjach długoterminowych, a także powodują eliminację kosztów kontraktów zabezpieczających. Inflacja – hiperinflacja (powyżej 50%) jest przeszkodą w stosowaniu waluty jako międzynarodowej. Skutkiem hiperinflacji jest utrata majątku, oszczędności, rozruchy społeczne i polityczne.

Pieniądzem międzynarodowym są te środki płatnicze, które są powszechnie przyjmowane i akceptowane w rozliczeniach między kontrahentami z różnych krajów. Pierwszym nowoczesnym pieniądzem międzynarodowym było złoto i funt wymienialny na złoto. Potem funkcję waluty międzynarodowej przejął dolar wymienialny na złoto. Obecnie najważniejsze waluty kluczowe to: dolar, jen, euro, funt brytyjski, frank szwajcarski.

Po II wojnie światowej Keynes zaproponował utworzenie międzynarodowej jednostki walutowej Bancor, która miała funkcjonować jako waluta równoległa. Jednak koncepcja ta nie weszła w życie. SDR-y utworzone w roku 1969 nawiązały do koncepcji keynesowskiego Bancora, jednak nie odegrały takiej roli, jaka była przypisana Bancoro-
wi przez Keynesa. Natomiast ECU była to waluta równoległa, funkcjonująca w obiegu bezgotówkowym w krajach należących do ESW. Miała służyć do rozliczeń w obiegu oficjalnym. Jej zalety spowodowały, że przeszła do obiegu prywatnego.

Czy bitcoin z obiegu prywatnego przebije się do obiegu oficjalnego? Wydaje się, że na obecnym etapie jeszcze nie jest to możliwe. Pierwszym krokiem powinno być wyjście z szarej strefy.

Pieniądz międzynarodowy ewoluował od złota, które było jednocześnie pieniądzem narodowym, poprzez waluty narodowe wymienialne na złoto, waluty kluczowe niewymienialne na złoto, aż do międzynarodowych jednostek walutowych opartych na koszty walut, jak SDR-y. Obecnie waluta międzynarodowa może występować w sferze oficjalnej jako: waluta rezerwowa, interwencyjna, kotwica walutowa. W sferze prywatnej jest to waluta fakturowania transakcji, rozliczeniowa, płatnicza, inwestycyjna. W tabeli 3 przedstawiono sposoby zastosowania pieniądza międzynarodowego.

**TABELA 3. Matryca zastosowania pieniądza międzynarodowego**

<table>
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<tr>
<th>A. Teoria</th>
<th>Użycie prywatne</th>
<th>Użycie oficjalne</th>
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<tr>
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<td>Waluta odniesienia na rynku walutowym</td>
<td>Waluta interwencyjna</td>
</tr>
<tr>
<td>Miernik wartości</td>
<td>Waluta notowania cen</td>
<td>Kotwica walutowa</td>
</tr>
<tr>
<td>Środek akumulacji</td>
<td>Waluta inwestowania w aktywa finansowe</td>
<td>Waluta rezerwowa</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>B. Praktyka</th>
<th>Użycie na rynku finansowym</th>
<th>Użycie w innych krajach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Międzynarodowe rynki długu</td>
<td>Kotwica walutowa, rezerwy</td>
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</tr>
<tr>
<td>Międzynarodowe rynki walutowe</td>
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<td>Waluta fakturowania</td>
<td>Gotówka i użycie jako waluty równoległą</td>
<td></td>
</tr>
</tbody>
</table>


Docelowa podaż BTC to kwota 21mln jednostek, co przy kursie 130 USD stanowi 2730 ml USD. Jest to zaledwie 0,28% obecnych oficjalnych rezerw walutowych. Oznacza

W międzynarodowym wymiarze prywatnym z uwagi na zmienność kursu BTC nie będzie pełnić funkcji waluty fakturowania transakcji. Funkcja inwestycyjna ze względu na poważne wahania również nie będzie wchodzić w rachubę. Obecnie BTC znajduje zastosowanie w prywatnym obiegu międzynarodowym jako środek wymiany i miernik wartości, ale dotyczy to w zasadzie transakcji bieżących. Te transakcje odbywają się bez prowizji i poza systemem bankowym. Co do funkcji środka akumulacji z uwagi na ryzyko, jakie związane jest z BTC, na razie nie jest to praktykowane.

Bitcoin z uwagi na małą projektowaną podaż nie będzie miał większego znaczenia jako oficjalna waluta rezerwowa, co widać na rysunku 7.

**RYSUNEK 7.** Rezerwy oficjalne w mld USD w 2012 r. oraz projektowana podaż BTC

![Rysunek 7. Rezerwy oficjalne w mld USD w 2012 r. oraz projektowana podaż BTC](image-url)

**Z źródła:** Na podstawie Annual Report, Appendix I, IMF, April 2013.1

Ta pobieżna analiza wskazuje, że BTC nie pełni funkcji, jakie są przypisane walucie międzynarodowej, zwłaszcza w obiegu oficjalnym.
BTC nie ma formy materialnej, występuje tylko w Internecie, co ogranicza jego obieg do użytkowników Internetu. Z uwagi na dynamicznie zwiększający się dostęp do Internetu ta przeszkoda w niedalekiej przyszłości może zostać usunięta. Jednak cała grupa krajów rozwijających się jeszcze długo będzie poza zasięgiem Internetu i BTC.

Zagrożenia związane z BTC

 Nowy pieniądz ma pewne cechy, które w sprzyjających okolicznościach mogą stanowić zagrożenie dla oficjalnych systemów walutowych. Czy BTC odbierze bankom klientów, czy odbierze też część dochodów bankom i systemowi podatkowemu? Takie ryzyko istnieje w sytuacji, gdyby BTC weszły do powszechnego użycia i wyparły z obiegu walutę oficjalną. Na razie takiego ryzyka nie ma. Obecnie około 270 000 osób posługuje się tą walutą. Pochodzą oni z ponad 120 krajów. Wartość rynku BTC waha się w zależności od kursu i wynosi obecnie około 275 mln USD.

Jednak znaczny wzrost upowszechnienia BTC spowodować może zachwianie światowej gospodarki i światowego systemu finansowego, a zwłaszcza systemu bankowego i budżetowego. Na taką „rewolucję” nie mogą pozwolić rządy państw, które są zadłużone. Należy liczyć się z odpowiedzią oficjalnego systemu bankowego w momencie, kiedy rynek BTC uznany zostanie za niewygodny i powodujący straty w systemie bankowym. Banki prywatne, które posiadają większość rezerw walutowych (tylko nieznaczna część stanowi tzw. oficjalne rezerwy walutowe), mogą bardzo łatwo zlikwidować rynek BTC, interwieniując w sposób zorganizowany na rynku BTC.

Rządy natomiast mogą na przykład wyłączyć Internet i cały mechanizm kreacji BTC nie będzie możliwy do uruchomienia.

Możliwość zawierania anonimowych transakcji za pośrednictwem BTC zachęciła do oferowania narkotyków w sieci. Nowy serwis Silk Road, który działa od lutego 2011 r. zaoferował spójną wizję wykorzystania bitcoinów do zakupu narkotyków. Możliwość zakupu narkotyków za BTC stanowi poważne zagrożenie dla rynku nowej waluty, na co zwraca uwagę Krzysztof Pasikowski. Jeżeli agencje antynarkotykowe doprowadzą do zamknięcia serwisu Silk Road, spowoduje to załamanie się rynku bitcoinów, gdyż część posiadaczy będzie chciała pozbyć się niepotrzebnej dezlegalizowanej waluty.

Innym problemem jest odporność rynku BTC na ataki spekulacyjne i kradzieże. Anonimowość transakcji takie ataki bardzo ułatwia. Przygotowany 20 czerwca 2011 r. cyberatak spowodował spadek wartości BTC z 17,5 USD do 0,01 USD w ciągu kilku minut. Około 400 000 bitcoinów (prawie 9 mln USD) zostało zaangażowane w tym incydencie. Jak podaje platforma Mt.Gox, działania te zostały podjęte przez hakerów w celu wyprowadzenia z konta zgromadzonych tam bitcoinów. Ponieważ konto miało limit 1 tysiąc dolarów dziennie obniżenie kursu BTC do 0,01 USD umożliwiło obejście tego limitu i wyczyszczenie konta. W odpowiedzi na to włamanie Mt. Gox zamknął gieł...

Pomimo tego rynek BTC wciąż nie daje poczucia bezpieczeństwa. Jeden duży inwestor może łatwo zmienić kurs BTC. Jest to wynikiem bardzo płytkiego rynku i małej liczby inwestorów i użytkowników BTC.

Przyszłość BTC

Wobec tylu wątpliwości trudno jednoznacznie wypowiedzieć się co do dalszego rozwoju BTC. Możliwości jest kilka. Od wielkiego powodzenia i rozwoju tej waluty, aż do całkowitego zaniechania projektu.


Niezbyt jest zdecentralizowany system sieci i system kodów gwarantujących bezpieczeństwo transakcji. Ważny jest szybki rozwój liczby transakcji w BTC, który jest gwarantem utrzymywania wartości BTC opartej na zaufaniu do tego pieniądza. Rozwój ten zapewnia również płynność rynku w BTC.

Potrzebna jest także odpowiednia sieć powiązań pomiędzy ostatecznymi użytkownikami a serwerami, które zarządzają łańcuchem bloków BTC. Wraz ze wzrostem obiegu BTC niezbędne jest profesjonalne zarządzanie systemem obliczeń. System rozliczeń w BTC powinien być usprawniony dzięki wprowadzeniu clearingu.

Pomimo tych niedogodności około 14 mln BTC dziennie przemieszcza się w sieci. Według Apple w 2011 r. wielkość transakcji w BTC wyniosła 108 mld USD. Świadczy to o znacznym wzroście popularności tej waluty wśród użytkowników Internetu. Jednak wraz ze wzrostem użytkowników rośnie liczba nadużyć, wirusów i hackerów.

W cytowanym już raporcie EBC stwierdza, że obecnie system wirtualnej waluty [European Central Bank, 2012]:
Bitcoin – nowa wirtualna globalna waluta?

„– nie stanowi ryzyka dla stabilności cen, zakładając, że kreacja BTC pozostanie na niskim poziomie,
– jest niestabilny, lecz nie może zagrazać finansowej stabilności z uwagi na jego ograniczone związki z realną gospodarką, niski wolumen obrotu i brak szerokiej akceptacji,
– jest obecnie nieregulowany i nienadzorowany przez żadne władze publiczne, nawet gdyby uczestnictwo w tym systemie wystawiało ich uczestników na ryzyko kredytowe, płynności operacyjnej czy prawne,
– może stanowić wyzwanie dla władzy publicznej, tworząc prawną niepewność związaną z tym systemem,
– może mieć negatywny wpływ na reputację banków centralnych, zakładając, że poważnie wzrośnie liczba użytkowników, co wiąże się ze zwiększonym ryzykiem i stratami, w rezultacie banki mogą być oskarżone o niedostateczne wywiązywanie się ze swoich zadań,
– może rzeczywiście upać wraz z ograniczeniem odpowiedzialności banku centralnego jako rezultat specyfiky odpowiedzialności dzielonej z systemem płatniczym, który wzrośnie wraz z potrzebą badania rozwoju i zabezpieczeń dotyczących początkowej oceny”.
Jest to ostrożna i wyważona ocena biorąca pod uwagę zarówno wady, jak i zalety nowego pieniądza. Autorzy raportu zalecają ciągłe monitorowanie dalszego rozwoju BTC w celu uniknięcia wymienionych rodzajów ryzyka.

Wnioski

Przeprowadzona analiza potwierdza tezę, że BTC nie jest sposobem na uniknięcie różnych rodzajów ryzyka na rynku pieniądza. Niestabilność kursu, ryzyko kredytowe, ryzyko płynności, ryzyko operacyjne i prawne nowej waluty są trudne do uniknięcia. Do tego dochodzą zarzuty o wykorzystywaniu BTC do prania pieniędzy. Obecny system BTC jest niedoskonały i ma mały zasięg.

Jednak nowatorstwo i zalety BTC powodują, że pomimo ryzyka zdobywa on coraz więcej zwolenników.

O jego dalszym upowszechnieniu i ewentualnym wyparciu z obiegu innych walut zadecyduje zaufanie społeczne. Jednak to zaufanie z uwagi na liczne ataki spekulacyjne już dziś jest mocno nadszarpanie. Odbudowa zaufania będzie wymagała czasu i działań mających na celu wyjście z obiegu nieoficjalnego oraz dokonanie szeregu zmian.

Notes

1 Według danych www.internetworldstats.com z dnia 10.05.2012.
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5 Według https://pl.bitcoin.it/ Wiki/Strona_g%C5%AA%C3%BCwna (2012-04-12).
6 Najmniejsza jednostka BTC = 0,00000001 nosi nazwę „satoshi” na cześć Satoshi Nakamoto. Co do pozostałych nazw jednostek BTC toczy się dyskusja. Jedna z propozycji to: 1 Centi-Bitcoin dla 0,01 BTC, 1 Mili-Bitcoin dla 0,001 BTC, czy 1 Micro-Bitcoin dla 0,0001BTC, na podstawie: https://en.bitcoin.it/Wiki/FAQ, s. 5.
8 Można też otrzymać gratisowe bitcoiny w kwocie 0,05 BTC na stronie: www.freebitcoins.appspot.com.
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Agnieszka Domańska
Institute for International Studies,  
Warsaw School of Economics
Dobromił Serwa
Institute of Econometrics,  
Warsaw School of Economics

Factors of the European economies’ vulnerability to external shocks – an empirical analysis.  
The example of 2008–2009 crisis costs

Abstract

The article analyses the factors determining the vulnerability of the European countries to external shocks taking the example of the global 2008–2009 economic slowdown (also called the subprime crisis) and its impact on economies in Europe. The particular attention is attached to factors related to the fundamentals of the economy, i.e. the GDP growth, fiscal and monetary stability and external stability. Attempting to level off the gap existing in the Polish literature in the empirical research on that problem, the hereby article also refers to wider problems of the macroeconomic factors enhancing economies’ capabilities to meet the challenges of global crises and strengthening their competitiveness afterwards. The special attention in the paper was attached to the role of financial and trade openness.

In the empirical study we have assessed the macroeconomic “costs” of the crisis in the European economies and then we have run the regression model process to estimate the factors determining the exposure to those costs in cross-country perspective. The above mentioned macroeconomic costs are the relative falls (“gaps”) in GDP, i.e. the difference between the hypothetical GDP (resulting from the average mid-term trend) in 2008–2009 and actual GDP incurred in those two “crisis years”. In the regression model (crisis costs as the explained variable) we used the chosen data and indicators denoting the potential factors of the European countries’ exposure to 2007–2009 crisis shock as explanatory variables.

As the calculation results show, the variables that contributed to higher 2008–2009 crisis effects in the European countries were among others: high unemployment and
high real interest rates, considerable government sector debt before the crisis, high economic development level, high share of nonperforming credit portfolio and high share of equity in the banking sector’s assets (signifying a relatively poorly developed banking system), as well as good quality of law. Greater costs of the 2007–2009 crisis were (on average) incurred by countries experiencing high inflation, rapid GDP growth (as compared to the other sample countries), and considerable share of investment in GDP before crisis, and the economies which were characterized by above-average industry concentration and high development of stock exchange and bank market. The study leads to a general conclusion that in case of the European countries, the recession only highlighted and enhanced many problems and unfavorable tendencies which had existed before.

**Keywords:** globalization, global crisis, international macroeconomic shocks

**JEL:** F15, F41, F62

**Introduction**

Nowadays, when globalization of the world economy is gathering pace dynamically, the issues of international transmission of economic shocks and mutual economic impact of countries and markets often located at far distances from each other constitute the area of interest for one of the major open-economy macroeconomics research trend. A new aspect of these issues arose after the phenomenon of transmitting economic impulses between most of the countries in the world, observed during the unprecedented range and strength of the recent global crisis (2008–2009). Reports and numerous analyses concerning the crisis effects (incl. World Economic Outlook, World Financial Stability Report, other reports and analyses from World Bank, IMF, OECD, etc.) indicate though that recession consequences in their broad sense (such as financial and real capital outflow, collapse of international trade, overall business slowdown etc.) influenced particular regions and countries to different extent. What are then the reasons for different levels of national economies’ sensitivity (vulnerability, or as defined in literature – exposure) to the negative influences of the crisis and slowdowns originating abroad?

The abundant literature on the issue with numerous empirical studies presented by other researchers provided different and sometimes counteractive results. It can be thus concluded that the literature has not given so far one universal and comprehensive answer explaining what factors (among them those connected with the fundamentals, i.e. structural features of the economy) can be responsible for the specific vulnerability of the economies to the shocks coming from the rest of the world. That is why it is worth to analyze this important issue in the context of the recent global crisis, especially
considering its vital importance for the Polish economy in Europe. To the authors’ knowledge this issue has not been studied empirically in the Polish literature, what gives another reason to take and advance the problem in this article.

In line with the properties of international transmission mechanisms as regards negative shocks, a recession spreads from the financial to real economy and attacks subsequent groups of key economic equities, what results in worsening the situation on all mutually tied markets and sectors and deteriorating the overall stability of the economies touched by crisis. Hence, a substantial literature focuses on the country-specific vulnerabilities to transmission mechanisms (especially negative ones) in the context of the country-specific features, so called fundamentals, i.e. some general categories reflecting the economies’ performance such as, e.g., the economy size, domestic demand stability, fiscal stability, international competitiveness and country’s general significance in the global economy, trade and financial account balance, external debt level, banking system stability, etc. It is also worth to note that, as can be concluded from the overview of the literature, the studies focusing on economies’ fundamentals as determining the exposure to international shocks (global or regional) often examine the factors (indicators) related to the internal stability (manifested mainly by budget balance and public debt level), together with the indicators of the external stability (like balance of payments, external debt level, exchange rate fluctuations, foreign reserves, etc.) [See Domańska, 2011a, Domańska, Serwa 2013].

Considering all the above, the herewith article analyses the factors determining the vulnerability of the European economies to the effects of the global economic slowdown also called the subprime crisis, noted since mid 2007 with particular attention to the factors related to the fundamentals of the economy, i.e. the GDP growth, fiscal and monetary stability and external stability. The selected macroeconomic indicators are used to denote the level of the macroeconomic stability and its general performance before the strike of the crisis (marking the “entry” situation of the analyzed economies, i.e. at the very beginning of the crisis). The study presented herein attempts to define to what extent the considered macroeconomic fundamental features of the analyzed European countries caused lower or higher exposure of their economies to the 2008–2009 world economic slowdown.

That is why the hereby article is an attempt to level off the gap existing in the Polish literature in the empirical research on that problem. Moreover, it refers to wider problem of the macroeconomic country-specific factors enhancing economies’ capability to meet the challenges of global recessions at all and strengthening their competitiveness afterwards. Thus, the article is a contribution to potential further discussion on the determinants of countries’ exposure to the global slowdowns’ effects in general.

1. The article advances the following arguments concerning the tackled issue. The financial and trade openness of the European countries contribution to strengthening the negative consequences of the 2007–2009 crisis.
2. The weak stability of the European economies observed before the crisis struck as another important factor which deepened the general economic slowdown during the crisis period.

The paper consists of two parts: a theoretical and empirical one. The first part comprises a literature review and provides the most significant postulates of other authors as regards the title issues. Several specifications of the general model presented in the methodology description were estimated in the second, i.e. empirical part.

The literature review

According to Ch. Rosenberg et al. [2005, pp. 4–6], the real economy shocks are especially dangerous if they accompany high vulnerability of the financial economy. It is because production collapse is usually strongly correlated with a reduction of access to financial market (loans, etc.). Thus, internal (state budget) and external stability make the economy resistant to shocks, both those resulting from turbulences and collapses in the international financial markets and those coming out of the real economy (e.g. decrease in the world demand). Hence, two kinds of balance determine the economy’s resistance to crises jointly and, e.g., budget instability should not arouse anxiety as long as the good condition of the balance of payments is sustained. The countries suffering from the instability of public finances combined with the bad situation in the balance of payments are exposed to sudden capital outflows or other consequences of changes in market equities' confidence. So it should be stated that crisis episodes and recessions in general reveals weak fundamentals of a particular economy because players take their decisions basing on some selected indicators which may not give a perfect picture of the country’s real vulnerability to a crisis or a longer-lasting recession [Calvo, 2000; Rosenberg et al., 2005].

The review of approaches and methods applied in literature [Domańska, 2011a, Domańska 2011b, Domańska and Serwa 2013] focus on linkages between turbulence and downturns in international financial markets and the aforementioned structural characteristics of economies. So we can draw the conclusion that factors “originating” in the real and in the financial economy should be treated and analyzed together. That is why, basing on the approach presented in the literature, in the herein article we analyze the factors concerning both real and financial economy, as well as concerning both internal and external stability put in the cross-country analysis. Thus, the following potential determinants of the European countries’ exposure to 2007–2009 crisis shock were taken into consideration, among others economic development before crisis, financial system quality, the economy’s trade and financial openness, diversification of the economy’s sectors, legal system quality, financial system stability and resistance, stability of the government sector, propensity to invest by the private sector, inflation and unemployment level before the crisis, etc.
Macroeconomics of the open economies became interested in the determinants of national economies’ exposure to external influences a relatively short time ago: empirical research on the matter flourished mainly in the 1990s and later on. Many studies focus on general factors of countries’ vulnerability to global shocks in the broad sense (more detailed analyses concentrate on vulnerability factors of particular sectors/industries, i.e. studies the problem in the cross-sectional or cross-industry perspective). In their empirical research on fundamentals in the context of countries’ exposure to external shocks, the authors consider different “categories” (e.g. regional and global crises) such as: the income of the economy, the economy’s sector and branch structure, production specialization vs. diversification level, monetary and fiscal policy, income distribution, financial and trade openness, propensity to invest/consume, strength of the domestic market, general stability of the economy, quality of institutions, etc.

Selected studies are worth quoting here, with a special focus on what categories (usually presented dynamically as tendencies of changes) are treated empirically as factors of vulnerability (variables in the models). L. Goldberg [1996, pp. 413–430] for example in his research, considered aggregate credit in the internal market, foreign exchange rate volatility, relative prices, the level of external credit and money demand as factors of fundamental vulnerability to crisis attack. C. Pazarbasioglu and I. Otker [1997, pp. 837–845] focused on the real income growth rate, domestic credit creation, real exchange rate, foreign exchange reserves, indicators of expansive fiscal and monetary policy, and in their further studies they added information on budget deficits and unemployment rate. In his analysis of Brazil’s vulnerability to currency crisis, O.F. Saquib [1999, pp. 193–206] referred to the data on government expenditure, foreign reserves, real exchange rate, net export dynamics and he added variables describing the political scene.

Parallel to the aforementioned studies, a new current in the literature was initiated by the research of J. Frankel and A.K. Rose [1996, pp. 351–366], who introduced so called “new generation models” based on general equilibrium approach and concentrated on mutual relations within multiple-equilibrium. In their analysis of a sample of over 100 countries in the period between 1971 and 1992, the authors utilized a number of statistical data on public debt structure broken down by entities public sector, private sector and banks, variables defining the external situation, that is the relation of foreign exchange reserves to imports, external debt, current account balance, real foreign exchange rate as well as variables concerning domestic budget balance, dynamics of domestic credit growth and real income per capita, etc. M. Klein and N. Marion [1997] listed the level of the economies’ openness and trade geographic concentration (as well as variables characterizing political situation) among structural factors defining proneness to a crisis. Whereas G. Kaminsky, S. Linzodo and C. Reinhard [1998] focused on the information concerning foreign exchange reserves, domestic credit dynamics, inflation rate, budget deficit and public sector debt as well as balance of trade.
Studies from the 1970s and 1980s, e.g. Krugman’s [Krugman, 1979, pp. 311–325] or R. Flood and P. Garber’s [Flood, Garber, 1984, pp. 1–13] already proved that crises and especially the collapse of fixed exchange rate regimes are mainly related to inadequate monetary policy and fiscal policy, notably budget deficit monetization and loss of foreign exchange reserves. The early literature on the subject states that directly before a crisis, there are often substantial fiscal weaknesses (considerable budget deficits and high public debt) which burden the financial balance of the economy (as well as the external one, which creates pressure, e.g., on the change in exchange rate). As emphasized by S.U. Khan and O.F. Saquib [2008], despite certain differences in the attitude and a variety of models applied by different authors to research on crisis exposure determinants, all of them, in fact, refer to reasons underlying fundamentals (i.e. structural features) of the economies (fundamentals-driven crisis).

Other authors who tackled factors of economies’ vulnerability to external shocks include: S. Edwards [1998], J. di Giovanni and A.A. Levchenko et al. [2008], C. Raddatz [2007], D. Rodrik [2007], C. Calderon et al. [2005], C. Artreta et al. [2001]. The studies on trade openness influence on output and income include: e.g. D.A. Irvin and M. Tervio [2002], M.A. Kose et al. [2002], D. Ben-David [1993], T. Brodzicki [2006]. The issue of how liberalization in regard to capital markets and financial openness influences economic growth and business cycles was examined, i.a., by H.J. Edison et al. [2002], M.A. Kose [2002], A. Razin and Y. Rubinstein [2004], as well as G. Bekaert et al. [2004]. Other shock factors were analyzed by, e.g., Mendoza [1991], S. Schmidt-Grohe [1998] or A. Malik and J. Temple [2006]. Whereas terms of trade in the context considered herein were addressed by, e.g., R. Hausman and M. Gavin [1996] and later by C. Broda [2004].

Models applied in empirical research (presented by the aforementioned and other authors) are to describe quantitatively the dependency of business cycles (in most cases, defined by changes or fluctuations of GDP, GDP per capita, etc.) in the analyzed countries on their economies’ features (which are explanatory variables of the models). However, in some cases data representing external shocks are explanatory variables whereas macroeconomic indicators (features or economies’ endogenous conditions) become control variables.

Outcomes of various analyses on the subject, especially those based on different specifications of regression models, contribute to a typical literature discussion on technical and factual aspects of the estimation process. The discussion focuses on justifiability of applying particular categories and macroeconomic factors as explanatory variables, dependency of quality of results on the parameters used in the models, sample selection (data broken down by countries, chosen groups of countries, types, e.g. divided into developed, developing and emerging markets, etc.). Depending on analysis assumptions, statistical data of different aggregation levels in international statistics, e.g. country-level, regional-level, industry level (i.e. broken down by industry branches such as ISIC two-digit, four-digit classification, data aggregated at the level of product, etc.)
may be also used. The authors dispute about the selection of desirable control variables, the fact of existing additional (imperceptible in certain model specifications) so-called country-specific conditions that may influence estimation outcomes, and especially about the existence of hidden correlations or autocorrelations that may undermine the appropriateness of estimation results. The most often used categories (indicators) denoting particular specific determinants include: the level of income at the beginning of the period (or some average quantities describing the economy development long-term tendencies), data referring to human and real capital accumulation (e.g. investment value in relation to GDP), an average period of education, reflecting the society education level and quality of human capital, data concerning the internal market and demand dynamics, income distribution (significant due to the fact that, as it was proved, the poorest households are the most affected ones by the national income slowdowns). The control variables used in models include also various indicators of the main balance sheets reflecting the macroeconomic internal and external stability (budget balance, current account balance, the level of foreign exchange reserves, the level of assets, international investment position, etc.) as well as fiscal and monetary policy (government expenditure, public debt level, monetary base, central bank interest rates – their average level or fluctuations, etc.) in a form that shows the state of /change in their values, fluctuations (e.g. variance, standard deviation) [see in Domańska, 2011a, Domańska 2011b, Domańska and Serwa 2013] some variables is another often mentioned problem.

Basing on the overview of the literature we can conclude that while the researchers generally agree that the very mechanisms of crisis extension in general depend on specific country features (group of countries, regional integration group, etc.), the studies differ in assessing the role (and even the impact direction) of those features (as factors) in creating countries’ vulnerability to external shocks. Thus the results concerning such factors (variables in estimated models) as the economy size and its significance in the global economic turnover, income level, unemployment and inflation, specialization versus diversification of domestic production and trade, level of the financial stability, fiscal policy (defined by internal, public debt or external debt level), monetary policy (interest rate level, capital turnover liberalization, etc.) are diverse. This proves that despite relatively numerous studies on the subject and a variety of attitudes presented (especially in terms of research methodology), there are no unequivocal, “absolute” outcomes concerning the set of factors significant to creating countries’ vulnerability to external shocks (and even directions of their impact on this vulnerability). Thus transmission of impulses and the economies’ exposure to a crisis should be analyzed each time in relation to a certain group of countries and a given economic situation, which makes the analysis presented herein additionally justified.

Moreover, as can be concluded from the above presented literature’s review, numerous studies focus on vulnerability to transmission mechanisms (especially negative ones) in the context of the country-specific features, so called “fundamentals”, and in search
for the importance of those fundamentals in determining the exposure to international shocks they often examines the indicators of internal and external stability together. That is why the authors of the hereby article took the same approach. Namely, we have used many factors in our analysis combining them in extended regression models. Among the indicators potentially explaining the macroeconomic vulnerability of analyzed countries to the global crisis consequences (understood here as “our” crisis costs) we used (in the cross-country regression): the average economic growth before the crisis, financial system openness, trade openness, level of diversification vs. specialization of the economy (sectors), legal system quality, financial system stability, government sector liquidity and stability, propensity to invest in the private sector, inflation and unemployment level before the crisis and other indicators (see below).

The special attention in this article was attached to the role of financial and trade openness since the openness itself plays an ambiguous and multifaceted role in the problem tackled here. Openness is connected not only to the simple relation of particular producers and whole industries to the volatile demand in foreign markets. Tight international linkages additionally loosen particular industries’ relations to the rest of the national economy and change the features of the common course of highly international branches or industries’ output fluctuations and country’s business cycle. International trade can provide some buffer against the fall in demand on the national markets since it helps to redirect the sales from the national to the foreign markets. On the other hand it may contribute to deepening the problems of the economy when also foreign markets suffer from the collapse. Taking into account the dubious role of openness as a determinant of economies’ reactions to a global shock as well as different (often even contradictory) research results (broken down into various groups and periods), the general influence of this factor on GDP level and fluctuations remains an open empirical question, which should be answered here in the context of 2008–2009 crisis in Europe.

Research methodology and data

The empirical analysis of particular European economies’ sensitivity to the world economic slowdown in 2007–2009 presented herein is divided into two parts. In the first one we calculate the level of macroeconomic costs incurred by particular countries during 2008–2009 crisis. In the second one, we use a regression model to detect how strongly the given factors (among them the fundamental ones) affected the macroeconomic costs in Europe in the cross-country perspective.

To accomplish the analysis there were the data from IMF World Economic Outlook (WEO) and International Financial Statistics (IFS) as well as from the UNCTAD databases, gathered and aggregated. The data concerning fundamental variables, i.e. on GDP, unemployment, inflation and debt come from WEO databases, the data on
financial variables and capital markets used for accounting the capitalization, data on interest rate and credit originate mainly from IFS statistics. The rest of the data, i.e. those used for accounting openness and concentration index come from UNCTAD 2-digit level database since they are aggregated in cross-sectional and in cross-country perspective (37 industries for all European countries except from Moldova, Belarus, and Montenegro due to the lack of comparable data).

Crisis costs in Europe and in the rest of the world

Macroeconomic costs of the global financial crisis are estimated with the use of data on gross domestic product’s rate of decrease (in the real terms) compared to the average GDP growth rate from the period before crisis. To be more precise, so called crisis “costs” were calculated by means of two methods and in both of them the “loss” or “gap” in the GDP due to the crisis is, most simply saying, the difference between the economic growth during the slowdown and the hypothetical one (i.e. the growth that could have been achieved if the crisis had not struck)\(^6\). According to the first method (that is cost 1, the results presented in table 1), a theoretical income level (or other variable level) was calculated for each of the years: 2008 and 2009 by multiplying the real production in 2007 and 2008 respectively by an average annual growth from the last 10 years.

In line with Domańska and Serwa [2013] a theoretical long-term production level was calculated by means of the following equation:

\[
Y_{it}^* = \begin{cases} 
Y_{it} & \text{dla } t < 2008 \\
\left(\frac{Y_{i,2007}}{Y_{i,1998}}\right)^{\frac{1}{10}} & \text{dla } t < 2008.
\end{cases}
\]

The cost of crisis is a percentage deviation of theoretical production, calculated as it was presented above, from the real production in 2008 and 2009 respectively, and the accumulated cost is the sum of costs for those two years.

To calculate production decrease in country \(i\), the output (or other variable) \(Y_{it}\) in country \(i\) in period \(t\) of the crisis was compared to the theoretical production level \(Y_{it}^*\) computed on the basis of a long-term production tendency before crisis; the calculation was made by means of the following formula (production decrease is measured in a percentage terms):

\[
\Delta y_{it} = \frac{Y_{it} - Y_{it}^*}{Y_{it}^*} \cdot 100\% \quad \text{for } t = 2008, 2009.
\]

The production decrease accumulated within the whole crisis period was calculated by adding up the decreases from subsequent periods of the crisis. For example the accumulated decrease of production in the economy’s branch \(i\) in 2008 and 2009 amounts to:

\[
S_i = \sum_{t=2009}^{2009} \Delta y_{it}.
\]
In the second method, the theoretical level (marked as \textit{cost 2}, table 2) of production (or any other variable, notably: consumption level, government expenditure) for the year 2008 was calculated in the same way as in method 1; however, the values for 2009 were obtained by multiplying the theoretical production (and not the real one as in method 1) in 2008. As it was in method 1, the crisis cost for 2008 is a percentage deviation of theoretical production from the real production in 2008. Whereas the crisis cost for 2008–2009 is a percentage deviation of theoretical production in 2009 from the real production in 2009, which is an accumulated deviation for two years. The crisis costs calculated according to both methods are very similar. On the basis of the above described methods we estimated the crisis costs using the data on GDP \textit{per capita} for Europe (and EU) and compared them with the results for another regional economies (i.e. South America, South-East Asia, Central America) and the countries important for the global economy (USA, China and Japan). The aim of this study was to show the performance of the European economy in the wider context of another region’s (and countries’ economies) situation in times of the global downturn.

\textbf{Factors of vulnerability to the crisis shock}

After calculating the crisis costs, in the second part of the empirical research we use the regression model to explain the influence of the chosen macroeconomic factors (mainly those connected with the \textit{fundamentals}) on crisis costs in Europe calculated above (as reflecting the downturns in the economic growth). In these estimations we refer only to Europe, according to the problem stated in the title. In this way, we estimate, using great variety of measures and indicators, the factors of the vulnerability of the economies to the crisis shocks.

The following measures were used as potential explanatory variables: average economic growth before the crisis, financial system openness, trade openness, level of diversification vs. specialization of the economy (sectors), legal system quality, financial system stability, government sector liquidity and stability, propensity to invest in the private sector, inflation and unemployment level before the crisis and other.

As presented in Domańska and Serwa [2013], the regression model explaining crisis macroeconomic costs is as follows:

\[
\begin{align*}
\text{cost}_{i,j} &= \alpha_0 + \alpha_1 \text{unemployment}_j + \alpha_2 \text{investments}_j + \alpha_3 \text{debt}_j + \alpha_4 \text{inflation}_j + \\
&+ \alpha_5 \text{concentration}_j + \alpha_6 \text{openness}_j + \alpha_7 \text{development}_j + \alpha_8 \text{capitalization}_j + \alpha_9 \text{NPL}_j + \\
&+ \alpha_{10} \text{cap/ass}_j + \alpha_{11} \text{percentage}_j + \alpha_{12} \text{credit}_j + \alpha_{13} \text{law}_j + \alpha_{14} \text{growth}_j + \varepsilon_j,
\end{align*}
\]

where:

\begin{itemize}
    \item (the explained) variable \textit{cost} denotes the crisis macroeconomic costs (measured with the method presented above),
    \item index \(i = 1, 2\) represents the method of calculating costs, index \(j = 1, 2, \ldots, N\) denotes a country number,
\end{itemize}
variable unemployment measures unemployment level (percentage of the whole labor force) before the crisis started, variable investments denotes investment level in relation to GDP, debt denotes the level of state government and local government sector debt in relation to GDP, inflation measures inflation level, concentration measures the concentration level of the economy’s sectors, openness measures the economy’s openness by means of the relation of aggregate exports and imports to GDP, variable development represents economic development level measured as GDP per capita in USD, variable capitalization denotes the capitalization level of companies listed in a particular country in relation to GDP, NPL measures the share of nonperforming loans in banking sector, variable (cap/ass) measures the financial leverage of banks, that is the relation of banks’ equity to their assets, variable interest rates denotes the level of market interest rates, credit is the level of banking sector development as the relation of bank loans to GDP, variable law measures the quality of business law according to the World Bank indicator, whereas variable growth measures the economic growth rate. The random component was marked as $\varepsilon$. All explanatory variables are measured for the year preceding the start of the global financial crisis, whereas crisis costs are measured for the years 2008–2009.

The following methods were used to select explanatory variables for the model. General-to-specific approach was applied firstly, which means that the least statistically significant explanatory variables were removed at subsequent stages. Only statistically significant variables and the variable measuring the economy’s openness as well as the absolute term were included in the model. The algorithm used for selecting model specifications is not perfect for at least two reasons. Firstly, while eliminating subsequent insignificant variables from the model, it is possible to omit specifications which best describe the selected dependent variable. Secondly, probably each proposed model specification is only an approximation of the “real” relationship between the financial crisis costs and the examined economic factors. In such a situation, it is better to take into account the results from good enough multiple models than to select a single model.

Therefore, models in which the values of Akaike, Schwarz and Mallows’ information criteria are the lowest were selected as alternative model specifications. Additionally, three methods of averaging models were applied and average estimates of parameters defined after all the combinations of variables used in these models were taken into account. As the potential influence of the economy’s openness on the cost level of 2008–2009 financial crisis is the most significant element in the study, the distribution of parameter estimates for the variable measuring the economy’s openness was also tested for all the possible model specifications.
Empirical research results

As regards the crisis costs, the authors focused on the general distribution of these costs in the global economy by comparing the data for Europe and other regions of the world. Secondly, the authors calculated costs for international trade net exports and compared them between groups of countries (in EU and Europe versus the rest of the world). Special attention was given to the declines in foreign trade. This preliminary analysis covers 81 developed and developing countries. Data concerning GDP and GDP per capita was gathered and costs were estimated in line with the methods presented above for all the 81 countries from the given regions and for individual countries (i.e. those having the special importance for the world economy). Subsequently the results were aggregated for the world regions. Due to the size of this study, detailed results for all the analyzed countries will not be presented herein. Only the results for Europe and other regions with indicating the most important conclusions in the context of further research stages will be charted and discussed.

As the cost comparison revealed, the European countries as a group incurred on average higher costs (calculated as GDP and GDP per capita) than the countries from outside Europe. For example, accumulated growth deviation from the growth rate obtained on the basis of the long-term development tendency accounted for 20% for Argentina, about 20% for Bolivia, 7% for Brazil, almost 12.5% for China, 9.2% for India, 11% for Indonesia, about 15% for Japan. On the other hand, only three European countries did not bear costs of the crisis, notably Switzerland, Moldova and the former Yugoslavia (i.e. Serbia and Montenegro). The rest of the countries incurred costs with the deviation values starting over ten per cent and finishing at -62% in Iceland’s economy (-38% in Estonia).

Chart 1 presents costs for Europe in comparison to other world regions. Average costs of GDP per capita for Europe and EU were collated here with the results for South America, Central America, the USA, Southeast Asia (calculated as averages out of the data for appropriate countries) as well as for China and Japan separately. The chart shows that the negative GDP deviation during the crisis from 10 years’ tendency was especially high in Europe (including EU). On average, it amounted to -16.6% for EU member states whereas it was positive for South America (12.6%), negative for the USA (-9.3%), slightly negative for Southeast Asia (-1.2%) and positive for China and Japan (12.4% and 15.2% respectively).

As regards the results for individual GDP elements, the general outcomes indicate that the greatest costs in the whole world economy were registered in relation to net exports. The whole foreign trade dropped sharply in 2008–2009. All world regions were affected by the decrease of exports and imports and in this respect the differences between Europe and the rest of the world were less significant. Chart 2 presents costs of GDP, exports and imports for Europe and other regions (accumulated value for
CHART 1. GDP costs per capita: Europe versus other world regions

Source: own elaboration.

CHART 2. The costs of GDP, exports and imports for Europe in comparison to other world regions

Source: own elaboration.
2008–2009 calculated in line with method 1). GDP deviation appeared to be positive only in the countries of South America (1.14%), slightly negative in China and Southeast Asia. For a change, the declines in foreign trade were especially significant for China and Southeast Asia. The decrease in exports was due to the lower demand of purchasers – the western countries: imports dropped considerably especially in Europe, with the deviation of below -26%. The lowest foreign trade costs were also incurred by South America. The comparison of Europe with the USA reveals that the crisis effects were greater in Europe than in the USA as regards costs of both GDP and exports (GDP costs in the USA: -8%, in EU: -11.5%, costs of exports: -12.3% and -22% respectively). The results indicate that decrease determinants with reference to exports will be worth looking into more deeply at further stages.

The substantial part of the research, presented below, consists of the results of the regression model which defines the level of crisis costs with reference to particular macroeconomic factors, taken into account herein because they were considered to be significant based on the literature review. The regression results follow discussion in Domańska and Serwa [2013].

The first observation concerns the correlations among the variables. The calculations showed mainly that some explanatory variables are strongly correlated with each other – suggesting the existence of multicollinearity – and that is why the regressions utilize those variables interchangeably.

For example:

- the inflation in 2007 was strongly positively correlated with the level of investment,
- the state government and local government sector debt was negatively correlated with the economic growth in 2007,
- the capitalization of listed companies in relation to GDP was strongly positively correlated with the level of economic development (GDP per capita) and with the level of credit in the economy,
- there is a strong positive dependency between the shares of nonperforming loans in total credit portfolio and the relation of banks’ equity to their assets and unemployment level, as well as a negative dependency between nonperforming loans and the amount of total credit portfolio, and the economic development level.

Table 1 presents estimation results for different specifications of the 2008 and 2009 financial crisis cost model for the explained variable $\text{cost}_1$, as calculated in Domańska and Serwa [2013]. In the first model, which contains all the explained variables (“big model”), it was examined how particular economic factors in individual countries before crisis contributed to the crisis in those countries. In this model, the variables that contributed to the deepening the crisis consequences (i.e. higher crisis costs) scale included: high unemployment and high real interest rates, high government sector debt before the crisis, high economic development level, high share of nonperforming loans and high share of equity in the banking sector’s assets.
### TABLE 1. Estimations of the parameters in the 2008–2009 crisis costs’ models (explained)

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>Unemployment</th>
<th>Investment</th>
<th>Debt</th>
<th>Inflation</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Big model</strong></td>
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<td>-0,006</td>
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<td>(0,278)</td>
<td>(0,385)</td>
<td>(0,086)</td>
<td>(0,660)</td>
<td>(30,846)</td>
</tr>
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<td>0,532</td>
<td>1,150</td>
<td>33,559</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5,778)</td>
<td>(0,214)</td>
<td>(0,506)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Optimal AIC</strong></td>
<td>4,563</td>
<td></td>
<td></td>
<td></td>
<td>2,026</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3,050)</td>
<td></td>
<td></td>
<td></td>
<td>(0,368)</td>
<td></td>
</tr>
<tr>
<td><strong>Optimal BIC</strong></td>
<td>4,563</td>
<td></td>
<td></td>
<td></td>
<td>2,026</td>
<td></td>
</tr>
<tr>
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<td>(3,050)</td>
<td></td>
<td></td>
<td></td>
<td>(0,368)</td>
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</tr>
<tr>
<td><strong>Optimal MIC</strong></td>
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<td></td>
<td></td>
<td></td>
<td>2,026</td>
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</tr>
<tr>
<td></td>
<td>(3,050)</td>
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<td></td>
<td></td>
<td>(0,368)</td>
<td></td>
</tr>
<tr>
<td><strong>Averaged</strong></td>
<td>1,504</td>
<td>-0,025</td>
<td>0,083</td>
<td>-0,001</td>
<td>1,810</td>
<td>0,262</td>
</tr>
<tr>
<td><strong>BMA[1]</strong></td>
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<td>(0,102)</td>
<td>(0,243)</td>
<td>(0,010)</td>
<td>(0,679)</td>
<td>(3,713)</td>
</tr>
<tr>
<td><strong>Averaged</strong></td>
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<td>-0,050</td>
<td>0,184</td>
<td>-0,003</td>
<td>1,652</td>
<td>3,402</td>
</tr>
<tr>
<td><strong>BMA[5]</strong></td>
<td>(8,401)</td>
<td>(0,141)</td>
<td>(0,293)</td>
<td>(0,022)</td>
<td>(0,694)</td>
<td>(12,429)</td>
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<tr>
<td><strong>Average AIC</strong></td>
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<td>0,251</td>
<td>-0,009</td>
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<td>6,605</td>
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<tr>
<td><strong>Average BIC</strong></td>
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<td>0,261</td>
<td>-0,010</td>
<td>1,284</td>
<td>8,061</td>
</tr>
</tbody>
</table>

Notes: standard errors of estimations were presented in brackets. The “big model” is a model with all explanatory variables, “optimal BIC” and “optimal MIC” are models that are optimal as regards the value of information criteria of Akaike, Schwarz all possible combinations of explanatory variables (the number of combinations is \(2^{14}=16384\)). In case of “averaged BMA[1]” al., pp. 25–58] was applied for classic estimations with the assumption that the *a priori* expected number of parameters in the by means of weights calculated on the basis of Akaike and Schwarz’s information criteria was used. (cf. Hansen, 2007).

Source: own elaboration presented in Domańska and Serwa [2013].
### Table: \textit{costs}_1)

<table>
<thead>
<tr>
<th>Openness</th>
<th>Development</th>
<th>Capitalization</th>
<th>NPL</th>
<th>Cap/ass</th>
<th>Interest rate</th>
<th>Credit</th>
<th>Law</th>
<th>Growth</th>
</tr>
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<td>0.000</td>
<td>-0.466</td>
<td>-0.584</td>
<td>-0.605</td>
<td>0.001</td>
<td>-0.372</td>
<td>0.191</td>
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<tr>
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<td>(0.028)</td>
<td>(1.035)</td>
<td>(0.714)</td>
<td>(0.356)</td>
<td>(0.033)</td>
<td>(0.773)</td>
<td>(0.741)</td>
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<tr>
<td>1.419</td>
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<td>(0.284)</td>
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</tr>
<tr>
<td>1.506</td>
<td></td>
<td></td>
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<td>(2.007)</td>
<td></td>
<td></td>
<td>(0.439)</td>
<td></td>
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<tr>
<td>1.506</td>
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<td>-1.372</td>
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<td>(2.007)</td>
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<td>(2.007)</td>
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<td>(0.439)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.023</td>
<td>0.001</td>
<td>0.000</td>
<td>-0.606</td>
<td>-0.080</td>
<td>-0.045</td>
<td>0.001</td>
<td>-0.004</td>
<td>0.008</td>
</tr>
<tr>
<td>(2.197)</td>
<td>(0.011)</td>
<td>(0.002)</td>
<td>(0.740)</td>
<td>(0.270)</td>
<td>(0.184)</td>
<td>(0.005)</td>
<td>(0.085)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>1.642</td>
<td>0.002</td>
<td>0.000</td>
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<td>-0.191</td>
<td>-0.177</td>
<td>0.002</td>
<td>-0.035</td>
<td>0.052</td>
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<td>(2.148)</td>
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<td>(0.006)</td>
<td>(0.746)</td>
<td>(0.401)</td>
<td>(0.317)</td>
<td>(0.010)</td>
<td>(0.227)</td>
<td>(0.240)</td>
</tr>
<tr>
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<td>-0.001</td>
<td>-0.467</td>
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<td>-0.278</td>
<td>0.004</td>
<td>-0.068</td>
<td>0.105</td>
</tr>
<tr>
<td>1.567</td>
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<td>-0.002</td>
<td>-0.481</td>
<td>-0.220</td>
<td>-0.308</td>
<td>0.004</td>
<td>-0.085</td>
<td>0.118</td>
</tr>
</tbody>
</table>

The "small model" is a model with explanatory variables selected by means of "general-to-specific" algorithm; "optimal AIC", and Mallows respectively. "Averaged (...)" correspond to models built as weighted averages of a group of linear models with and "averaged BMA[5]", the Bayesian Model Averaging method [Sala-i-Martin X. et al., 2004, pp. 813–835], [M. Próchniak et model amounts to one and five respectively. In case of “averaged AIC” and “averaged BIC”, a method of averaging estimations
### TABLE 2. Estimations of the parameters in the 2008–2009 crisis costs’ models (explained)

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>Unemployment</th>
<th>Investment</th>
<th>Debt</th>
<th>Inflation</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Big model</strong></td>
<td>4,383</td>
<td>-0,141</td>
<td>0,286</td>
<td>-0,009</td>
<td>1,135</td>
<td>29,846</td>
</tr>
<tr>
<td></td>
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<td>(0,261)</td>
<td>(0,362)</td>
<td>(0,081)</td>
<td>(0,620)</td>
<td>(28,969)</td>
</tr>
<tr>
<td><strong>Small model</strong></td>
<td>-4,244</td>
<td>0,483</td>
<td>1,122</td>
<td>30,434</td>
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</tr>
<tr>
<td></td>
<td>(5,461)</td>
<td>(0,202)</td>
<td>(0,478)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Optimal AIC</strong></td>
<td>4,572</td>
<td></td>
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<td>1,905</td>
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</tr>
<tr>
<td></td>
<td>(2,844)</td>
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<td></td>
<td>(0,344)</td>
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<tr>
<td><strong>Optimal BIC</strong></td>
<td>4,572</td>
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<td></td>
<td>1,905</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td>(0,344)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Optimal MIC</strong></td>
<td>4,572</td>
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<td></td>
<td>1,905</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(2,844)</td>
<td></td>
<td></td>
<td>(0,344)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Averaged</strong></td>
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<td>0,062</td>
<td>-0,001</td>
<td>1,739</td>
<td>0,203</td>
</tr>
<tr>
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<td>(0,102)</td>
<td>(0,203)</td>
<td>(0,010)</td>
<td>(0,594)</td>
<td>(3,180)</td>
</tr>
<tr>
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<td>0,142</td>
<td>-0,003</td>
<td>1,617</td>
<td>2,536</td>
</tr>
<tr>
<td><strong>BMA[5]</strong></td>
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<td>(0,252)</td>
<td>(0,021)</td>
<td>(0,607)</td>
<td>(10,420)</td>
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<tr>
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<tr>
<td><strong>Averaged BIC</strong></td>
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<td>-0,009</td>
<td>1,256</td>
<td>6,991</td>
</tr>
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</table>

Remarks: see Tab. 1.

Source: own elaboration presented in Domańska and Serwa [2013].
### Factors of the European economies' vulnerability to external shocks

**variable: \( costs_2 \)**

<table>
<thead>
<tr>
<th>Openness</th>
<th>Development</th>
<th>Capitalization</th>
<th>NPL</th>
<th>Cap/ass</th>
<th>Interest rate</th>
<th>Credit</th>
<th>Law</th>
<th>Growth</th>
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<td>(0,726)</td>
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<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>(0,410)</td>
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</tr>
<tr>
<td>1,428</td>
<td></td>
<td></td>
<td>-1,277</td>
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</tr>
<tr>
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<td>(0,410)</td>
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<td>-1,277</td>
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<td>-0,005</td>
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<td>(0,083)</td>
<td>(0,093)</td>
</tr>
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<td>0,000</td>
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<td>-0,040</td>
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<td>(0,699)</td>
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<td>(0,265)</td>
<td>(0,008)</td>
<td>(0,224)</td>
<td>(0,235)</td>
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<td>1,524</td>
<td>0,001</td>
<td>-0,001</td>
<td>-0,443</td>
<td>-0,181</td>
<td>-0,233</td>
<td>0,003</td>
<td>-0,076</td>
<td>0,109</td>
</tr>
<tr>
<td>1,448</td>
<td>0,001</td>
<td>-0,001</td>
<td>-0,457</td>
<td>-0,200</td>
<td>-0,258</td>
<td>0,003</td>
<td>-0,095</td>
<td>0,124</td>
</tr>
</tbody>
</table>
(signifying a relatively poorly developed banking system), as well as good quality of law. In the big model, the parameter for unemployment variable amounted to -0.118, (signifying a relatively poorly developed banking system), as well as good quality of law. In the big model, the parameter for unemployment variable amounted to -0.118, 0.356 for investment, 1.177 for inflation and 31.942 for concentration indicator, with the costs calculated according to method 1. It is worth noting that greater crisis costs were incurred by countries which experienced high inflation, rapid GDP growth and considerable share of investment in GDP before crisis, and when the economy was characterized by above-average industry concentration and high development of stock exchange and bank market. The economies which were more open before crisis incurred on average higher costs of crisis.

It must be borne in mind that hardly any of the estimated parameters in the first model is statistically significantly different from zero, which might indicate a poor model adjustment to the data. This is due to high correlations between individual explanatory variables in the model. While the “small model” with a limited number of explanatory variables was created by means of general-to-specific algorithm of selecting an optimal model specification, then the impact direction of particular economic indicators on crisis costs is identical to the one obtained in the “big model”. Most explanatory variables are statistically significant, but the parameter for the variable measuring the economy’s openness is not significantly different from zero. This may signify that openness of individual economies was not a significant factor contributing to the scale of crisis costs.

Similar outcomes were obtained by means of optimal model selection methods utilizing estimation of Akaike, Schwarz and Mallows’ information criteria. These methods of selecting an appropriate model specification are preferred by most authors because they allow to choose models bearing the most information while consisting of a moderate number of explanatory variables. Here, it turns out that the inflation level and the share of nonperforming loans in banking sector had a decisive effect on the scale of crises in the European countries. Again, the positive influence of the economy’s openness is not statistically significant.

Finally, methods of averaging parameter estimates were applied on the basis of numerous model specifications. Such approach to model analysis is becoming more and more popular in the econometric literature as it allows to take into account the risk related to optimal model selection [Sala-i-Martin et al., 2004], [Próchniak et al., 2012]. A single model may not explain the analyzed phenomenon appropriately (e.g. precisely), but a combination of multiple models allows to limit the risk of selecting unsuitable model and to avoid a variables selection bias as well so it raises the goodness of estimates.

Most variables in the averaged estimates of the crisis cost model influence the dependent variables in a similar way as in the “big model”. The variables “economic development” and „capitalization” are exceptions: their parameters in different specifications are of positive and negative values.
Analogical outcomes were obtained during the analysis of the second potential variable measuring the scale of crisis, that was the variable costs. The results were presented in Table 2 in line with Domańska and Serwa [2013]. Since both explanatory variables measuring crisis costs are almost perfectly correlated, the results in Table 2 differ from those in Table 1 only in parameter values – the signs of corresponding variables remain the same (with the exception of one case). For example, for the variable unemployment, the parameter amounted to -0.141, for the var. investments: 0.286, debt: -0.009, inflation: 1.135, concentration: 29.846, openness: 0.78, economic development: -0.02, and capitalization: 0.001 (averaged values are respectively as follows: 2.035, -0.027, 0.062, -0.001, 1.739, 0.203, 1.9 and 0.001).

Summary and suggestions as to the future research

As indicated in the literature, a number of macroeconomic factors determine the differences in vulnerability to economic crises. Those factors include: the situation in internal markets (demand), general GDP growth rate before crisis, the level of internal stability (budget deficit and public debt level) and external stability (trade balance, external debt, international investment position, foreign reserves) of the economies. As a rule, countries and world regions whose weaknesses include low domestic demand dynamics, considerable imbalances and deficits, weak bank system and legal system, etc. are less resistant to a downturn, but the pace of their recovery is also much slower.

Referring to the results of the empirical study presented in this article, the impact directions of particular variables seem to correspond to the intuitive understanding of how a crisis is deepening and are consistent with the results obtained by another authors. As the calculation results show, the variables that contributed to 2007–2009 crisis effects in the European countries were among others: high unemployment and high real interest rates, considerable government sector debt before the crisis, high economic development level, high share of nonperforming credit portfolio and high share of equity in the banking sector’s assets (signifying a relatively poorly developed banking system), as well as good quality of law. Greater costs of crisis were (on average) incurred by countries which experienced high inflation, rapid GDP growth (as compared to the other sample countries) and considerable share of investment in GDP before crisis, and the economies which were characterized by above-average industry concentration and high development of stock exchange and bank market. These outcomes correspond to the economic intuition and the findings of analysis performed by other authors. Higher unemployment and inflation rates show the economy’s weakness and high interest rates, constraining economic activity and slowing down the pace of growth make the European countries relatively prone to the negative influence of an economic downturn in the rest of the world in 2008–2009 period. Developed bank and stock exchange systems, being more
open to international flow of capital, were significant crisis transmission channels in the examined countries (the conclusion corresponds to the research results obtained by other authors). Similarly, as the computations herein showed, a relatively higher vulnerability to a crisis is related to weak bank and legal systems. The European countries in which the growth rate was relatively fast (in comparison to others) experienced a sharper drop of it. It is worth noting that considerable industrial concentration (poor branch diversification of production) had an overwhelming negative impact on the economy’s resistance to a crisis shock. As regards the economies’ openness, a slightly positive influence of this factor on the increase of crisis costs was observed (the fact is that the parameter for the variable “the economy’s openness” is positive regardless of a model specification).

The study leads to a general conclusion that in case of the European countries, the recession only highlighted and enhanced many problems and unfavorable tendencies which had existed before the crisis. It concerns mainly the weak stability of the European economies observed before the crisis struck and that was probably an important factor which deepened the general economic slowdown during the crisis period. The empirical results have also proved the argument that financial and trade openness of the European countries highly contributed to strengthening the negative consequences of the 2007–2009 crisis. We also emphasize that favorable conditions for crises (especially currency ones) to spread are created firstly by conditions making the economies more prone to the trap of indebtedness or bank panic to occur (coming out of financial markets), secondly by fundamental weaknesses.

The results obtained in the analysis allow to draw some interesting conclusions as to the economic policy. It seems it should be concentrated on strengthening the financial system and – in the real economy – on stimulating the domestic markets’ demand (boosting the investments and creating favorable conditions for intra-regional trade in Europe).

As the results obtained within this research (as well as results by other authors tackling the issues of the 2008–2009 crisis) show, the crisis put the substantial negative pressure particularly on the international trade. That is why in the future research concerning the factors of the vulnerability to crisis shock, it will be worth to attach the special importance to the factors connected with international trade. Within this problem (analyzed in relation to 2008–2009 crisis) it should be studied the role and importance (in relation to another factors like financial openness) of trade links in the broad context of the mechanisms through which trade contributes to international transmission of shocks. Since the herewith study relates to more general country-specific factors it is desired to shift the attention to the less aggregated data, for example data on industries and their international trade (cross-industry rather than cross-country perspective) taking into consideration the factors like patterns of specialization (relationship between commodity diversification/concentration and export volatility and dynamics which indirectly affect income), the role of demand shocks in the partner countries for economic volatility and development in exporting countries, the role of terms of trade, the possible role of geographical concentration of exports and imports in exposure to demand shocks, etc.
Notes

1 The article was accomplished in the framework of the project no. N N112 377940 financed by the Polish National Science Centre.

2 The crisis started in fact in the year 2007 but since its effects revealed in most of countries in 2008 and 2009 it is frequently referred to as 2008–2009 global crisis.

3 What is more, so far the world literature has not provided many studies analyzing the issue of shock transmission in the context of 2007-2009 economic crisis.

4 Similarly, financial openness may cushion the negative influence of endogenous shocks on the economy and counteract cycles thanks to wider access to foreign loans and generally thanks to greater chances to finance investments with foreign capital as well as domestic companies’ portfolio diversification. On the other hand, if domestic sources are too strongly tied to the international financial system, they are exposed to its shocks, which may cause a recession.

5 Understanding of crisis “macroeconomic costs” corresponds to this notion definition in specialized literature. The studies analyzing macroeconomic costs of financial crises often compare the level of gross domestic product (usually real GDP calculated per capita) during the crisis to the GDP level that would have been reached but for the crisis. An analogical way of calculating costs was to compare GDP growth rate during a crisis to the hypothetical GDP growth rate that would have occurred but for the crisis. GDP growth rate analyses were carried out, among others, by: IMF [1998, 1999], Azis, Caramazza and Salgado [2000], Barro [2001], Hutchison and Noy [2005], while output levels were compared among others by Hoggarth, Reis and Sapporta [2002], Boyd, Kwak and Smith [2005], Laeven and Palencia [2010]. IMF [1998, 1999], Azis, Caramazza and Salgado [2000] as well as other researchers additionally aggregated costs of crises that occurred in particular years to calculate overall crisis costs. They added up differences between the real level (or dynamics) of output and hypothetical level (or dynamics) of output from each year during the crisis or from each year after the crisis occurred when the differences were negative.

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Rebalancing the eurozone troubled economies

Abstract

The aim of the article is to assess how much rebalancing of the six eurozone troubled economies (Ireland, Portugal, Spain, Italy, Greece, Cyprus) was achieved since the outbreak of the financial crisis in 2007/2008, to what extent migrations were a mitigating factor on their labor markets and how much the troubled countries were assisted in their adjustment by other countries. The first part of the article shows an overall macroeconomic picture of the troubled economies’ rebalancing together with a presentation of the etiology of the problem (i.e. accumulation of imbalances). The second part presents the role of migrations and the third part the role of the Eurosystem and international financial assistance in the rebalancing process. The research is based on comparing developments in selected indicators across countries. The conclusions are that the rebalancing in the troubled countries was either at most limited or actually their economies continued to fall out of balance (various indicators showing various developments make the situation ambiguous), migrations were either not much supportive for rebalancing of the troubled economies or they did not provide any dent to unemployment at all and that the troubled countries were provided with significant international assistance mainly in the form of the ECB policies causing the rise in the Target balances.

Keywords: eurozone, rebalancing, adjustment process

JEL: F320, F330, F410, J610
Introduction

The eurozone countries have restricted policy options to balance their economies, both internally and externally, as compared to countries using exchange rate arrangements that allow for exchange rate adjustment. When confronted with a crisis having its roots in deteriorated international competitiveness of their economies, the eurozone countries, assuming they want to remain in the monetary union, cannot rely on currency depreciation to help improve their external position and their adjustment has to be based on other mechanisms like internal devaluation, its softer version of still positive inflation rate, but one lower relative to the rates experienced by trading partners or even restricting transactions recorded in their balances of payments (foreign trade restrictions, capital controls). Assuming that they want to stick to the trade and capital movement freedoms, they are left with the options of internal devaluation or relatively low inflation rate. Unfortunately, when prices and wages are rigid downwards, as generally is the case, internal devaluation is painful, particularly in terms of lost GDP and high unemployment. The second option of relatively low inflation rate would probably require that the more competitive eurozone countries operating at low unemployment would have to accept “overheating” of their economies, which is also problematic. Whichever path is chosen, the adjustment process can be alleviated (i.e. rebalancing can be slowed down) through international assistance, while unemployment can be additionally moderated through emigration.

Since the outbreak of the financial crisis in 2007/2008 we have been witnessing painful adjustment in the six eurozone troubled economies, i.e. in Ireland, Portugal, Spain, Italy, Greece and Cyprus, after financial markets became aware that international competitiveness of these countries’ economies had deteriorated and their private and public sectors might have become unable to repay their debts. The cost of adjustment has not only been borne by these states, but also by other members of the eurozone, who have provided financial assistance or have experienced the consequences of the European Central Bank accommodative policy. This external assistance did not come easy though. In the last few years the eurozone has been going through a strife on the conditions and volumes of interstate financial assistance, the ECB policy, possible mutualization of state debts, on how to deal with failing banks and so on. In general this strife may be seen as one about how the burden of adjustment of the troubled countries should be shared among the eurozone member states.

The aim of this article is to assess how much rebalancing of the eurozone troubled countries’ economies was achieved since the outbreak of the financial crisis in 2007/2008, to what extent migrations were a mitigating factor on their labor markets and how much the troubled countries were assisted in their adjustment by other countries. The first part of the article shows an overall macroeconomic picture of the troubled economies’ rebalancing together with a presentation of the etiology of the problem (i.e.
accumulation of imbalances), which might offer some clue into how much adjustment is supposed to return the troubled economies to balance and as a point of reference to what was actually achieved. Then the article focuses on specific issues that in the author’s opinion are important aspects of rebalancing of the troubled countries’ economies. The second part presents the role of migrations and the third part the role of the Eurosystem and international financial assistance in the rebalancing process. The author thinks that omitting these issues would render the analysis of the rebalancing incomplete. Finally, conclusions are drawn.

The research is based on comparing developments in selected indicators across countries. The first two parts of the article are based on the Eurostat data. The analysis presented in the third part of the article uses both the Eurostat and the Ifo Institute data.

**Macropicture**

A good starting point for analyzing rebalancing of the eurozone troubled economies might be to establish, how large these imbalances were before the rebalancing started. Looking at the eurozone crisis as a balance-of-payments one should be of use here. Current developments in the eurozone show that too much of international capital flows to the troubled countries prior to the outbreak of the financial crisis were not used for sound investment improving the economy’s production capacity that subsequently allows to repay creditors and increase domestic spending. How did it come about? Sinn [2013, p. 3] reminds that before the introduction of the euro the “southern” states and private sectors had to pay much higher interest rates than the “northern” ones and these differences in interest rates disappeared in the second half of the 1990s because investors perceived the Eurosystem as a protection against state bankruptcy and private bankruptcies subordinate to it. Feldstein [2011, p. 5] likewise points that due to the creation of the monetary union interest rates fell in some of the eurozone countries and this brought increased borrowing on the part of households to finance home building and on the part of governments to finance deficits accompanying social transfers, whereas bond buyers in spite of the “no bailout” clause in the Maastricht Treaty assumed bonds issued by all the governments in the eurozone to be equally safe. Krugman [2012] similarly states that the introduction of the euro led many investors to believe that cross-border investment within the eurozone became much less risky. When financial markets realized that they had been overoptimistic about investing in the south of the eurozone and in Ireland, the stage for rebalancing was set, which created a serious problem both for the eurozone creditor and debtor countries.

On the basis of the presented views one might assume that imbalances started to accumulate about the time of the euro introduction or earlier. According to the opinion presented by Sinn, who draws attention to the European Council meeting in Madrid...
in December of 1995 as a point in time when the euro was definitively announced and after which the interest-rate spreads between the “southern” and “northern” states disappeared within two years [Sinn, 2013, p. 3], one might assume that 1995 could be a starting point for this analysis, at least for the countries that were the members of the eurozone from its creation in 1999. Taking the abovementioned views into account time series presented below start between 1995 and 2001. The exact choices of the points of departure were driven by the need to present clearly the developments before the outbreak of the financial crisis, ensure data comparability and were also dependent on the availability of the statistics. Indicators present the situation not only in the six troubled countries but also for the whole euro area composed of 17 states (the EA17) and Germany in order to place the developments in the troubled countries in the eurozone perspective.

As it can be seen on Chart 1, the troubled countries’ balances of payments significantly worsened prior to the outbreak of the financial crisis. In 1995 Ireland and Italy recorded current account surpluses of 2,5% and 2,2% of GDP respectively, Portugal and Spain were almost balanced, while Germany recorded a 1,2% deficit. Deficits of Greece and Cyprus (which joined the eurozone in 2001 and 2008 respectively) were then at 2,2%. In 2000, Ireland and Italy had almost balanced current accounts and Germany was still in deficit, but deficits of Portugal, Spain, Greece and Cyprus reached 10,3%, 4,0%, 7,8% and 5,4% respectively. Up until 2003 current accounts of the troubled countries improved or at least did not worsen markedly but afterwards they started to deteriorate again and in 2008 the deficit in Italy reached 2,9%, in Ireland 5,6%, in Spain 9,6%, in Portugal 12,6%, in Greece 14,9% and in Cyprus 15,6%. Then, in the context of the eurozone crisis, current accounts of the troubled countries improved. In 2012 Ireland recorded a 5,0% surplus, while deficits of Portugal, Spain and Italy stood only at -1,5%, -1,1% and 0,7% respectively. Deficits of Greece and Cyprus were still significant at 3,1% and 6,5% respectively. Yet one should take note of the data for the first quarter of 2013 that show increased current account deficits for Italy (1,6%), Greece (5,7%) and Cyprus (12,4%). The German current account surplus did not come below 6,0% since 2006, while the current account of the eurozone from the start of its existence remained largely in balance. In general current account deficits that arose prior to the crisis largely reversed afterwards, but the German surplus did not adjust to assist the troubled economies in their rebalancing. Thus the other eurozone countries have recorded deteriorations in their current accounts, in particular France (from 0,5% surplus in 2005 to 2,4% deficit in the first quarter of 2013) and Belgium (from 1,9% surplus in 2007 to 3,3% deficit in the first quarter of 2013).

Developments in the current accounts presented above are reflected in the net international investment position (IIP) statistics shown on Chart 2, where one can observe diverging paths for Germany and the six troubled countries. Since the introduction of the euro, Germany recorded a growth trend in its net IIP (a rise from 0,4% of GDP in 1998
CHART 1. **Current account balance of the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2013*** (% of GDP)

* Data for the first quarter of 2013.

Source: based on the Eurostat data.

to 41,7% of GDP in the first quarter of 2013). Ireland’s net IIP that peaked at 50,4% in 1999 fell to -75,6% in 2008 and then further decreased to -108,2% in 2012. Portugal’s net IIP fell from -9,3% in 1996 to -96,2% in 2008 and further to -118,0% in the first quarter of 2013. Spanish net IIP fell from -21,7% in 1995 to -93,7% in 2009 and afterwards it remained relatively stable (-92,0% in the first quarter of 2013). Italian net IIP was the strongest among the six troubled countries, but it also recorded a deterioration from -4,8% in 1997 to -24,5% in 2007 and then remained relatively stable to reach -23,7% in the first quarter of 2013. Greek net IIP fell from -24,5% in 1998 to -96,1% in 2007, then recorded improvements in 2008 and 2011, but finally fell to -116,8% in the first quarter of 2013. The Cypriot net IIP after peaking at 37,7% in 2006 entered a nosedive and fell to -126,7% in the first quarter of 2013. Thus after the outbreak of the financial crisis no adjustment in the net IIP positions of the troubled eurozone economies took place. Actually imbalances in the net IIP in the six troubled countries widened.
Rebalancing the eurozone troubled economies

CHART 2. **Net international investment position of Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2013** (% of GDP)

The fall in interest rates in the troubled countries together with changed investors’ attitudes reflected themselves in increased credit flow both into the troubled countries’ private and general government sectors (Charts 3 and 4 respectively). In 1995 the private credit flow statistics were as follows: 1,3% of GDP in Germany, 9,1% in Portugal, 3,8% in Spain, 4,6% in Italy, 1,8% in Greece, 16,1% in Cyprus. They rose in the second half of the 1990s and in 1999 they reached 8,3% in Germany, 18,6% in Portugal, 15,2% in Spain, 8,4% in Italy, 10,2% in Greece and 18,5% in Cyprus. At the beginning of the 2000s private credit flow in the troubled economies moderated to rise again to very high levels prior to the crisis reaching 44,4% in Ireland in 2006, 20,5% in Portugal in 2007, 36,0% in Spain in 2006, 12,4% in Italy in 2007, 17,0% in Greece in 2007, and 38,4% in Cyprus in 2007. These developments stood in stark contrast to the situation in Germany, where private credit flow fell to just 0,6% of GDP in 2002 and did not rise above 1,9% till 2012. After the outbreak of the financial crisis private credit flow fell to -3,7% in Ireland in 2009, -5,3% in Portugal in 2012, -4,6% in Spain in 2011, 1,7% in Italy in 2009, -6,4% in Greece in 2012 and 15,3% in Cyprus in 2009. Thus the adjustment with respect to private credit flow has been even stronger than the rise prior to the crisis. In the area of public finances no significant deterioration
CHART 3. Private credit flow (consolidated) in Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2012 (% of GDP)

Source: based on the Eurostat data.

CHART 4. Net lending(+)borrowing(−) under the Excessive Deficit Procedure in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2012 (% of GDP)

Source: based on the Eurostat data.
in the troubled countries prior to the outbreak of the financial crisis was recorded. To the contrary, some of them improved their public finances. Ireland recorded surpluses every year in the period 1997–2007 except for 2002 and Spain recorded surpluses in 2005, 2006 and 2007. In the period 2000–2007 the Irish general government sector recorded an average annual surplus of 1,5% of GDP and the Spanish one of 0,5%, while in the other troubled countries average annual deficits were as follows: 4,2% in Portugal, 2,9% in Italy, 5,4% in Greece and 2,5% in Cyprus. The EA17 and Germany recorded on average deficits of 1,9% and 2,3% in this period. Public finances in the troubled countries dramatically deteriorated only after the outbreak of the financial crisis and in the period 2009–2012 an average annual deficit in Ireland reached 16,4%, in Portugal 7,7%, in Spain 10,2%, in Italy 4,2%, in Greece 11,5% and in Cyprus 6,0%, while for the EA17 and Germany it was 5,1% and 2,0% respectively.

The stock equivalents of the above presented credit flows, i.e. debt statistics for private and general government sectors (Charts 5 and 6 respectively) are also interesting facets of the eurozone adjustment challenge. It is worthwhile to note that private debt in Germany stood at 108,4% of GDP in 1995, rose to 128,0% in 2001 and then started falling to reach 107,6% in 2012. In 1995 Portuguese, Spanish, Italian and Greek private sectors were less in debt than the German one – at 76,7%, 76,6%, 71,5% and 41,6% respectively. In 2008 their debts reached 216,3%, 206,5%, 119,1% and 118,8% respectively. Portugal reached the German level already in 1997, Spain in 2003, Italy in 2007 and Greece in 2008. Cypriot private debt rose from 126,3% of GDP in 1995 to 236,6% in 2008. The Irish one from 154,5% in 2001 to 258,5% in 2008. In the period 2009–2011 the private debt ratios in most of the troubled countries rose (in Ireland by 22,2 p.p., in Portugal by 6,9 p.p., in Italy by 7,1 p.p., in Greece by 11,2 p.p. and in Cyprus by 46,8 p.p.). Only in Spain the ratio declined, but only by 2,5 p.p., thus after the outbreak of the financial crisis there was practically no adjustment in the troubled countries in their private debt levels. As concerns general government debt levels, the German one rose from 55,6% of GDP in 1995 to 65,2% in 2007. The Portuguese, Greek and Cypriot general government debt ratios in this period also rose by about 10 p.p. (the Portuguese one from 59,2% to 68,4%, the Greek one from 97,0% to 107,4% and the Cypriot one from 51,8% to 58,8%), while the ratio for Ireland fell from 80,1% to just 25,1%, for Spain from 63,3% to just 36,3% and for Italy from 120,9% to 103,3%. It was only after 2007 when general government debt-to-GDP ratios dramatically deteriorated. For the EA17 the ratio rose from 66,4% in 2007 to 90,6% in 2012. In Germany in 2012 it reached 81,9% (16,7 p.p. more than in 2007), in Ireland 117,6% (92,5 p.p. more), in Portugal 123,6% (55,2 p.p. more), in Spain 84,2% (47,9 p.p. more), in Italy 127,0% (23,7 p.p. more), in Greece 156,9% (49,5 p.p. more despite a “haircut” in 2012) and in Cyprus 85,8% (27,0 p.p. more).
CHART 5. Private debt (consolidated) in Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2012 (% of GDP)

Source: based on the Eurostat data.

CHART 6. General government gross debt (consolidated) in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2012 (% of GDP)

Source: based on the Eurostat data.
Another interesting facet of adjustment in the troubled countries is also the GDP dynamics presented on Chart 7. Prior to 2008 the economies of the six troubled countries generally grew well in comparison with the economies of the whole EA17 area or Germany (in large part due to the infl ow of foreign capital, the scale of which was already reflected on Chart 2), but after 2009 the situation reversed. In the period 2000-2007, when the average annual rate of economic growth in the EA17 was 2,2% and in Germany 1,6%, the rate for Ireland was 5,8%, for Portugal 1,5%, for Spain 3,6%, for Italy 1,6%, for Greece 4,2% and for Cyprus 3,8%. But in the period 2010–2012, when the average annual rate of growth for the EA17 area was 1,0% and for Germany 2,6%, the Ireland’s economy grew on average by only 0,5% a year and the other troubled countries’ economies were shrinking: the Portuguese by 1,0%, the Spanish by 0,4%, the Italian by 0,1%, the Greek by 6,1% and the Cypriot by 0,2%. These disappointing growth rates made it difficult for the troubled countries to show improved economic indicators that have a country’s GDP in denominator. Although using such indicators may underestimate the troubled countries’ efforts to balance their economies, the disappointing growth rates do not allow to perceive the indicators for and the perspectives of these countries in a more positive, special way.

**CHART 7.** GDP growth in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2013*

* Data for 2013 are forecasts.

Source: based on the Eurostat data.
The GDP dynamics reflected itself on the troubled economies’ labor markets, which can be seen on Chart 8. The situation in the EA17 labor market improved in the period 1995–2007 as the unemployment rate fell from 10.7% to 7.6%. In 2007 the situation in Ireland, Italy and Cyprus was better than the average for the EA17, while in Germany, Portugal, Spain and Greece the unemployment rates were in the 8.3-8.9% range. Yet after the outbreak of the financial crisis unemployment in the EA17 increased markedly, especially in the troubled economies. In the first quarter of 2013 the seasonally adjusted rate of unemployment in the EA17 stood at 12.0%, while in Ireland it reached 13.7%, in Portugal 17.6%, in Spain 26.4%, in Italy 11.9%, in Greece 26.6% and in Cyprus 14.7%. These developments are contrasted by the situation in Germany, where in the first quarter of 2013 this rate fell to 5.4%. It is worth to take note of the situation in the two countries recording especially high unemployment rates, i.e. Spain and Greece. In Spain the dire situation on the labor market might be associated with especially large employment creation accompanying the infl ow of foreign capital to Spain prior to the crisis outbreak and subsequent reversal of the situation. In 2008 in Spain there were 38.5% more employed (aged 15 or over) than in 1999 (in construction 56.0% more), whereas

**CHART 8. Unemployment rate in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2013**

* Data for the first quarter of 2013 (seasonally adjusted).

Source: based on the Eurostat data.
for the EA17 area (excluding Malta) the employment grew by 14.5%. In Greece it grew by 12.8%, thus below the EA17 average, but Greece experienced especially dramatic GDP contraction in recent years compared to the other troubled economies (see Chart 7), which is one of the main factors explaining its particularly high unemployment rate.

In order to assess the progress in rebalancing of the troubled economies one also needs to look at a few indicators showing changes in their international competitiveness. Credit flowing into the troubled economies prior to the outbreak of the financial crisis has contributed to rising price levels, which is problematic for a country that does not have an option to let its currency depreciate. As it can be seen on Chart 9, prices measured by the GDP deflator (based on euro) in 2007 were 18.1% higher in the whole EA17 area than in 1999. In this period prices in Germany rose only by 6.8%, while in Ireland by 33.1%, in Portugal by 26.8%, in Spain by 36.7%, in Italy by 21.2%, in Greece by 22.7% and in Cyprus by 29.8%. Such rises have deprived the troubled countries of some of their competitiveness, especially in comparison with Germany, but then changes in price levels in the context of the eurozone crisis became more supportive for their competitiveness. Whereas prices both in the EA17 and in Germany in 2012 were 4.3% higher than in 2008, prices in Ireland fell by 5.3% in this period, so this country achieved

**CHART 9. GDP deflator in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 1995–2013* (based on euro, 1999 = 100)**

* Data for 2013 are forecasts.

Source: based on the Eurostat data.
a significant adjustment in price levels. Unfortunately developments in other troubled countries were not so positive for their competitiveness. Prices in Portugal, Spain and Greece rose by 1.9%, 1.6% and 3.8% respectively, so their adjustment was very modest compared to the EA17 and Germany. Yet prices in Italy and Cyprus rose by 5.5% and 6.9% so they recorded further (though slight) losses relative to the EA17 and Germany.

Changes in nominal unit labor costs (NULC) are another indicator helpful in assessing an economy’s competitiveness. As it is illustrated on Chart 10, the NULC in Germany in 2008 were almost at the same level as in 2001, while in the EA17 they grew by 12.8%, in Ireland by 33.2%, in Portugal by 18.4%, in Spain by 27.1%, in Italy by 21.7%, in Greece by 27.2% and in Cyprus by 23.8% (an explanation concerning the data on Cyprus is presented in [*] on Chart 10). After the outbreak of the financial crisis some of the troubled countries recovered part of their losses from the pre-crisis period. Whereas in 2012 NULC in the whole EA17 rose by 6.1% as compared to 2008.

CHART 10. Nominal unit labour costs (NULC) in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus* in 2001–2013** (2001 = 100)

* Cyprus adopted the euro in 2008, but as the exchange rate movements of the Cypriot pound against the euro were limited in 2001–2007 (within the range of 0.57–0.59 euro for a pound, as it was verified on http://fxtop.com/en/historical-exchange-rates.php on 09.08.2013), the chart presents a fairly good depiction of the Cypriot NULC measured in euro.

** Data for 2013 are forecasts.

Source: based on the Eurostat data.
Rebalancing the eurozone troubled economies

and in Germany by 9.0%, in Ireland they fell by 13.8%, in Portugal by 2.7%, in Spain by 5.4% Greece by 2.3%. Unfortunately, the situation in Italy and Cyprus barely changed relative to the EA17 and Germany in this period, so the picture of adjustment in NULC is uneven across the troubled economies.

A useful complement to presenting the developments in NULC, helpful in explaining their nature is to show developments in labor productivity. Chart 11 evidences that in the period 2002–2008 real labor productivity per hour worked recorded the biggest rise among the troubled countries in Greece (21.5%), then Ireland (12.2%), Cyprus (10.2%), which recorded almost the same rise as Germany (9.9%), then Portugal (6.7%) and Spain (5.3%). Italy recorded virtually no rise (0.3%). The rate for the EA17 was 7.3%. These data evidence that before 2009 Germany did not record any outstanding rise in productivity, which points at controlling wages (and thus prices as it can be seen on Chart 9) as a factor allowing to keep their NULC under control. The six troubled economies obviously did not manage to keep wages growth in line with growth in productivity in order to restrain rises in NULC.

An economy’s relative competitiveness towards its trade partners can be also assessed by observing changes in real effective exchange rates (REER). In 2008 the REER for the EA17 was 11.5% higher than in 1999 and the change in REER for Portugal, Italy, Greece

CHART 11. Real labour productivity per hour worked in the EA17, Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus in 2001–2012 (2001 = 100)

Source: based on the Eurostat data.
and Cyprus was quite similar for that period (12.3%, 15.7%, 7.4% and 14.8% respectively) as it is visualized on Chart 12. Yet the REER for Ireland rose by 37.3% and for Spain by 21.7% in that time, which means that their economies lost some of their international competitiveness relative to the EA17. In the same period the REER for Germany fell by 10.8% meaning that the country gained in competitiveness relative to the EA17. After the outbreak of the financial crisis the pattern of the REER dynamics in the eurozone changed. In 2012 the REER for the EA17 fell by 7.8% relative to 2008 and in Germany it fell only by 2.1% meaning that it lost some of its price competitiveness relative to the EA17. In this period the REER for Ireland fell by 23.4%, for Spain by 13.3%, for Greece by 12.4% and for Portugal by 8.7%, thus they gained in competitiveness relative to the EA17 and their adjustment was quite substantial relative to changes in the pre-crisis period. The REER for Italy and Cyprus did not change much (-3.3% and 1.0% respectively). Although the developments in the crisis countries were diverse, none of them managed to recover losses relative to Germany from before the outbreak of the financial crisis.

The developments presented above are summarized in Table 1. The troubled countries’ rebalancing effort seen through the lens of the flow indicators (largely reversed current account deficits, dramatic fall in private credit flows, increased public lending) is partly
positive. Yet when the rebalancing is being considered looking at their stock counterparts, i.e. no adjustment or deterioration in net IIP positions and private indebtedness and also dramatic rises in public debt statistics, the picture becomes really worrisome, especially when one looks at weak GDP dynamics and dramatic rise in unemployment rates. The indicators showing changes in international price competitiveness of the troubled economies, i.e. inflation rates, nominal unit labor costs and real effective exchange rates, though providing a mixed picture, also do not seem to evidence significant rebalancing.

**TABLE 1. Rebalancing in the six troubled countries after the outbreak of the financial crisis in 2007/2008**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Adjustment in the six troubled countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>current account balance (% of GDP)</td>
<td>deficits largely reversed</td>
</tr>
<tr>
<td>net international investment position (% of GDP)</td>
<td>no adjustment or deterioration</td>
</tr>
<tr>
<td>private credit flow (% of GDP)</td>
<td>credit flow fell more than it had previously increased</td>
</tr>
<tr>
<td>general government balance (% of GDP)</td>
<td>deficits increased</td>
</tr>
<tr>
<td>private debt (% of GDP)</td>
<td>no adjustment or deterioration</td>
</tr>
<tr>
<td>general government debt (% of GDP)</td>
<td>dramatic deterioration</td>
</tr>
<tr>
<td>GDP dynamics</td>
<td>mostly negative</td>
</tr>
<tr>
<td>unemployment</td>
<td>dramatic rises, especially in Spain and Greece</td>
</tr>
<tr>
<td>inflation (GDP deflator)</td>
<td>slight adjustment or slight deterioration, significant adjustment only in Ireland</td>
</tr>
<tr>
<td>nominal unit labour costs</td>
<td>significant adjustment, no adjustment in Italy and Cyprus</td>
</tr>
<tr>
<td>real effective exchange rates</td>
<td>partial or no adjustment relative to Germany</td>
</tr>
</tbody>
</table>

*Source: based on the Eurostat data.*

**Migrations**

High unemployment rates in the eurozone troubled countries evidence not only the severity of their economic situation, but also, together with low German unemployment figures, suggest lacking geographic labor mobility between the eurozone member states. Yet labor mobility is one of the crucial factors determining whether a given currency area is „optimal“. According to Mundell [1961] high level of geographic labor mobility supports the functioning of fixed exchange rate systems.
Unfortunately empirical analyses show that geographic labor mobility in the eurozone is low [L’Angevin, 2007; Gáková, Dijkstra, 2008; Broyer et al. 2011; Bräuninger, Majowski, 2011]. Feldstein [2011] and Krugman [2012] consider low geographic labor mobility as one of the main problems of the eurozone in the context of its systemic crisis. Feldstein warned against the introduction of the common currency within the EU a few years prior to the euro inauguration highlighting low geographic labor mobility among European nations and vulnerability of the EU countries to asymmetric shocks [Feldstein, 1992].

Developments in net international migrations in Germany and the six troubled countries as a proxy for labor mobility are presented on Chart 13. The data were computed based on changes in population between the beginning of a given and the following year and life births and deaths in a given year. The chart shows that some of the troubled countries started to attract markedly more immigrants prior to the outbreak of the financial crisis. Net immigration in Ireland rose from 44 persons per 10 000 of population in 1998 to 158 in 2006. In Spain it rose from 40 in 1998 to 158 in 2002, then it fell to 138 in 2006 to rise again to 158 in 2007. In Italy it grew from 9 in 2001 to 107 in 2003, then fell to 52 in 2005 and rose to 84 in 2007. In Cyprus it grew from 57 in 2000 to 215 in 2004. Changes in Portugal were not so prominent, as net immigration rose there from 32 persons per 10 000 of population in 1998 to 68 in 2002 and then fell each consecutive year to reach 9 in 2008. Greece recorded virtually no changes as net immigration varied between 32 and 37 persons per 10 000 of population in 2001–2008. In Germany no dramatic changes were recorded, but it attracted less and less immigrants prior to the outbreak of the financial crisis (in 2001 net immigration there stood at 33 persons per 10 000 of population, whereas in 2008 Germany recorded net emigration at the level of 7 persons per 10 000 of population). After the outbreak of the financial crisis only Ireland and Portugal among the troubled countries recorded marked shifts into net emigration, which reached 66 persons per 10 000 of population in Ireland in 2009 and 57 in Portugal in 2010, whereas Spain and Greece recorded virtually no net migrations in 2011 (net emigration at 9 and 13 persons per 10 000 of population respectively). In 2010 Italy was still a country of net immigration (at 51 persons per 10 000 of population), whereas in Cyprus net immigration reached about 200 persons per 10 000 of population yearly in 2009–2011. After the outbreak of the financial crisis Germany turned again into net immigration (34 persons per 10 000 of population in 2011).

The data on net international migrations presented above suggest that only in Ireland and Portugal net emigration might have eased the situation on their labor markets to some extent after the outbreak of the financial crisis, whereas in Spain and Greece a vestigial net emigration could not have helped to alleviate the dire situation on their labor markets. Italy and Cyprus, despite rising unemployment, remained net immigration countries. Germany became the country of net immigration again after the outbreak of
the financial crisis suggesting that to some extent it might have contributed to alleviating the situation on the labor markets of the troubled countries, but apparently much too little when one looks at unemployment rates there.

The **Eurosystem and international financial assistance**

The Eurosystem contributes to a large extent to determining how the rebalancing of the troubled countries proceeds as it is responsible for the monetary policy in the eurozone. But it is argued that the Eurosystem in fact also conducts fiscal policy. According to Sinn and Wollmershäuser [2012] voluminous money creation and lending by the national central banks of the peripheral eurozone countries at the expense of money creation and lending in the core eurozone countries, which gave rise to the Target balances (i.e. claims and liabilities of the eurozone central banks versus the Eurosystem being a measure of accumulated surpluses and deficits in balances of payments of the eurozone countries with the rest of the eurozone) constituted fiscal support understood as transferring the control of real economic resources and was a public capital flow helping the crisis countries just like the capital provided through the official facilities to assist the eurozone countries in difficulties (e.g. EFSF). The pattern
of accumulation and scale of these imbalances is presented on Chart 14. According to the data compiled by the Ifo Institute the Target balances were generally limited in the first years of the euro and their marked growth started only in 2007 to reach the record values of 751,45 bn EUR worth of the Bundesbank claims and 434,43 and 286,56 bn EUR worth of liabilities of the Italian and Spanish central banks on September 31, 2012, while for the Irish central bank liabilities peaked at 144,55 bn EUR on December 31, 2010, for the Portuguese one at 73,53 bn EUR on March 31, 2012, for the Greek one at 107,33 bn EUR on November 30, 2012 and for the Cypriot one at 11,19 bn EUR on June 30, 2012.

Table 2 presents how significant was the support for the troubled countries provided by the ECB policies that made the Target balances rise. We can see there that the rise in Target claims was equal to 84% of the German current account surplus in the period 2009–2012, which can be interpreted as follows: 84% of the current account surplus in Germany was used as a credit support for the troubled countries via the Eurosystem to finance current account deficits and/or capital flight in the troubled countries. The table shows that the capital flight worth of 436% of the Irish current account surplus in 2009–2012 was financed thanks to the rise in the Irish Target liabilities. One can also
see there that the rise in Target liabilities allowed to finance 19% of the Cypriot current account deficit, 84% of the Greek one and 92% of the Portuguese one. In case of Spain and Italy one can interpret the situation presented as follows: in these countries the rise in Target liabilities allowed for the financing of the whole current account deficit and additionally capital flight equal to 103% of the current account deficit in Spain and 90% worth of current account deficit in Italy. The bottom row of the table shows the Target balances of the countries in relation to their GDP to illustrate the significance of the intra-Eurosystem support of the troubled economies. In fact the ECB policies that caused the rise in Target balances were the most significant mechanism of de facto fiscal support of the troubled countries after the outbreak of the financial crisis. This is illustrated in Table 3, which compares the Target balances and official international support (through bilateral loans, EFSF, EFSM, ESM and IMF) for the troubled countries. We can see there that for Ireland and Portugal the assistance provided through the ECB policies leading to the Target balances was more or less equal to official international assistance, the assistance to Spain and Cyprus was provided mainly through the ECB and in case of Italy only through the ECB. Only for Greece the assistance was provided mainly in the form of official international programs.

**TABLE 2. Comparison of Target balances with current account balances and GDP volumes in Germany, Ireland, Portugal, Spain, Italy, Greece and Cyprus**

<table>
<thead>
<tr>
<th>Country</th>
<th>Germany</th>
<th>Ireland</th>
<th>Portugal</th>
<th>Spain</th>
<th>Italy</th>
<th>Greece</th>
<th>Cyprus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Target balances in 2009–2012 (bn EUR)</td>
<td>540,0</td>
<td>-34,8</td>
<td>-47,1</td>
<td>-301,8</td>
<td>-274,9</td>
<td>-62,9</td>
<td>-1,0</td>
</tr>
<tr>
<td>Target balances at the end of 2012 (bn EUR)</td>
<td>655,7</td>
<td>-78,6</td>
<td>-65,0</td>
<td>-336,8</td>
<td>-251,5</td>
<td>-97,2</td>
<td>-7,4</td>
</tr>
<tr>
<td>Current account balances in 2009–2012 (bn EUR)</td>
<td>644,2</td>
<td>8,0</td>
<td>-51,2</td>
<td>-148,8</td>
<td>-144,7</td>
<td>-74,9</td>
<td>-5,3</td>
</tr>
<tr>
<td>GDP in 2012 (bn EUR)</td>
<td>2644,2</td>
<td>163,9</td>
<td>165,2</td>
<td>1049,5</td>
<td>1565,9</td>
<td>193,7</td>
<td>17,9</td>
</tr>
<tr>
<td>Change in Target balances in relation to current account balances in 2009–2012</td>
<td>84%</td>
<td>-436%</td>
<td>92%</td>
<td>203%</td>
<td>190%</td>
<td>84%</td>
<td>19%</td>
</tr>
<tr>
<td>Target balances at the end of 2012 in relation to GDP in 2012</td>
<td>25%</td>
<td>-48%</td>
<td>-39%</td>
<td>-32%</td>
<td>-16%</td>
<td>-50%</td>
<td>-41%</td>
</tr>
</tbody>
</table>

Source: based on the Eurostat data and the data compiled by the Ifo Institute.
TABLE 3. Target liabilities and official international assistance in Ireland, Portugal, Spain, Italy, Greece and Cyprus (bn EUR)

<table>
<thead>
<tr>
<th></th>
<th>Target liabilities*</th>
<th>Official international assistance**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>67</td>
<td>57 (EFSF, EFSM, IMF)</td>
</tr>
<tr>
<td>Portugal</td>
<td>62</td>
<td>66 (EFSF, EFSM, IMF)</td>
</tr>
<tr>
<td>Spain</td>
<td>281</td>
<td>41 (ESM)</td>
</tr>
<tr>
<td>Italy</td>
<td>199</td>
<td>—</td>
</tr>
<tr>
<td>Greece</td>
<td>64</td>
<td>215 (EA countries bilateral loans, EFSF, IMF)</td>
</tr>
<tr>
<td>Cyprus</td>
<td>8</td>
<td>3 (ESM, IMF)</td>
</tr>
</tbody>
</table>

* Data for Ireland, Portugal, Greece and Cyprus as of the end of May 2013, for Spain and Italy as of the end of July 2013.

** Data as of the beginning of August 2013.

Source: data of the Ifo Institute.

The financial assistance provided to the eurozone troubled economies in the form of Target credit and official assistance programs was substantial. This assistance alleviated the adjustment process in these countries, which explains to a large extent why the rebalancing proceeded as it is presented in the first part of the article. If the assistance had not been provided, the troubled countries would have experienced much more dramatic fall in their GDP and much higher unemployment. They would also have recorded stronger adjustment in their balances of payments, inflation, unit labor costs and real effective exchange rates. But political consequences of such an alternative variant of adjustment might have already caused the disintegration of the eurozone in line with the dramatic scenarios presented for instance by ING [2011] or UBS [2011].

Conclusions

The first part of the article has shown an ambiguous picture of adjustment in the six eurozone troubled countries. Some of the presented flow statistics, i.e. current account balances and private credit flows, seem to evidence that rebalancing has been largely achieved. Unfortunately when one looks at GDP dynamics and unemployment rates together with indicators of price developments (inflation, nominal unit labor costs, real effective exchange rates) rebalancing seems more Keynesian than classic in character. Other indicators presented in the first part of the article, i.e. general government balances and debts, private debts and net international investment positions evidence either no rebalancing or even deterioration. All in all the situation should be interpreted as follows: the rebalancing in the troubled countries was either at most limited or actually their economies continued to fall out of balance.
To make matters worse, migrations were either not much supportive for rebalancing of the troubled economies or they did not provide any dent to unemployment at all. If such a situation persists, the social consequences of the eurozone systemic crisis will be particularly painful thus increasing the probability of political changes putting at risk further participation of the troubled countries in the monetary union or even the existence of the eurozone itself.

Even though after the outbreak of the financial crisis Germany did not reduce its current account surplus, the troubled countries were provided with significant international assistance first of all from other eurozone member states, i.e. largely from Germany, and mainly in the form of the ECB policies causing the rise in Target balances. This assistance slowed down the rebalancing making the pain in the troubled countries less acute than it would otherwise have been without this assistance. But this assistance does not change the fact that these countries in the end have to go through painful price adjustment relative to the rest of the eurozone if they do not want to leave the monetary union. What is more, this assistance does not come without political risk and it cannot be prolonged forever. Voters in countries that are expected to foot the bill in some way (first of all Germany) may finally decide against the monetary union. We should not also expect voters in the troubled countries to consistently support the eurozone membership, especially when they perceive the euro as a source of economic hardship and associate it with foreign pressure on their countries.

For a few years the eurozone has been in the process of a deep institutional reform. Whether these efforts will be successful in a sense that the eurozone will not disintegrate and the troubled countries will eventually return to economic growth at full employment remains to be seen. But first they need to go through painful adjustment. Leaving the eurozone in turn bears the risk of dramatic economic slump together with political turmoil. One or the other way is not an optimistic scenario, especially in the short term. We should not expect the deep eurozone problems to be easily solved in a deus ex machina fashion. It seems that the troubled countries will not enter a period of economic prosperity any time soon. Rebalancing effort is still ahead of them, no matter if they chose to meet the challenge inside or outside the eurozone.

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Sources of statistical data

Eurostat
Ifo Institute

Abstract

The financial crisis of 2007 revealed structural weaknesses in many European countries, particularly in Southern Europe. The goal of this article is to identify the existing economic situation in the four main Southern European countries: Greece, Italy, Portugal, and Spain (GIPS), and in Poland, conduct a comparative analysis of the development paths and competitiveness levels of these countries using statistical data as well as existing scientific literature, and finally to formulate suggestions for a new development path of Poland. The results of the analysis suggest that Poland’s development is currently on a turning point, portraying many similarities to Southern European economies after their EU accession, as well as before the crisis. The authors come to a conclusion that unless Poland undertakes crucial reforms, particularly in the field of its innovation system, business environment, implementation of EU funds, and overall strategic long-term planning, it is inevitable that its economic growth will slow down, possibly falling into a middle-income trap. Poland might not avoid the same mistakes of GIPS, that failed to implement adequate reforms in times of economic growth, what today results in suffering from serious consequences. This paper presents a unique view on the future economic development of Poland in relation to the paths already undertaken by Southern European economies.

Key words: Economic development, Government policy, Competitiveness, Innovativeness
JEL: O20, O38, O43, O57, H00
Introduction

The financial and economic crisis of 2007 revealed significant vulnerabilities of many European economies, primarily those of Greece, Ireland, Italy, Spain and Portugal, indicating their substantial disparities with other European Union members. The case of Italy, Portugal, Spain, and Greece in particular, which for the remainder of this paper will be referred to using the acronym GIPS\textsuperscript{1}, demonstrates that countries that are most vulnerable to economic shocks are those exhibiting deeply embedded structural institutional weaknesses. The authors have chosen not to include Ireland in this analysis, as it does not share the same structural weaknesses and has experienced a different development model from the Southern European economies. What connects these countries with Poland, and allows for their further comparison, is the fact that they were latecomers to the European Union (with the exception for Italy). Greece, Portugal and Spain joined the European Community in the period of 1973–1986, while Poland in 2004. As a result it is possible to examine the consequences of their EU membership with regard to macroeconomic performance, the quality of institutions and the reaction of these countries to the recent financial crisis.

The aim of this paper is to compare the development paths undertaken by GIPS and Poland, their economic development, innovation level, competitiveness, institutional environment, as well as the effects of EU accession and recent financial crisis on their socio-economic situation. The authors argue that Poland, although more resilient to external shocks than GIPS, needs to reconsider its economic policy and development in terms of competitiveness of the economy and its innovation system in order to avoid the same mistakes of GIPS and ensure sustainable growth.

The following paper is divided into 6 parts. Section 2 presents an introduction to the topic from a theoretical perspective, while section 3 provides a description of the economic development of GIPS in the last 40 years and Poland in the past 20 years, as well as the influence of EU accession and the effects of the latest financial crisis on these countries. Section 4 consists of a comparative analysis of the international competitiveness, innovativeness, business environment, development and quality of institutions of Poland and GIPS. Section 5 presents a discussion on the results of the analysis as well as a proposal of a new model of development and socio-economic policy of Poland, taking into account lessons learned from Southern European economies. Finally, section 6 concludes with the summary of major findings.

Economic growth and middle-income trap

The key role of technology and innovation in long-term economic development has been recognized in the theory of economics since Joseph A. Schumpeter introduced
it in his 1911 revolutionary publication "Theory of Economic Development". More recent empirical studies have investigated the relationship between public and private investment in innovation and the international competitive position of countries. A positive connection has been identified, particularly in the case of highly developed economies. However, this is also true in the case of developing countries, which are trying to diminish the income gap and converge with their more developed counterparts.

Less developed countries tend to base their development model on the adoption and imitation of imported technology and focus their competitiveness on low labor costs. Such development model can be very effective initially in providing economic growth, however, it cannot be maintained in the long term. When an economy reaches a certain point of maturity, where labor costs have risen and no longer contribute to international competitiveness, the marginal return on capital investment falls and the costs of imitating and importing new technologies are much higher, then concerned country must focus its development strategy towards strengthening the innovation system. If a developing country fails to transform itself from a resource-driven economy into a productivity-driven and knowledge-based economy, it risks falling into a “middle-income trap”, with an economy facing declining competitiveness and dominated by low technology industries [World Bank, 2010].

The phenomenon of the “middle-income trap” has been receiving increased attention from scholars in recent years, particularly in the light of the financial crisis. There is no single precise definition of what it actually is, however, most researchers define the “middle-income trap” in terms of the characteristics that economies have to fulfill to be included in it. The middle-income can be measured by the level of GDP per capita (in PPP terms). A country risks falling into this category when it reaches 50–70% of GDP per capita (PPP) of a developed and highly competitive economy, typically the United States or a western European states, and then fails to further converge with it. Eichengreen et al. [2011], have analyzed the problem of the slowdown of economic growth in developing states. Their research indicates that, on average, the growth rate of economies slows down by at least 2% per cent when their per capita incomes reach 17,000 USD in 2005 constant prices, or 57% per cent of GDP per capita of a country that is an international leader in innovation and competitiveness.

Many countries in the Middle East and Latin America which have fallen into the middle-income trap, have been unable to attain a stable growth rate for many years and are considered to be among the least innovative nations. Examples of countries, which have broken this barrier, include South Korea, Israel or Finland [Felipe, 2012]. These countries have successfully transformed their economic development model and now are among the most innovative economies in the world. According to the World Bank [2010], the minimum conditions required to sustain economic growth and competitiveness that would allow a country to escape out of the middle-income barrier and enter into the high-income category are stable macroeconomic and regulatory
environment, along with sensible fiscal and monetary policies, high levels of investment in new technologies as well as an environment conducive to innovation and business development (particularly in terms of clearly defined property rights).

Currently Poland, as well as a number of other countries from Eastern and Central Europe, have entered into the middle-income category and have been observing a slowdown of the current and predicted long-term economic growth. The case of Italy, Greece, Portugal and Spain shows that the threat of experiencing a growth slowdown is present even among countries that are in the European Union – a community which has a strong innovation policy, structural funds for supporting development, as well as many other benefits.

**Thesis**

Despite a sound macroeconomic situation and greater resilience to external shocks, Poland shares many similarities with GIPS in its development path, what suggests that it needs to reconsider its economic policy, particularly in terms of international competitiveness, the business environment and the innovation system. This is necessary to ensure sustainable growth, avoid a slowdown in convergence with more developed economies, as well as to prevent Poland from falling into a middle-income trap.

**Economic development, EU accession and financial crisis in Southern European economies**

*GIPS* is an acronym referring to Greece, Italy, Portugal and Spain as countries representing similar economic environments and facing the possibility of a debt default. This is commonly seen as a result of the course of the economic policy and development strategy pursued by these countries since the time of their EU accession. Prior to the financial crisis, GDP growth in Southern Europe has been quite strong, originating primarily in the rapid expansion of private consumption and real estate investment. The only exception is Italy, which experienced a gradual slowdown of its growth levels since the economic boom of the 1960s. Prior to their membership in the European Union, the institutional framework of *GIPS* was relatively underdeveloped due to late industrialization, territorial dualism, as well as political instability. The inability of *GIPS* to modernize their economies at that time was strongly influenced by high levels of state intervention, poor governance, dominance of private interests, and a large share of the agricultural sector in the economy. Moreover, these countries experienced substantial immigration issues and suffered from excessive unemployment [Rangone, Solari, 2010].

Accession to the European Community introduced a long period of growth and convergence with more developed EU members. It granted certain stability to the existing
in institutional framework and economic systems as well as a new opportunity for trade and investment. GIPS became the recipients of significant subsidies from the EU, particularly towards the agricultural sector and infrastructure. In the late 1990s (1980s in the case of Italy), the ruling governments introduced reforms towards reducing budget deficits, lowering inflation and interest rates in order to be able to join the European Monetary Union (EMU). The liberalization of labour and financial markets, privatization as well as many other reforms were also undertaken, however, major challenges still remained, including the need for further structural reforms, reduction of unemployment and strengthening of international competitiveness.

Fiscal sustainability continues to be a key issue for policy makers within the EMU, particularly for the preservation of fiscal discipline and compliance with the Maastricht convergence criteria (government debt-to-GDP ratio must be under 60% and the budget deficit must not exceed 3% of GDP), which should be consequently monitored according to the Stability and Growth Pact. This rule, however, has often been broken and according to Eurostat [2012] in 2011 fourteen Member States had government debt ratios higher than 60% of their GDP. Among them we could find: Greece (170.6%), Italy (120.7%), Portugal (108.1%) and Ireland (106.4%) as is shown in Figure 1. In addition, in 2011 one of the largest government deficits in percentage of GDP were recorded in Ireland (-13.4%), Greece (-9.4%), and Spain (-9.4%).

**FIGURE 1. Budget deficit and government debt in selected EU countries in 2011**

![Budget deficit and government debt in selected EU countries in 2011](http://epp.eurostat.ec.europa.eu/)

With the development of the international financial crisis in 2007, fears of a Euro-zone disintegration appeared. The market for government bonds displayed substantial differences in the level of confidence in bond issues between distinct Member States, resulting in sharply differentiated state borrowing costs. Among the worst affected countries were GIPS, along with Ireland. In 2009, the poor fiscal condition of these countries resulted in the downgrading of their international credit ratings. Substantial public indebtedness and vulnerability to the financial shocks highlighted structural and competitiveness problems of GIPS. Apart from Italy and Portugal, whose GDP growth averaged only 1% in the period 2001–2008 [Eurostat, 2012], other Southern European countries were developing relatively fast before the crisis. As a result, their structural problems were not treated as a threat to their growth prospects [Verney, 2009]. Today, when the inherent structural deficiencies are no longer hidden behind the low cost of financing, these countries are faced with the task of substantial public finance consolidation. This is an extremely difficult problem, taking into consideration the ongoing recession, bloated public expenditures, widespread tax evasion, double digit unemployment, low international competitiveness (with no possibility of exchange rate devaluation), increasing costs of foreign borrowing, as well as growing reliance on external support. The consequences of such radical fiscal tightening can be severe, particularly in terms of worsening of the socio-economic situation of the populations, including higher unemployment and poverty levels, which can result in widespread protests and the destabilization of the political scene. Furthermore, GIPS will experience slow GDP growth in the short-term as their economies regain stabilities, international competitiveness and the confidence of foreign investors. If necessary reforms are fully implemented, in the long term, GIPS should benefit from higher GDP growth and a more stable macroeconomic environment, similarly to the experience of the transition economies of Central and Eastern Europe (CEE).

Economic development, EU accession and financial crisis in Poland

Poland is considered to be one of the most successful transition countries among all Central and Eastern European states. Taking into consideration the period from 1990 to 2009 Poland has, on average, experienced 3% GDP growth per year, significantly outperforming other countries, with the exception of Slovakia. Poland has also experienced the fastest economic convergence towards the old EU members. Its 18% gain, from 38% of the EU15 average development level (GDP per capita in PPP) in 1989 to 56% in 2010 was the largest in all transition economies [Rapacki, 2012].

Poland’s success as a transition economy can be primarily attributed to the “shock therapy” method of implementing economic reforms and to the ambition and
determination of the politicians responsible for them. The most crucial reforms were introduced within the first years after the collapse of the centrally-planned economy, which allowed the economy to enter a high growth trend (although it was preceded by a large initial fall in GDP in the years 1990 and 1991). Poland’s economic growth slowed down from 2000 – it no longer was the fastest growing CEE economy [Rapacki, 2012]. Nevertheless, in the years 2000–2011 Poland enjoyed the most stable growth, while its economy indicated surprising resilience during the financial crisis. Poland was the only country in the EU that did not experience a recession in 2009.

The potential for economic development has been further strengthened by Poland’s membership in the European Union. Prior to Poland’s accession in 2004 it had to implement many of the requirements of acquis communautaire (the total body of the European Union law), which required numerous reforms as well as the introduction of new standards and laws of more developed economies. This, along with the transition process of Poland and other Central and Eastern European countries, lies in contrast with the GIPS paths to EU membership, with already possessed fully functioning market economies, without dismantling the old institutions and without building compatible ones against them.

FIGURE 2. GDP per capita of selected EU countries (PPS in EUR) in relation to the EU-27 average (100%)

Poland has also strongly benefited from a huge inflow of structural funds, which have boosted the development of infrastructure and significantly improved the situation of the agricultural sector. Overall, Poland received over 67.3 billion EUR in funds for operational programs from the EU Structural and Cohesion Funds during the 2007–2013 EU budgetary period, and is said to receive 73 billion Euros in 2014–2020 (Ministry of Regional Development of Poland).

Similarly to GIPS, Poland and other CEE countries, as latecomers to the European Union, had significantly lower levels of development when compared with the old EU members such as Germany or France. The authors of this article have chosen GIPS as the basis for comparison with Poland not only because of their current economic situation, but also because they are closest to Poland in terms of economic development out of all the old EU members (see Figure 2). The basic measure of the standard of living and economic development is the GDP per capita (measured at PPS) or national income per capita.

**International competitiveness, business environment and innovation level of Poland in relation to GIPS**

Despite Poland's success as a transition economy, EU membership, and its solid GDP growth in recent years, it will become increasingly difficult for it to retain sustainable growth levels in the long term. Poland was able to achieve positive economic performance during the 2007–2009 financial crisis as a result of a combination of factors, including structural advantages, large inflow of EU funds, astute economic policies and an industry structure dominated by low- and medium-tech manufacturing. In addition, Poland benefited from a flexible exchange rate, which improved its international competitiveness and supported strong exports, particularly to its key partners, including Germany [World Bank, 2012]. The same factors, which helped Poland to go through the crisis relatively unscathed, do not guarantee strong growth in the future when the global economy recovers. The existing economic development model is beginning to run its course, potentially pushing Poland into a “development stall” [Geodecki, et al., 2012]. The continuation of the current economic policy, characterized by a lack of decisiveness in implementing long-term development reforms, particularly in terms of the business environment, public finance, labor market, education and innovation system, as well as the strategic coordination of EU structural funds absorption, can push Poland towards a development path similar to those of Portugal, Italy, Greece and Spain. Although Poland currently enjoys a more favorable macroeconomic environment, including a higher GDP growth rate, lower unemployment, as well as a significantly lower public debt ratio (Table 1), its long-term economic growth and situation will be dependent on the political decisions undertaken in the near future.
TABLE 1. Economic indicators of selected countries

<table>
<thead>
<tr>
<th>Country / indicator</th>
<th>Poland</th>
<th>Portugal</th>
<th>Italy</th>
<th>Greece</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth rate (2012)</td>
<td>1.9</td>
<td>-3.2</td>
<td>-2.4</td>
<td>-6.4</td>
<td>-1.4</td>
</tr>
<tr>
<td>GDP per capita (in PPS) – EU average =100 (2011)</td>
<td>64</td>
<td>77</td>
<td>100</td>
<td>79</td>
<td>98</td>
</tr>
<tr>
<td>Unemployment rate (2012)</td>
<td>10.1</td>
<td>15.9</td>
<td>10.7</td>
<td>24.3</td>
<td>25.0</td>
</tr>
<tr>
<td>Employment rate 15–64 (2012)</td>
<td>64.7</td>
<td>66.5</td>
<td>61.0</td>
<td>55.3</td>
<td>59.3</td>
</tr>
<tr>
<td>Inflation rate CPI (2012)</td>
<td>3.7</td>
<td>2.8</td>
<td>3.3</td>
<td>1.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Budget deficit / %GDP (2012)</td>
<td>-3.9</td>
<td>-6.4</td>
<td>-3.0</td>
<td>-10.0</td>
<td>-10.6</td>
</tr>
<tr>
<td>Public debt / %GDP (2012)</td>
<td>55.6</td>
<td>123.6</td>
<td>127.0</td>
<td>156.9</td>
<td>84.2</td>
</tr>
</tbody>
</table>


International competitiveness, economic environment and quality of institutions

The Global Competitiveness Report 2011–2012 prepared by the World Economic Forum ranks Poland as 41st out of 142 countries (Table 2), which is a small drop against previous 2010–2011 ranking, where Poland was ranked at 39th place. This is a similar position to that of the other analyzed countries, particularly Spain (36), Italy (43) and Portugal (45), however, Poland rank was much higher than of Greece (90) one, which is not surprising taking into consideration this country’s current macroeconomic situation.

The Report finds that the biggest obstacle for business development can be found in the quality of institutions, infrastructure, macroeconomic environment, labor market efficiency, business sophistication and innovation. These categories will serve as the base for comparison of the situation in Poland with the chosen countries.

The level of regulation and state involvement in the economy can have a significant effect on the competitiveness of a country. The quality of institutions, laws and regulations, as well as the level of tax burden influence the business environment and economic activity of the society. Poland has been relatively unsuccessful in creating a business friendly environment. According to the 2013 Doing Business, a report prepared by the World Bank, which analyzes the overall environment to conduct economic activity, Poland is ranked on the 55th place, much lower in comparison to other EU countries, however, it has made impressive gains (top performer in implementing reforms according to the report) since the previous 2012 ranking, where it occupied the 62nd place. In comparison to the countries under analysis in this article, Poland fared better than Italy (73) and Greece (78), however was ranked lower than Portugal (30) and Spain (44).

According to the 2012 McKinsey Report, the underlying problems of the Greek economy resulting in low levels of competitiveness, can be found primarily in the structure of the economy, which hinders investment and business activity, a large and
TABLE 2. Global Competitiveness Report 2011–2012 ranking of selected countries

<table>
<thead>
<tr>
<th></th>
<th>Rank / score (1–6)</th>
<th>Poland</th>
<th>Portugal</th>
<th>Italy</th>
<th>Greece</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCI</td>
<td>41 / 4.5</td>
<td>45/4.4</td>
<td>43 / 4.4</td>
<td>90 / 3.9</td>
<td>36 / 4.5</td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td>52 / 4.2</td>
<td>51/4.2</td>
<td>88 / 3.6</td>
<td>96 / 3.5</td>
<td>49 / 4.3</td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>74 / 3.9</td>
<td>23/5.5</td>
<td>32 / 5.0</td>
<td>45 / 4.5</td>
<td>12 / 5.8</td>
<td></td>
</tr>
<tr>
<td>Macroeconomic environment</td>
<td>74 / 4.7</td>
<td>111/4.2</td>
<td>92 / 4.5</td>
<td>140 / 3.3</td>
<td>84 / 4.6</td>
<td></td>
</tr>
<tr>
<td>Health and primary education</td>
<td>40 / 6.1</td>
<td>34/6.1</td>
<td>20 / 6.3</td>
<td>37 / 6.1</td>
<td>44 / 6.0</td>
<td></td>
</tr>
<tr>
<td>Higher education and training</td>
<td>31 / 4.9</td>
<td>35/4.8</td>
<td>41 / 4.7</td>
<td>46 / 4.7</td>
<td>32 / 4.9</td>
<td></td>
</tr>
<tr>
<td>Goods market efficiency</td>
<td>52 / 4.4</td>
<td>62/4.3</td>
<td>59 / 4.3</td>
<td>107 / 3.9</td>
<td>66 / 4.2</td>
<td></td>
</tr>
<tr>
<td>Labor market efficiency</td>
<td>58 / 4.5</td>
<td>122/3.8</td>
<td>123 / 3.8</td>
<td>126 / 3.6</td>
<td>119 / 3.8</td>
<td></td>
</tr>
<tr>
<td>Financial market development</td>
<td>34 / 4.6</td>
<td>78/4.0</td>
<td>97 / 3.7</td>
<td>110 / 3.5</td>
<td>64 / 41</td>
<td></td>
</tr>
<tr>
<td>Technological readiness</td>
<td>48 / 4.2</td>
<td>19/5.3</td>
<td>42 / 4.3</td>
<td>47 / 4.2</td>
<td>28 / 4.9</td>
<td></td>
</tr>
<tr>
<td>Market size</td>
<td>20 / 5.1</td>
<td>45/4.3</td>
<td>9 / 5.6</td>
<td>42 / 4.4</td>
<td>13 / 5.4</td>
<td></td>
</tr>
<tr>
<td>Business sophistication</td>
<td>60 / 4.1</td>
<td>50/4.2</td>
<td>26 / 4.8</td>
<td>77 / 3.8</td>
<td>34 / 4.5</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>58 / 3.2</td>
<td>32/3.8</td>
<td>43 / 3.5</td>
<td>88 / 3.0</td>
<td>39 / 3.6</td>
<td></td>
</tr>
</tbody>
</table>


inefficient public sector, low flexibility of the labor market, a cumbersome legal and judicial system as well as a high level of the informal economy. These productivity and competitiveness issues are shared by most Southern European economies, particularly in Italy, and to a lesser extent in Spain and Portugal. Poland’s economy is burdened by the same problems, while its level is closer to that of Greece and Italy than to Spain.

The above mentioned issues significantly influence economic activity and business development. A high share of small and micro enterprises in the economy (Table 3) is a trait that is shared by all countries under analysis. Small and often family-owned businesses, particularly in the manufacturing sector, are associated with lower levels of productivity and innovative performance in comparison to large enterprises that benefit from economies of scale, specialization, ability to attract the most talented employees and allocate larger funds into international expansion as well as in innovation development.

The lack of large businesses, low levels of investment as well as slow development and growth of small enterprises is strongly influenced by high levels of red tape, complicated tax laws, and overregulation of labor and product markets [PARP, 2012]. Labor market regulations and flexibility are a crucial parts of the economic environment. Overly-strict regulations can hinder the adjustment capacity of firms, reduce worker mobility, decrease workforce participation rate and ultimately increase the unemployment of some groups of workers, particularly among the youth [Bassanini, et al., 2009].
According to the OECD Employment Protection Legislation (EPL) index, which shows the ease of the hiring and/or firing conditions in a given country, Poland and GIPS are among the countries with the highest labor market regulations (see Figure 3).

**TABLE 3. Enterprise size class of non-financial business by country, 2009***

<table>
<thead>
<tr>
<th>Enterprise size</th>
<th>Poland</th>
<th>Portugal</th>
<th>Italy</th>
<th>Spain</th>
<th>Germ.</th>
<th>UK</th>
<th>EU27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro (&lt;10 employed)</td>
<td>95,4</td>
<td>94,1</td>
<td>94,5</td>
<td>93,8</td>
<td>82,8</td>
<td>89,2</td>
<td>92,0</td>
</tr>
<tr>
<td>Small (10–49 employed)</td>
<td>3,3</td>
<td>5,0</td>
<td>4,9</td>
<td>5,4</td>
<td>14,1</td>
<td>8,9</td>
<td>6,3</td>
</tr>
<tr>
<td>Medium (50–249 employed)</td>
<td>1,1</td>
<td>0,7</td>
<td>0,5</td>
<td>0,7</td>
<td>2,6</td>
<td>1,6</td>
<td>1,1</td>
</tr>
<tr>
<td>Large (&gt;250 employed)</td>
<td>0,3</td>
<td>0,1</td>
<td>0,1</td>
<td>0,1</td>
<td>0,5</td>
<td>0,4</td>
<td>0,2</td>
</tr>
</tbody>
</table>

*No data for Greece available; Data represents the share in total number of enterprises in the economy.


**FIGURE 3. Employment Protection Legislation (EPL) index* in selected OECD and non-OECD countries in 2008**

*Scale from 0 (least restrictions) to 6 (most restrictions).

Product market regulation is equally a crucial part of the business environment, as it concerns laws and regulations that can affect competition in the economy, including barriers to entrepreneurship, trade and investment in the form of entry barriers, restrictions concerning inputs, supply or pricing among others. This in turn can have a strong influence on the allocation of resources and factors of production. More competitive markets will allocate capital and labor more efficiently what leads to higher productivity of existing companies. Additionally, a highly regulated economy will deter foreign direct investment [Schiantarelli, 2008]. Poland along with Greece display very high levels of product market regulation (see Figure 4), while Spain is on a level similar to the more developed and competitive economies.

**FIGURE 4. Overall product market regulation index in selected OECD countries**

*higher score = higher regulation.*


Heavier regulation of the labor market is associated with a larger informal economy, lower labor force participation, and higher unemployment, particularly because it has a major effect on employers’ costs and workers’ incentives [Botero, et. al, 2004]. The size of the shadow economy can have significant effects on the competitiveness of a nation. Greece, Poland and Italy have one of the largest shadow economies in Europe (ranging from 29%–27% of GDP), followed by Spain and Portugal with an informal economy of about 23% of GDP [Andrews, et al., 2011]. An informal economy
includes illegal activities as well as unreported income from the production of goods and services. This can have wide-ranging negative consequences for the economy and society, including lack of social protection or insurance for workers, erosion of tax revenues, as well as unreliable official statistics, which can become an obstacle to the development of proper government programs, policies and decisions [Schneider, Enste, 2002].

Informal economies tend to be smaller in countries where government institutions are strong and efficient, and bigger in countries with poor quality of governance or a large and inefficient public sector. This is also connected with strong negative attitudes of the society towards the government and public institutions [Aghion, et al., 2009. A general distrust of public institutions among the society and business community is a common theme among Southern European economies. Poland has a similar distrust of institutions, however its roots can be found in the previous political regime (strong government intervention in the centrally planned economies).

Another typical characteristic of Southern European countries is government inefficiency and political polarization [Kickert, 2011]. This means that they lack the political stability necessary to carry out structural reforms effectively. In Poland, with its fairly young democracy, the political scene is still undergoing significant changes, with new political parties appearing and disappearing. A similar political instability observable in Southern European countries, results in the inability to introduce structural reforms effectively and implement long-term development strategies.

**National Innovation System**

Poland has made the smallest progress in terms of creating an efficient National Innovation System (NIS)² that fosters high innovation levels of the business and science sector, often considered as a key factor of economic growth in developed countries, and an equally important one for developing economies on the path of escaping the middle-income trap. The 2012 Innovation Union Scoreboard by the European Commission has placed Poland on a distant 23rd place (out of 27 EU countries) in terms of the level of innovativeness. Poland, along with Slovakia are at the lower end of the group considered by the European Commission to be “moderate innovators”, which means that they are below the EU-27 average. Greece (20), Spain (18), Portugal (16) and Italy (15) are also considered to be “moderate innovators”, albeit they are in the higher end of this group.

An important element of the National Innovation System is the amount of capital dedicated by all actors in the system to Research and Development (R&D). Poland is behind its regional counterparts in terms of innovation expenditures, and at a similar level to the less developed Central and Eastern European states. Poland’s Gross Expenditure on Research and Development (GERD) in relation to its GDP was only 0.74% in 2010, one of the lowest figures in Europe (Figure 5).
In comparison, the EU average was 2%, while Greece spent 0.6% of its GDP, Italy 1.26%, Spain 1.39% and Portugal 1.59% (OECD database, 2012). This is also almost 3 times less than the top performing countries (considered to be top innovators), which devote around 3 percent of their GDP to R&D expenditures annually.

Most of the expenditures on R&D in Poland come from outside the private sector, as the government is responsible for almost 61% of these expenditures. In 2009 the Business Expenditures on R&D (BERD) in Poland were equal to 0.2% of GDP, while the average in the EU was over 1.23% of GDP, and 54% of total GERD [Eurostat database, 2012]. The private sector is much more effective in implementing the results of R&D into the economy than are academic institutions or the public sector in general. Long term economic growth and competitiveness cannot be built without the substantial participation of the private sector in R&D and innovation.

In highly innovative countries R&D makes up more than 70% of investment in innovation development, as opposed to the purchase of existing and complete technology. In Poland the situation is dramatically different as companies decide to acquire technology and solutions almost entirely from the market without making effort to develop innovation through own R&D. This is a strong indicator that companies in Poland continue to be “market followers” instead of “market leaders” when it comes to introduction of new and innovative products. Technology absorption through acquisition of equipment, machinery and software crowds out innovative R&D and represents a major part of innovation spending (87 percent), while expenditures on the acquisition of knowledge as well as internal and external R&D amounts to only 13 percent of innovation spending of Polish enterprises [World Bank, 2012].
Apart from that, low overall expenses and a high participation of the public sector in R&D activities (low relation of BERD to GERD) have a strong influence on the patent activity and patents quality in Poland. Poland lags behind other European countries with a significantly lower fraction of patents registered in foreign patent offices, with more than 90% being registered in the Polish Patent Office [WIPO Statistical Database, 2011]. In the Southern European countries this figures ranges between 60% (Spain) and 80% (Greece). This might suggest that the major of the patents granted by the PPO are of low quality and of little or no economic value (the intellectual property is not worth the high costs of protecting abroad). In comparison, the relation between patents registered at home as opposed to abroad is entirely opposite in countries that are widely considered to be among the most innovative and competitive in the world, such as Israel (less than 10%), Sweden or Finland (less than 15%).

The inefficiency of the NIS is further enhanced by the relatively low cooperation level between scientific institutions and the business sector. As a result, the knowledge produced by scientific institutions is less suited for practical implementation in the economy, both in terms of the qualifications of the graduates who enter the labor market, as well as the quality and usability of research results.

According to the World Bank [2012] public spending on innovation in Poland is allocated relatively inefficiently. Most of the public support is assigned to low and medium technology sectors of the economy (trade, transport or construction) and much less towards high-tech industries. These funds also go towards innovative projects that are already in advanced stages of development, while few resources are allocated where they are most needed – into projects that are in their early stages of development. The institutional infrastructure supporting innovation is fragmented, with the responsibilities for strategic planning, financial coordination and implementation distributed unevenly among different agencies or ministries. Fragmentation makes it hard for proper strategic planning, raising administrative costs and duplicating responsibilities.

**EU structural funds and the common currency**

Poland’s membership in the EU gives it a unique chance to boost its social and economic development as well as convergence with the economies of more advanced EU members. Unfortunately, similarly to Southern European economies, Poland focuses primarily on fast absorption of EU funds, which boosts the economy in the short-run, but stands in opposition to their strategic implementation that could have an actual and permanent influence on the economy. Currently, most of the EU funds are granted through the selection of short term projects that display lower risk and have low budgets, while ambitious long-term projects that would actually have an enduring influence on the society and economy are rarely implemented [World Bank, 2012]. The lack of policy coordination with a long-term development strategy in Poland and focus on fast absorption of EU funds makes it implausible that this will change in the near future.
Poland is currently facing a significant dilemma concerning its obligation to adopt the common currency of the EU. Prior to the financial crisis the Polish government was set to adopt the euro as soon as possible. The crisis, however, has shown the problems that the common currency entails. The appreciation of the euro and the inability to control monetary policy has decreased the competitiveness of many countries in the euro zone. Poland was able to maintain GDP growth throughout the crisis partially as result of the depreciation of its currency. However, there is a greater hidden danger associated with adoption of the common currency, as was the case of Greece (as the most prominent example), but also to some extent Spain and Portugal. The common currency has granted easy and cheap access to capital which led to a significant consumption and construction boom, resulting primarily in a high level of public and household debt, and to a much lesser extent development of competitive export-led industries and innovation. This is an important lesson to be analyzed for Poland both in terms of absorption of EU funds as well as adoption of the common currency. As Poland’s economy converges with the EU average in terms of its level of development, the amount of funds transferred will decrease and go towards less developed EU regions. This is why Poland must not only make more effective use of EU funds, but also search for more reliable and independent sources of growth and development.

**Society and demography**

A significant threat, which looms over Poland as well as many other European countries, is the trend in demography. Poland’s population is predicted to decrease to 32 mln in 2060, and along with it, the number of people in working age. As a result it will become increasingly difficult for Poland to achieve a sustainable economic growth to support the imbalances in the pension system. The old-age dependency ratio (ratio between the total number of people age 65 and over and the number of those aged 15–64), although still relatively positive in comparison to other EU countries (in 2011 this ratio was 19 %), will significantly increase in the next decades [Eurostat database, 2012. In the table below we can see that Poland has the lowest ratio, however according to Eurostat predictions, by 2060 the old-age dependency ratio in Poland will reach almost 65%, much higher than in the analyzed countries (Table 4).

**TABLE 4. Old-age dependency ratio in selected countries**

<table>
<thead>
<tr>
<th></th>
<th>Poland</th>
<th>Portugal</th>
<th>Italy</th>
<th>Greece</th>
<th>Spain</th>
<th>EU 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio 2010</td>
<td>18,9</td>
<td>26,7</td>
<td>30,8</td>
<td>28,4</td>
<td>24,7</td>
<td>25,9</td>
</tr>
<tr>
<td>Projected ratio 2060</td>
<td>64,6</td>
<td>57,2</td>
<td>56,6</td>
<td>56,6</td>
<td>56,4</td>
<td>52,5</td>
</tr>
</tbody>
</table>

The negative demographic trends could be partially offset by increased immigration, which currently is considered a problem for many Southern European countries. Unfortunately, it is unlikely that Poland will benefit from it, since it is not a popular destination for immigrants. Additionally, little effort has been made by politicians to transform public policies and attract young and talented workers from other countries to fill in the future gap in the ageing workforce. Unlike Poland, Spain, Italy and Greece, which are countries neighboring poor Mediterranean states, are currently suffering from too much immigration.

**New economic development model for Poland – discussion**

Poland’s membership in the EU was a significant boost to its economic development and created a unique chance of rapid convergence with more developed states (Table 1). Poland’s competitiveness on the international market has increased due to substantial improvements in the overall macroeconomic situation (Table 2), despite the relatively poor performance in various innovation rankings (Table 2, Figure 5). Whether further high growth rates and convergence will occur, will depend on the ability of policymakers to transform Poland’s economic development model into the one that is best suited for the challenges of the modern global economy.

We can summarize the discussion of the economic development of Poland in the analysis of its strengths, weaknesses, opportunities and threats (SWOT), which are shown in Table 5.

It is evident that Poland is currently faced with weaknesses and threats to its economic development similar to those encountered by Southern European countries prior to the crisis. Their current poor economic condition stems from the introduction of inadequate economic reforms and development policies after their accession to the European Union. As described in the previous section of the paper, it could be observed that from the 1980s Southern European countries followed an expansionary fiscal policy, which led to a substantial rise in budget deficits and government spending. Greece and Spain displayed some of the largest government deficits as a percentage of GDP in the European Union, while the debt ratios of Greece, Italy and Portugal exceeded 100% of their GDP (Figure 1). Furthermore, the majority of funds received from the European Union were not used with the aim to promote investment, but consumption. In the short run, such strategies increase economic growth and social well-being, however in the long run, they do not promote private investment and do not create an environment sustainable for long-term economic growth. Such policies, along with the disproportionate role of the public sector in the economy, policies protecting domestic production and hindering competition as well as discouraging foreign direct investment were demonstrated by the analyzed Southern European states and their consequences are visible currently in their difficult socio-economic situation [Rapacki, 2012].
### TABLE 5. SWOT Analysis – Poland’s Economic Development

<table>
<thead>
<tr>
<th></th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Internal</td>
<td>Significant improvement in quality of institutions and governance</td>
<td>Large development gap with EU average</td>
</tr>
<tr>
<td></td>
<td>Stable economic growth</td>
<td>Relatively poor business environment</td>
</tr>
<tr>
<td></td>
<td>Fast convergence with EU GDP per capita average</td>
<td>Low innovation levels</td>
</tr>
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<td></td>
<td>Resistance to external shocks</td>
<td>High levels of public deficit</td>
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<td></td>
<td>Availability of qualified workforce (human capital)</td>
<td>High unemployment rate</td>
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<td></td>
<td>Low labor costs</td>
<td>Lack of large competitive enterprises</td>
</tr>
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<td></td>
<td>Price competitiveness</td>
<td>Low business – science cooperation</td>
</tr>
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<td></td>
<td>Strong exports</td>
<td>Low share of high-tech manufacturing and services in the economy</td>
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<tr>
<td></td>
<td>High FDI attractiveness</td>
<td>Excessive role of public sector</td>
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<td></td>
<td></td>
<td>Low quality of governance and policy implementation</td>
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<td></td>
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<td>Low levels of social trust towards public administration</td>
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<td></td>
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<td>Low efficiency of EU funds investment</td>
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<tr>
<td>Opportunities</td>
<td>UE cohesion funds</td>
<td>Slow pace of structural reforms</td>
</tr>
<tr>
<td></td>
<td>Adoption of common currency</td>
<td>Declining price competitiveness</td>
</tr>
<tr>
<td></td>
<td>Large infrastructural investments</td>
<td>Ageing and falling population</td>
</tr>
<tr>
<td></td>
<td>Market growth potential</td>
<td>Brain-drain and low immigration</td>
</tr>
<tr>
<td></td>
<td>Increase in employment level</td>
<td>Persistence of high unemployment</td>
</tr>
<tr>
<td></td>
<td>Improvement of business environment</td>
<td>Reversal of reforms of pension system</td>
</tr>
<tr>
<td></td>
<td>FDI</td>
<td>Poor coordination of long-term development strategy and policies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slowdown of GDP growth rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possibility of middle-income trap</td>
</tr>
</tbody>
</table>

**Source:** Own preparation

Poland should not only avoid following the path of GIPS, but also take necessary preemptive actions and implement a “policy mix” to improve its institutional infrastructure, business environment, international competitiveness and macroeconomic situation to ensure sustainable long-term growth. So far, there has been very little debate among politicians on what should be done to confront such long-term dangers to the proper development of the economy and society. Reforms have been undertaken primarily in times of crisis and when absolutely necessary, while not in times of economic growth and prosperity when they would be much easier implemented. The disruption of the natural need of reforms is enhanced by the feeling of prosperity and potential for future growth resulting from access to large amounts of EU funds as well as low costs of public and private borrowing in countries that adopted the common currency. Even when undertaken during calmer periods in the economy, such changes in laws and regulations
are usually loosely connected, implemented on a need basis, without a strategy of follow-up reforms and analysis of how they will influence the economy in the long term. True reforms that will influence entire sectors of the economy require a change in the anticipation of future problems, not just in terms of their implementation, but also a change in the whole business environment and economic thinking of the society. Continuous public discussion on major development and economic issues is necessary to maintain pressure on the government, which often limits itself to short-term plans and promises of political parties. To assist in asserting such constant pressure, mature democracies have developed various institutions such as think-tanks responsible for analysing, designing and supporting long-term development strategies. Poland has a few prominent think-tanks, however their number and influence is still insufficient to have an impact on decision-makers. Poland lacks a central institution for strategic studies, which would operate by the side of politicians and be responsible for research, consulting and preparing strategies. Although the Polish government has been recently active in introducing reforms, such as the increase of retirement age, deregulation of certain professions, or reducing administrative barriers in doing business, without a strategic long-term reform program and commitment to its implementation it will be difficult for Poland to enter a new development path that will allow it to improve its international competitiveness and continue to converge with the more developed EU countries.

The fulfillment of this goal requires further sophistication of the economy, with urgent attention in the field of innovation and R&D, where Poland has the largest shortcomings. From the experience of more innovative countries (Figure 5), the Polish government should increase expenditures on innovation to comparable levels. However, simple imitation of policies fostering innovation used by highly developed economies, where many innovative enterprises already exist, might not yield similar results in less developed economies. Poland should adopt a pro-innovation policy mix, which would strengthen the research sector and its linkages with the industry. The key is in the creation of a proper business environment that will foster the development of intellectual property, the transfer of applied knowledge from the science sector to companies, development of small business and start-ups as well as large innovative enterprises (often called the “national champions”) that will be able to successfully compete on the global market (and become “international champions” or simply trans-national corporations). Similarly, emphasis should be placed on increasing the share of higher value added manufacturing and services in the economy. Incentives should be made to allow companies to break from the dominating business models based on technological imitation (where the greatest focus is on the purchase of existing solutions and technologies) or based on providing cheap labour and simple services to foreign companies. Focus should be placed on key technologies with a chance to achieve a distinct competitive advantage. Polish companies must be prepared to face increasing international competition, while greater effort should be made to make Poland more attractive for FDI, particularly the R&D intensive type.
Poland is set to receive record high Structural and Cohesion Funds during the 2014–2020 EU budgetary periods. The inflow of EU funds has been a significant motor of growth for Poland since its accession to the European Community in 2004, so taking into consideration the issues described in the previous section of the paper, it is crucial that Poland makes more effective use of these funds, allocating them into ambitious long-term projects, as opposed to low-risk and low-budget projects. The allocation of these funds should be well coordinated with the long-term development strategy of the government.

Integral reforms are required to boost entrepreneurship and creativity of the Polish society in general. This not only includes changes in the regulatory environment and administrative procedures, but also reforms in the area of the education system and the public research sector. The academic and business community must change its attitude toward intellectual property protection, commercialization of research results as well as cooperation between universities and private companies. Necessary steps must be undertaken as soon as possible, taking into consideration that such changes in attitudes cannot be quickly dictated from above, but rather, developed slowly over time.

Without a change in the thinking and attitudes of politicians, science and business communities, as well as the society in general, the implementation of a new development model will be difficult to attain. Each day that passes brings new challenges, while demographic and social changes become permanent. It will become increasingly difficult to implement structural reforms that are necessary to transform Polish economy into a modern, innovative and sophisticated one.

**Conclusion**

The purpose of this article was to identify the existing economic situation in the four main Southern European countries: Greece, Italy, Portugal, and Spain (GIPS), as well as Poland, conduct a comparative analysis of their development paths and competitiveness levels using statistical data and existing scientific literature, as well as to formulate suggestions for a new development path of Poland.

The results of the analysis suggest that Poland’s development is currently on a turning point, portraying many similarities to Southern European economies after their EU accession and before the crisis. During the past two decades Poland has experienced impressive economic development as a result of the transformation process as well as accession to the European Union. It has made remarkable progress in terms of introducing capitalism and converging with more developed European states, not only in terms of national income, but also in terms of governance, economic freedom, institutional quality and the overall business environment.
These changes, as well as the present economic structure, have allowed Poland to withstand the global financial crisis better than most countries. Nevertheless, Poland will not be able to sustain its economic growth and remain competitive on the international market without a new model of development, one that will allow it to change its strategy from merely “catching up” to one that allows it to go beyond, addressing the main issues of competitiveness and innovativeness. Poland shares many similarities with Portugal, Italy, Greece, and Spain, however, it still has the potential to alter its course of development without making the same structural mistakes as these countries, and avoid falling into a middle-income trap.

Notes

1 The acronym PIGS has become more popular in describing these countries, particularly in the media, however, it is also viewed as offensive and controversial. The authors of this article have chosen to use its less offensive version – GIPS.

2 The National Innovation System (NIS) is a macroeconomic perspective on the development of innovation in the economy with the focus on linkages between the actors engaged in this process. According to Metcalfe (1995, pp. 462–463) NIS is a "set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provide the framework within which governments form and implement policies to influence the innovation process".

3 For example: Forum Obywatelskiego Rozwoju, Centrum Adam Smitha, Centrum Analiz Społeczno-Ekonomicznych, or Polski Instytut Spraw Międzynarodowych.

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Copper in Chile – when the resource “curse” becomes a blessing

Abstract

The article aims at explaining how a small opened economy can effectively deal with a resource abundance problem. The thesis of the essay is a statement that Chile has been able to cope with the resource “curse” by developing proper institutions and diversifying the structure of its foreign trade. To verify the thesis, a literature review of theoretical recommendations how to utilize resource revenues without harming economy, as well as analyses of chosen macroeconomic variables were conducted. The possible solutions on how to deal with resource abundance problem are following: investing resource revenues outside of the economy, implementing fiscal rules that will stabilize budget revenues and prevent inflation from rising, and diversifying export in terms of product and geographical structure. Consequently, these solutions have been introduced in Chile, the world leading producer of copper, several years ago and proved to be very successful. Chile enjoys stable resource revenues despite the business cycle and performance of the copper market, while its real effective rate and export competitiveness has not been eroded. This paper presents, according to author’s knowledge, the first detailed case study analysis of the country from Latin America, that has been successfully dealing with the resource abundance problem over several decades.

Key words: Dutch disease, resource abundance, resource revenues, Chile

JEL: E2, E3, E6, F4, G1, H6, O1
Introduction

Resource-richness is sometimes treated as a “blessing” for an economy. Advocates of this thesis argue that such a country has a competitive cost advantage. The commodities are simply extracted and sold, which may not require substantial outlays beyond infrastructure. Funds from their sales can be utilized to boost the standard of living by providing financial resources to develop (or modernize) infrastructure or improving the access to public services (education, social security etc.). Moreover, resource revenues “are not subject to the conditions that donors and lenders oft en impose on recipient countries” [Daban, Helis, 2010, p. 8]. That is why information about (potentially) big resource deposits is usually welcomed with enormous enthusiasm (e.g. shelf gas discovery in Poland or oil in the United Kingdom).

Despite the described above advantages, a long-term dependency on natural resource exports may be the source of numerous problems for a resource-rich countries. Labor force reallocation (in favor of resource extracting sector), real exchange rate appreciation, and fluctuations in government revenues, to name the few. That is why resource-richness is often called “curse”. It is worth stressing, that not all the countries that possess big deposits are deemed to have this problem, some of them cope with it successfully. Chile, the largest world copper producer, may perhaps be numbered among them.

This article has two aims. Firstly, to show in what ways resource-richness can adversely influence economy and what are the recommended solutions to such “curse”. Secondly, to discuss the Chilean approach to this problem. The main thesis of this work is that Chile is dealing effectively with resource-richness problems by developing appropriate institutional framework and diversifying its export structure and main trade partners. In order to verify it literature studies and analyses of chosen macroeconomic variables were conducted.

The resource “curse”

Some elements of this notion have been mentioned in the introduction, but they need to be discussed in more detail. The most widely discussed concept in the literature associated with the resource “curse” is so called “Dutch disease”. The term coined by “The Economist” [1977] describes several economic problems which appeared in the Netherlands in the 1960s after the discovery and exploitation of natural gas deposits.

The formal model describing the source and consequences of the disease was created by Corden and Near [1982]. They assumed a small open economy with three sectors: services and two traded goods sectors. The first traded goods sector is based on an extraction of natural resources, prices of which are rising quickly (booming sector). The second traded goods sector is manufacturing or agriculture (lagging sector).
When the country becomes dependent on exporting resources, whose prices are increasing, two effects are observed. Firstly, greater profits generated by the booming sector cause reallocation of labor force. Workers start leaving the lagging sector in favour of an extraction sector due to higher real wages offered in the latter (“resource movement effect”). As a result the manufacturing sector may lose its importance in contributing to economic growth, which Corden and Near [1982, pp. 830–831] call “direct de-industrialization”. As more workers are employed in the sector, where salaries are relatively higher, their demand for services rises (“spending effect”). This leads to jobs creation in non-traded goods sector and further workers leave manufacturing sector. This process is called “indirect de-industrialization”. It is enough to recall the example of Trinidad and Tobago’s labor market to see the effects of the “curse”. In 1977 the wage index was equal to 100. 20 years later the index for the oil sector workers amounted to 1048, and for assembly-type industries employees it was nearly three-fold lesser (398) [Sachs, Warner, 2001, p. 836].

Furthermore, greater demand for services increases their prices. However similar effect in the traded goods sector does not occur, as in case of a small open economy these are derived from international markets. It means that real exchange rates in such countries tend to appreciate, which additionally undermines the cost competitiveness of domestic manufacturing. The perfect example of the discussed mechanism is Equatorial Guinea, where cocoa and coffee production dropped from 60% of GDP to less than 9% within 11 years (1991–2001) due to expansion of the oil sector [Daban, Helis, 2010, p. 8]. Sachs and Warner [2001, p. 837] put it straightforwardly: “resource-abundant countries tended to be high-price economies and that, partly as a consequence, these countries tended to miss-out on export-led growth”.

Critiques of that model may say that its assumptions cannot hold in the real world. Corden and Near [1982, p. 826] ignore monetary considerations (only relative prices) and international capital mobility. Furthermore, they assume that real wages are perfectly elastic, what means they are arbitraged across sectors and labor market is constantly in its equilibrium point (i.e., there is no unemployment). These three assumptions are strong. Nevertheless, that model is frequently recalled in discussions on the problem, as it has a strong explanatory power by presenting the mechanism of an adverse impact of commodity prices boom on the economic performance of resource-rich countries in a relatively simple way.

Furthermore, deindustrialization unables developing countries, which are resource abundant, to follow a long term fast paced growth, as the faster growth in manufacturing sector gives observable greater productivity growth (Kaldor’s Law). Also Rodrick [2011, p. 4] notes that manufacturing sectors are experiencing automatic-unconditional convergence and “industry is placed on an automatic upward trajectory. The trajectory is steeper the lower is the starting point”.
Another dimension of the “Dutch disease” is instability of resource revenues. A commodity boom may encourage boosting government spending, whereas in periods of commodity bust politicians may find it difficult to cut excessive expenditures. Is such case they need to borrow funds against their future expected income. That was the case of Mexico between 1979 and 1981 [Daban, Helis, 2010, p. 9].

Moreover, several studies point out that resource richness can undermine two important sources of economic growth – human capital and savings. Some scholars [Atkinson, Hamilton, 2003, p. 1796] suggest that in resource abundant economies education sector can be insufficiently financed or even neglected as it does not contribute much to the main source of country’s income – resource exploitation. That is why, without proper institutional solutions, the described problems can even lead to an actual decrease in GDP. Sachs and Warner [1997, p. 35] estimate that a 1% increase in primary exports share gives, ceteris paribus, a drop of GDP from 0.07% to 0.1%.

Furthermore, in case of countries rich in oil gas and other petroleum products, their prices, as locally-available necessities, are kept by politics artificially low on domestic markets. As a result they are excessively consumed. For instance, the annual oil barrels consumption per capita in Chile, the UK and the United Arab Emirates amounts to 6, 9 and 36 respectively [own calculations on the basis of CIA 2013a and CIA 2013 b]. That brings additionally a negative effect for natural environment, which is not included in GDP calculations, but effectively has a negative impact on the quality of life in such countries.

Moreover, Dutch disease hinders GDP growth by expanding the primary commodities sector (e.g. oil, gas) that do not involve high value-added processing, which could generate high-productivity employment [van der Ploeg, Poelhekke, 2008, p. 4]. Resource extraction involves low-productivity activities, which do not contribute much to the acceleration of GDP growth.

It is also worth noting, that the consequences of a development strategy based on resource extraction and exports may also have a political impact through emergence of privileged groups taking advantage of resource rents. This can pose a significant threat to economic growth as bureaucrats are afraid of losing significant source of income and political power, which can make them oppose any proposals to solve the problem set in the introduction. One of the best known papers in this field was written by Kruger [1974]. She estimates that the licenses granting system in Turkey in 1968 generated rents reaching 15% of GDP. Another dimension of politicians competing for rents in resource-rich countries is the corruption problem, which additionally undermines GDP growth [Leite, Weidmann, 1999, p. 30]. Such an uneven distribution of benefits from natural resources extraction can be a source of political instability (or even civil wars) as different groups of interests are encouraged to take actions aimed at more equal participation in rents [e.g. Lujala, Gleditsch, Gilmore, 2005, and Ross, 2004].
How to cure the disease?

Before I discuss the solutions to the problem of resource richness provided by scholars, I need to stress that having big resource deposits does not automatically lead into the “Dutch disease”. It is important to note that effective resource richness depend not only on available deposits, but also on the effect of non-remoteness of deposits on the effective cost of extraction.

First, there is no ideal solution to the problem. The literature is rich in recommendations to be taken into consideration while designing the economic policy in such countries. One way to deal with the problem is to invest resource income outside the economy. This may ease the resource movements and spending effects. Furthermore, a proper wage negotiating system may help to avoid inter-sectoral gap in salaries. A perfect example of a practical implementation of these recommendation is Norway with highly centralized wage negotiating system, which enabled to maintain the wage parity of manufacturing to extraction industries in favor of the first [Larsen, 2006, p. 636]. They have also created an oil fund, which manages the revenues from oil export and is now one of the biggest investors in the world with assets under management worth GBP 450 billion [BBC, 2013]. The main aim of the fund is to amass savings to cover future pension expenditures.

World Bank [Canuto, Cavallari, 2012, p. 5] highlights the necessity of increasing transparency in resource revenues management beginning from scrutinizing the terms of contracts and ending on the use of the tax income. This should diminish the risk of an establishment of privileged groups, which are interested in the resource-rent management. Other economists stress that diversification of exports structure and production is an effective way of dealing with the problem [Gelb, 2010 or Kozeibayeva, 2008].

What is more, the International Monetary Fund pays attention to the absorption of the resource revenues without fuelling inflation. It recommends to implement fiscal rules “commonly anchored by some form of non-resource primary budget balance” [IMF, 2012, p. 26]. They should also be supplemented by some form of strengthening fiscal discipline introduced by additional fiscal responsibility laws, which may help to prevent exchange rate from appreciating [IMF, 2012, p. 42].

The role of institutions in managing resource rich economy has been explored by Atkinson and Hamilton [2003]. In a cross-section study they show that quality of institutions is a statistically important variable explaining the economic development of the country. The conclusion from their work is that resource abundant countries, with higher quality of institutions (e.g. lower corruption rates), tend to have greater savings (and investments) rates and, as a result, better economic performance. Further research conducted by Boschini et al. [2007, p. 614] revealed that the positive effect of “good” institutions on management of resource deposits may be increased. This multiplication
will depend on the resource type. The strongest positive (when institutions are well functioning) and negative (with “poor” institutions) effects will appear in case of precious metals and diamonds.

### Chilean economy and copper

Chile is a resource rich country, as it has large copper deposits. It is also the leading copper producer having 35% share of world production (see Table 1). That is why it is worth to describe the ways in which the country deals with its potential “Dutch disease.”

**Table 1. Top five copper mine producers, by countries, 2008**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Mine production level (thousand tons)</th>
<th>Share of world production (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chile</td>
<td>5,328</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>United States</td>
<td>1,335</td>
<td>9</td>
</tr>
<tr>
<td>3.</td>
<td>Peru</td>
<td>1,268</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td>China</td>
<td>951</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Australia</td>
<td>883</td>
<td>6</td>
</tr>
</tbody>
</table>

*Source: [IISD, 2010, p. 10]*.

**Chart 1. Leading importers of copper, 2008**

*Source: ICSG [2010, p. 32].*
Before I do this I permit myself to briefly describe the specific features of the copper market. Firstly, it is worth adding that its supply side is relatively concentrated with the top 5 exporters having a 64% share in the global copper market [IISD, 2010, p.10]. Likewise, the demand side is also concentrated. The biggest four importers (chart 1) are Asian countries with a 70% share in the market.

Secondly, China, one of the two leading importers, has been growing with an impressive two-digit pace for the last 2 decades (1991–2010) and its demand for natural resources has increased respectively. Furthermore, its further dynamic growth perspectives suggest its share may substantially increase within the next few decades. Thirdly, the copper market is a highly speculative one, which means that trading activity on the financial markets can substantially divert the price of the ore from its fundamentals. That has been the case for the last few years, when world economy faced a sharp slowdown (in many developed countries recessions occurred) and the price of copper has gone through the roof (an increase of 29.3% between January 2008 and December 2010 [Index Mundi, 2013]).

Export diversification

In order to comply with the recommendations presented in the previous section of the essay, Chile has strived to diversify its exports structure. This attempt is quite a successful one, as the share of the ores and metals export dropped from nearly 90% in the early 1960s to 60% in the late 2000s (chart 2). However, we shall note that this refers to value terms in volume or constant-price terms diversification has become even greater. The increase in the share of the ores and metals export in the Chilean merchandise export, observed in the late 2000s, is not driven by the expansion of the ores and metal sector in Chile. It is associated with a statistical effect as in that decade world prices for metals were rising very fast to historical heights. Despite the fact that the sold quantities (metric tons) of the metals could be constant or growing very slowly, their prices went through the roof (which is shown on chart 4 for the copper market), the nominal value of their export and its share in the Chilean merchandise export rose respectively. However, this did not mean that Chile changed its economic policy and decided to be more dependent on the copper export.

What is more, the Chilean exports have become more geographically diversified (chart 3). The share of the high-income countries has declined by 40 percentage points since 1960. However, this is basically associated with a dynamic expansion of Asian countries (especially China) and, to a lesser extent, other countries in Latin America and the Caribbean region. Nevertheless, this change makes Chilean exports more diversified and exposed to fast growing and opening economies, which is a positive thing in the current period of economic slowdown in high-income countries. This diversification
encompassed not only new markets, but also greater number of non-copper product-categories being traded. Moreover, the market concentration of top ten non-copper
export markets dropped (Herfindal-Hirschman Index declined from over 0,1 to nearly 0,07) [Berthelon, 2011, pp. 13 and 18, Figure 3]. This proves Chile’s success in the export diversification strategy.

Copper and the Chilean budget

As it has been mentioned earlier, boom in the ore price tends to lead to real exchange rate appreciation. As a result, inflation pressure drops and real wages rise. In the wake of a low inflation central bank cuts interest rates, which stimulates investments activity (particularly in construction and residential assets) and consumption. However, Chile faces relatively moderate fluctuations of economic activity induced by boom and bust cycle on the copper market due to a proper mechanism introduced in 1985 – the Copper Stabilization Fund [Spilimbergo, 1999, p. 29].

The fund was established in order to stabilize exchange rate and government revenues associated with the boom-bust copper price cycle8. When the current copper price was greater by USD 0,1 per pound than the estimated long term equilibrium price, the whole difference was deposited with the fund [Fasano, 2000, p. 7]. If this positive gap was between USD 0,04 and USD 0,1, only 50% of the difference was deposited, and in case of the gap being lesser then USD 0,04 there was no deposit. When the copper price drops below the long-term estimated equilibrium symmetric mechanism operates and the difference is transferred to the state budget.

The fund manages to successfully stabilize resource revenues. It was perfectly clear in 1989, when the copper price reached its 6-year-height, and the budget deficit appeared. Also in the early 1990s when price of copper was dropping, budget surpluses were generated. It is worth stressing that Chile managed to show budget surpluses for 20 out of 30 years included in chart 4, and even when it had deficits, they were relatively small, not exceeding 2% of GDP (not mentioning 2010).

Despite of described above successful attempts to cope with resource-richness problem in Chile, IMF suggests to create an independent Fiscal Council in the country. The main aim of the body would be the further reduction of the pro-cyclical impact of fluctuation of commodities prices by adjusting current resource revenues to the estimated long-term prices9 and introducing more transparent calculation rules of the structural balance [IMF, 2011, p. 12]. Nevertheless, the overall assessment of the Chilean fiscal framework is positive, as the proposed changes are rather aimed at enhancing, not essentially changing it.

The Chilean mechanism of copper revenues management proved to be successful also in preventing the real effective exchange rate (REER) from appreciating. Copper price stayed fairly stable between the late 1980s and the early 2000s, as compared to the late 2000s, when it went through the roof (three-fold growth within a 5-year period).
CHART 4. Government budget surplus (deficit) to GDP (%) in Chile (left axis) and price of copper (USD/metric ton) (right axis), 1983–2012

Source: World Bank [2013] and Index Mundi [2013].

CHART 5. Chile’s REER (right axis) and copper (real) price (USD/metric tonne) (left axis), 1983–2010

Source: Index Mundi [2013] and IMF-IFS [2013].
Surprisingly, the volatility of the REER has substantially declined in the 2000s, as compared to the 1980s and 1990s. What is more, since the mid-2000s the REER has actually remained unchanged. This clearly shows that copper price boom in the late 2000s, contrary to Corden and Near [1982] model conclusions, did not eroded Chile's export competitiveness, as the REER did not appreciate (chart 5). This is another evidence of Chile's success in dealing with resource riches problem.

We shall however remember that Chile learnt about dealing with resource abundance by paying the price of political difficulties (like the 1973 coup)\textsuperscript{10}, as well as massive economic fluctuations up to the mid 1970s. This proves that it takes time and painful experience to get to the proper institutions\textsuperscript{11}.

**Conclusion**

Resource abundance is often viewed as an “economic blessing”. Yet despite revenues generated from exploration and exporting natural resources countries with such deposits are frequently underperforming economically. This phenomenon is also known as the “Dutch disease” – resource export tends to lead to exchange rate appreciation, which undermines the competitiveness of the domestic manufacturing industry and leads to artificially inflated real wages. As a result, public finance sector is exposed to fluctuations of resources prices, which favors rent-seeking of politicians.

The proper institutional framework and revenue diversification strategy in Chile played a significant and, at the same time, positive role in fighting the “Dutch disease” symptoms. Firstly, copper revenues are transferred to the state's budget or saved and invested on financial markets depending on the current and expected long-term ore prices. This significantly diminishes public finance's exposure to the performance of copper market and enhances stability of resource revenues. Secondly, Chile has substantially changed the product structure of its export. The share of ores and metal exports declined by 30 percentage points between the early 1960s and 2010. Also the export partners structure has become far more diversified, which can be at least partly attributed to a shift in world economy towards greater importance of the East Asian countries (mainly China).

The discussed above actions enabled Chile to have a stable budget policy, which is proved by 20 years of budget surpluses in the period 1981–2010. What is more, even if deficits occur, they usually do not exceed 2% of the GDP, which is a remarkable result. Furthermore, the REER remains stable, and does not undermine the Chile's export competitiveness. We shall however remember, this success came with the price (e.g. the 1973 coup). Nevertheless, it shows that with proper institutions you can cope with the resource abundance problem in a very effective way.
Notes

1 By definition, resource abundance is associated with low unit-cost of extraction. Once infrastructure is in place, unit-cost, which determines competitiveness, declines as production increases.

2 Corden and Near created their model in 1982, when international capital flows were more restricted; today, capital mobility is much greater. Furthermore, there is no country with no unemployment, i.e. there is always a certain level of natural unemployment.

3 More detailed discussion on the link between public debts and resource abundant countries can be found in [Manzano, Rigobon, 2001].


5 This finding may however depend on a handful of cases: success in Botswana [Meijia, Castel, 2012] versus failure in Liberia [Economywatch, 2012].

6 Nevertheless, we shall remember that major importers can become major exporters in recessions, because copper is a recoverable resource.

7 This copper price boom cannot be explained by macroeconomic fundamentals as the accumulated growth of GDP for China, Japan, India and Korean Republic between 2008 and 2010 amounted to: 36%, -2.4%, 15.9% and 12.5% respectively [own calculations on the basis of World Bank, 2013]. If we calculate the weighted average accumulated GDP growth for this group (proportionate weights to their share in the world copper market as in the Chart 1) we will get 15.9%, which is in fact substantially lower than the copper price appreciation (29.3%) in this period.

8 Similar, but much earlier, mechanism was introduced in Iceland for fishing revenues management [Gylfason, Weitzman, 2002].

9 In case of a substantial change in the estimated future prices “the government should use partial adjustments mechanisms to smooth the convergence towards a new long-run equilibrium” [IMF, 2011, p. 13].

10 1973 coup was caused by significant economic and political problems. The economic reforms implemented by socialist governments in the late 1960s and early 1970s did not resolve problems of high inflation, inequality in income distribution, as well as stagnation of economic growth. Among the political problems we can enumerate pro-socialist policy of president Salvadore Allende and lack of political support for his reform proposals in the Chilean parliament. As a result of military coup (10/11 September 1973) Allende was killed and chief commander gen. Augusto Pinochet was appointed to be the president of Chile.

11 Likewise, we may say that Norway learnt a lesson from the banking crisis (1988–1992) [see details in: Steigum, 2011].

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Female employment and parental leave: 
the case of Poland

Abstract

With the use of the Polish Social Security’s administrative data for the period 1999–2011, nonparametric and Cox models, the author assesses the role of the means-tested child-raising allowance in shaping an effective period for parental leave and the impact of parental leave duration on the subsequent (continued) job tenure.

The results suggest low income level (an eligibility criterion for child-raising allowance) loses any significant negative effect on the intensity of returning to a job as soon as the eligibility period for the allowance expires. Long periods of parental leave increase the intensity of transition to unemployment soon after the return to the interrupted job but they have only a minor impact on the intensity of transition to other jobs. The intensity of transition from the continued job to unemployment is also related to employment in the private/public sector, unemployment history and length of service.

Keywords: parental leave duration, female employment duration, child-raising allowance impact, duration analysis, policy evaluation

JEL: J18, J48, K31

Disclaimer: the views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of any agency of the Polish government.

Introduction

In the second decade of the XXI century there is a need to draw the policymakers’ attention towards the family policy issues in Poland. Poland currently belongs to those countries with the lowest fertility rates in Europe and whilst, since 2004, a slight rebound
has been observed, TFR is very far from the levels registered three decades ago, posing the threat of a demographic disaster in 20 years. One of the reasons for this can be seen in the disruption of the balance between work/family that began during the transformation to the market economy. Low fertility in Poland suggests the family policy is insufficiently compatible with parenthood. It is worth noticing that for various work/family models (particularly for the dual-earner model that dominates in Poland) the state offers child tax credit on the one hand and very long (compared with other EU and OECD countries) parental leave along with the option of income splitting for purposes of filing a joint tax return for spouses (other family policies, including childcare arrangements, are of minor importance in Poland). As tax credit is often more useful for families where both parents are working (tax credit in Poland has no phase-out and it cannot exceed paid income tax) it should therefore encourage employment; long parental leave, however, seems to discourage one parent from working. Therefore, these instruments appear to be directed towards different families. The impact of parental leave policy on labor market participation and further unemployment seems to be unclear – too short period of parental leave may force a woman that decides to raise her child on her own to exit the labor market. On the other hand, extended parental leave may lead to human capital depreciation and it can seriously harm any subsequent employment career [OECD, 2011].

The aim of the following article is to assess the role of child-raising allowance on the duration of parental leave and the impact of the duration of parental leave on the job tenure after returning to the same employee. Both can be illustrated by duration analysis based on data from the Polish Social Security system. The paper begins with a theoretical framework description and research hypotheses (part 2). Part 3 describes the dataset and methods. Part 4 and 5 contain descriptive statistics for females who take parental leave and for women that returned to their interrupted jobs. Part 6 and 7 concerns the results from nonparametric and Cox hazards models of parental leave spell and continued job tenure after the parental leave. Part 8 contains conclusions.

**Theoretical framework**

The theoretical framework of the research presented in this paper is related to several hypotheses on the relations between post-natal employment and voluntary parental leaves. It is expected that the shape of the regulations governing leave may influence the entire context of female employment and therefore influence the decisions on whether to have a child, leave the labor market in order to take personal care of the child, remain out of the labor market whilst on leave and re-enter the labor market. It also influences the employer’s response to female staff decisions, including the dismissal of employees that take voluntary parental leave.
FIGURE 1. Maternity and parental leaves in the labor market

Note: States are bolded. Events are emphasized by italics. States and events in grey are beyond the scope of this analysis.

Source: own preparation.

Following OECD [2011], the length of parental leave can be determined by individual preferences, the duration of paid child-related leave schemes, formal and informal childcare, earnings of spouses and workplace support. In particular, even low and flat-rate parental leave payment rates reduces the incentives to work for low-income earners [OECD, 2011]. Therefore, they are most likely to make full use of prolonged leave arrangements, while well-paid women either take no parental leave or take relatively short periods of leave due to high opportunity costs and more possibilities for affording paid childcare [OECD, 2011]. Matysiak [2005] points out lower compensation boosts the return of female employees to the workplace but higher compensation might encourage male workers to take parental leave instead of their spouses. She also suggests that the flexibility of the leave schemes and transferability for the partner may lead to greater numbers of women in the labor market and shorter female career breaks.

The overall effect of paid leave on work interruptions is not clear a priori. A paid leave policy encourages some women to interrupt work on the one hand, but it also entices other women to return to the job after birth rather than quit, resulting in a shorter interruption of work [Joesch, 1997]. The impact of leave-taking on retaining the job after returning from a period of leave is presented by some scholars as positive, particularly in the case of short, unpaid but job-protected leave [Gauthier, 1996; Bussemaker and van Kersbergen, 1996; Berger and Waldfogel, 2004; Espinola-Arredondo and Mondal, 2009; Han et al., 2009; Baker and Milligan, 2008]. Returning to the same job after taking leave as a result of job-protection regulations gives the
possibility to retain firm-specific human capital among female employees [Pronzato, 2009]. Gupta, Smith and Verner [2008] argue that formal job protection improves post-natal employment by easing the return to work but this protective effect declines after an unspecified length of time [Verner, 2008]. However, there is more evidence that one ought to expect some negative effects from parental leave on female employability and wages, including a negative correlation between the statutory length of parental leave and the employment rate among mothers with young children [OECD, 2011]. Speedy return to actual work is seen as a prerequisite for maintaining employment [Klerman and Leibowitz, 1994]. According to their study, most women working when their child was one year old had returned to work within three months after childbirth. Long periods of parental leave may lead to human capital depreciation [Edin and Gustavsson, 2007]; especially among highly educated women [Baum, 2003; Gutiérrez-Domènech, 2005]. This can be rooted in the theory of human capital, with a hypothesis that education should be treated as investment that could result in higher wages in the future and the assumption wages reflect productivity [Becker, 1964]. The Human Capital Model with Training over the Life Cycle takes into account not only the prior education but also experience gained during employment. It also includes the rate of human capital depreciation. Measuring the actual rate of the human capital depreciation can be made with use of Mincer’s earnings function, so that it can account for heterogeneous employment histories, including information on possible career interruptions [Mincer and Polachek, 1974 and 1978; Mincer and Ofek, 1982]. Basing on these models, prolonged parental leave should lead to human capital depreciation responding to depreciation rate. Because one assumes wages reflect productivity, drop in human capital translates to drop in wages, reducing wage growth and – due to inelasticity – dismissing an employee. Among other mechanisms, long periods spent on leave impair a women’s attachment to the labor market, including any attachment to the employer that granted the leave [Jaumotte, 2003]. Every break in employment is inconvenient for the employer who has to find a replacement for the employee [Kotowska et al., 2007]. Furthermore, they have no guarantee the employee is willing to return to the same job [OECD, 2011] and may perceive the taking of leave as a signal of low commitment.

Therefore, parental leave may be followed by job termination after the return from the leave. Ejrnæs and Kunze [2006] found that extended parental leave in Germany could have a negative impact on female employment, though this was not confirmed by the research of Schönberg and Ludsteck [2008]. Numerous scholars have produced evidence that extended parental leave has a negative impact on subsequent earnings [Ruhm, 1998; Ondrich et al., 2002; Beblo and Wolf, 2002; Ejrnæs and Kunze, 2006; Zhang, 2007; Gupta, Smith and Verner, 2008]. There are some examples of catching-up compared with women without children, however [Gupta and Smith, 2002]. For first transition to employment after the first childbirth, a polarization is found between highly educated,
high-wage mothers and lower-educated, low-wage mothers [Dex et al., 1998]. Finally, parental leave is perceived as an instrument that may lead to gender discrimination [Pylkkänen and Smith, 2004].

The mandatory and voluntary leave in Poland has already been a research subject in a few dedicated publications [Wóycicka et al., 2006; Kotowska et al., 2007, Matysiak, 2012]. They provide an analysis of employment breaks related to motherhood and the returns of mothers to the labor market, basing on the Labor Force Survey module “Work/family reconciliation” (2005) and on another research “Professional, educational and family biographies” (2006). Matysiak presents in the report [Kotowska et al., 2007] the piecewise exponential model of job continuity after having a child. According to the model, the hazard of losing a job rises in the 4th and 12th month following childbirth and it is higher than that of women without children with similar observable characteristics. The rise from the 12th month is perceived by Matysiak as an impact of the parental leave – women that have taken the leave attempt a return to employment but move on soon after their job-protection expires. However, the design of the research limited it to women employed for 3 years until the moment of conception.

The paper is to test the hypothesis that the effect of transfers combined with parental leaves is significant enough to shape the effective length of parental leave and that the length of parental leave has a negative impact on the continuation of employment following such a leave. In comparison to [Kotowska et al., 2007], the author emphasizes the period of parental leave and job continuation after the leave, using administrative data instead of survey data. The author expects extended parental leave results in the increased risk of transition to unemployment due to declining human capital and possible retributive measures by the employer. Alternatively, the opposite is also possible, due to an additional year of job protection in case of transition to part-time employment after return from a leave. The author is to test whether extended parental leaves are related to more intensive transitions within the labour market when compared with shorter leaves and to verify whether the public sector can be perceived as a more stable employer for women taking parental leave, which can be inferred from the work of Pylkkänen and Smith [2004]. The paper tries to answer if the work experience allows job security for professional mothers leaving the labor market to take care of their children and to test the significance of the hysteresis effect of unemployment spells in the past on job continuation.

The article is a first step in the analysis of mothers’ employment. Further research is planned to compare mothers on parental leave with mothers that have not taken the parental leave and females with no children. Penalized splines could be also used as in work of Kuhlenkasper and Kauermann [2010]. A general equilibrium approach to model the impacts of parental leaves (e.g. [Erosa et al., 2010]) would be the most powerful tool for modelling the impact of policy changes.
Data and methods

To verify the aforementioned hypotheses there is a need for data that can be analyzed using the longitudinal approach; data that is precise, representative for the population and capable for revealing the causal effects. Until now, the research on the parental leave has been based on survey and retrospective data (see [Kotowska et al., 2007]). In the following paper, the non-identifiable sample of the Social Security system’s administrative database has been used instead. Administrative data, collected on a monthly basis, contains the most accurate information available on the duration of spells of employment in Poland, appropriate for duration analysis. The sample has been created by a random selection of the full history for 1% of individuals that have been insured by the public scheme for at least one month in the period between January 1999 and August 2011 – in total 250,806 observed individuals. The dataset contains periods when each insured individual in the general insurance system paid social contributions, their corresponding income and – in the case of the employed – their NACE employer codes. The sample also contains information on gender, date of birth, place of birth of the insured individual and the employer’s place of residence. Based on data available, the incidence of spells of unemployment in a period of two years before taking the parental leave and approximated length of service has been also calculated.

The dataset has been used to calculate spells of female parental leave, as well as employment (broken down by different employers), self-employment, unemployment, vocational training and maternity leave. Data has been transformed to illustrate the records of 14,956 spells of female parental leave, followed by 4,579 records of continued employment with the previous employer. For both periods, the preceding and successive events are taken into consideration (if not censored).

The determinants of the spell of parental leave and job tenure, following parental leave, for the employer who granted the leave have been estimated using Cox models [Cox, 1972]. If necessary, time-varying variables have been added to the model. The hazard of this model is defined as follows:

$$h(t) = \lambda_0(t) \exp \left( \sum_{j=1}^{k} \beta_j x_{ij} + \sum_{j=k+1}^{k+l} \beta_j x_{ij}(t) \right)$$

where $\lambda_0(t)$ is the baseline hazard function, $x_{ij}$ is a set of individual characteristics – the first $k$ variables are time-invariant and the remaining $l$ are time-varying (denoted $x_{ij}(t)$) and the coefficients to be estimated are denoted as $\beta_j$.

Five semi-parametric models have been presented in this paper: three for the duration of parental leave and two for the duration of the job contract for women that returned to the same job after the taking of leave. Models 1–3 are estimated on 9,115
spells for the following events: return to the same job (Model 1), immediate transition to another job (Model 2) and immediate transition to unemployment (Model 3). They use: length of service, earnings, employer branch and the unemployment record for the period of 2 years prior to the taking of leave as covariates. Models 4 and 5 are based on 3,565 spells finishing with transition to unemployment (Model 4) or by transition to another job or self-employment (Model 5). The determinants in model 4 and 5 are: the duration of parental leave, length of service, employer branch and unemployment record for the period of 2 years prior to the taking of leave. Models 1, 2, 3 as well as models 4 and 5 deal with the same individuals in the same state (though states for models 1, 2 and 3 are different than for models 4 and 5) and the occurrence of one type of event removes the individual from the risk of other events. Therefore, the competing risks approach has been used, with implicit orthogonality assumption for random arrival times associated with each risk.

**Duration of parental leave – descriptive statistics**

Table 1 examines the distribution and mean duration of parental leave spells grouped by their terminating events. Descriptive statistics aim to verify whether there are systematic differences between female parental leave takers that finished the leave by transition to different states. Moreover, they are necessary to verify the existence of systematic biases caused, for example, by the relatively short observation window (years 1999–2011) that may lead to underestimation of the length of the parental leave.

The duration of parental leave differs in the reason for termination and the personal characteristics of the leave-taker. The difference between transition to another job or self-employment and transition to unemployment is significant (16.8 versus 19.9 months), particularly for older females, with longer working experience. The differences are smaller in case of return to the interrupted job and transition to unemployment (18.1 versus 19.9 months) and even smaller between return to the previous job and a new job or self-employment.

Length of service might play a positive role in securing the return to the same job – those who took parental leave and returned to the same employer are characterized by longer working experience. It also seems that higher wages work to discourage individuals from taking parental leave (and extended leave in particular). A drop in mean parental leave duration is particularly significant for the transition to another job what may suggest that the rate of voluntary job changes is relatively high. The rate of those employed in the public sector is smaller for transition to unemployment than to employment. On the other hand, parental leaves there taken are on average shorter than in the private sector.
TABLE 1. **Distribution and mean duration of parental leave by reason for termination**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>N</th>
<th>PctN</th>
<th>Mean dur.</th>
<th>StdDev dur.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of service</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0-3 years</td>
<td>973</td>
<td>28.81</td>
<td>18.37</td>
<td>11.25</td>
</tr>
<tr>
<td>2</td>
<td>4-6 years</td>
<td>906</td>
<td>26.83</td>
<td>17.95</td>
<td>11.39</td>
</tr>
<tr>
<td>3</td>
<td>7-10 years</td>
<td>859</td>
<td>25.44</td>
<td>17.97</td>
<td>11.38</td>
</tr>
<tr>
<td>4</td>
<td>11+ years</td>
<td>639</td>
<td>18.92</td>
<td>18.18</td>
<td>12.27</td>
</tr>
<tr>
<td><strong>Earnings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>&lt; 0.7 avg wage</td>
<td>2 847</td>
<td>84.31</td>
<td>18.73</td>
<td>11.48</td>
</tr>
<tr>
<td>2</td>
<td>0.7 avg wage ≤ x &lt; 1.2 avg wage</td>
<td>390</td>
<td>11.55</td>
<td>15.73</td>
<td>11.19</td>
</tr>
<tr>
<td>3</td>
<td>≥ 1.2 avg wage</td>
<td>140</td>
<td>4.15</td>
<td>12.34</td>
<td>10.80</td>
</tr>
<tr>
<td><strong>Employer branch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>agriculture, mining, manufacturing, energetics and construction</td>
<td>930</td>
<td>27.54</td>
<td>19.46</td>
<td>11.45</td>
</tr>
<tr>
<td>2</td>
<td>commerce, car reparation, transportation, gastronomy and hotels</td>
<td>1 159</td>
<td>34.32</td>
<td>19.67</td>
<td>11.37</td>
</tr>
<tr>
<td>3</td>
<td>communication, financial, real estate, scientific and administrative services</td>
<td>478</td>
<td>14.15</td>
<td>16.76</td>
<td>11.16</td>
</tr>
<tr>
<td>4</td>
<td>public administration, national defense, social security, education, health care, social aid, culture and entertainment</td>
<td>810</td>
<td>23.99</td>
<td>15.17</td>
<td>11.37</td>
</tr>
<tr>
<td><strong>Unemployment history</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>none in 2 years before leave</td>
<td>3 015</td>
<td>89.28</td>
<td>17.83</td>
<td>11.55</td>
</tr>
<tr>
<td>1</td>
<td>yes in 2 years before leave</td>
<td>362</td>
<td>10.72</td>
<td>20.51</td>
<td>10.99</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16-25 years</td>
<td>677</td>
<td>20.05</td>
<td>19.76</td>
<td>11.00</td>
</tr>
<tr>
<td>2</td>
<td>26-30 years</td>
<td>1 460</td>
<td>43.23</td>
<td>17.84</td>
<td>11.52</td>
</tr>
<tr>
<td>3</td>
<td>31+ years</td>
<td>1 240</td>
<td>36.72</td>
<td>17.55</td>
<td>11.72</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>3 377</td>
<td>100.00</td>
<td>18.12</td>
<td>11.52</td>
</tr>
</tbody>
</table>

Source: Own calculations based on Social Insurance database. Only completed spells included.
<table>
<thead>
<tr>
<th>Exit state</th>
<th>Parental leave spell</th>
<th>Exit state</th>
<th>Parental leave spell</th>
</tr>
</thead>
<tbody>
<tr>
<td>2: Other job or self-employment</td>
<td></td>
<td>3: Unemployment</td>
<td></td>
</tr>
<tr>
<td>474</td>
<td>34.65</td>
<td>17.14</td>
<td>11.02</td>
</tr>
<tr>
<td>380</td>
<td>27.78</td>
<td>16.91</td>
<td>11.53</td>
</tr>
<tr>
<td>313</td>
<td>22.88</td>
<td>16.22</td>
<td>11.91</td>
</tr>
<tr>
<td>201</td>
<td>14.69</td>
<td>16.76</td>
<td>12.93</td>
</tr>
<tr>
<td>1 139</td>
<td>83.26</td>
<td>17.94</td>
<td>11.46</td>
</tr>
<tr>
<td>160</td>
<td>11.70</td>
<td>11.15</td>
<td>10.95</td>
</tr>
<tr>
<td>69</td>
<td>5.04</td>
<td>11.26</td>
<td>11.25</td>
</tr>
<tr>
<td>313</td>
<td>22.88</td>
<td>18.17</td>
<td>12.07</td>
</tr>
<tr>
<td>504</td>
<td>36.84</td>
<td>19.00</td>
<td>11.16</td>
</tr>
<tr>
<td>266</td>
<td>19.44</td>
<td>15.28</td>
<td>11.30</td>
</tr>
<tr>
<td>1 223</td>
<td>89.40</td>
<td>16.74</td>
<td>11.71</td>
</tr>
<tr>
<td>145</td>
<td>10.60</td>
<td>17.41</td>
<td>11.19</td>
</tr>
<tr>
<td>621</td>
<td>45.39</td>
<td>16.11</td>
<td>10.97</td>
</tr>
<tr>
<td>450</td>
<td>32.89</td>
<td>16.19</td>
<td>12.44</td>
</tr>
<tr>
<td>1 368</td>
<td>100.00</td>
<td>16.81</td>
<td>11.66</td>
</tr>
</tbody>
</table>
Duration of employment after parental leave – descriptive statistics

Table 2 examines the distribution and mean duration of jobs continued after the taking of parental leave, and gives reasons for termination.

Mean job tenure of mothers that returned after the leave to their previous employment was 7.6 months for those who became unemployed and 13.8 months for those who changed their job. Employment spells terminated by a change in jobs are, on average, longer than those terminated by unemployment for each category illustrating the duration of parental leave; this difference is striking for short-term leave and it almost vanishes for longer leave (2 years and above). This might suggest that the duration of parental leave significantly facilitates the transition to another job (voluntary or involuntary). 57% of transitions to unemployment and 38% job switches concern female workers that spent not less than 2 years on leave, suggesting a detrimental impact of long leaves. It seems to be coherent with the work of Harris [1996] that examined American single mothers in employment with spells of claiming welfare. Employment periods for these women were on average shorter and return to welfare faster if their welfare spell that preceded employment had been relatively long.

Taking working experience into account, its length might have a negative impact on the transition to unemployment or another job, what goes in line with results of Böheim and Taylor [2002]. Furthermore, females with unemployment history are characterized by shorter mean job tenure and larger propensity of the transition to unemployment comparing with females without unemployment record. Only 6% of observations that moved to a state of unemployment were females employed in public administration, national defense, social security, education, health care, social aid, culture and entertainment, suggesting public sector jobs are more secure for women taking personal care of their children.
TABLE 2. Distribution and mean duration of job tenure (months) by reason for termination

<table>
<thead>
<tr>
<th>Leave duration</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td>Leave duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 &lt; 6 months</td>
<td>55</td>
<td>7.86</td>
<td>8.16</td>
<td>16.64</td>
</tr>
<tr>
<td>2 6 months ≤ x &lt; 24 months</td>
<td>247</td>
<td>35.29</td>
<td>8.40</td>
<td>13.95</td>
</tr>
<tr>
<td>3 ≥ 24 months</td>
<td>398</td>
<td>56.86</td>
<td>7.05</td>
<td>12.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of service</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td>1 0-3 years</td>
<td>282</td>
<td>40.29</td>
<td>5.24</td>
<td>10.82</td>
</tr>
<tr>
<td>2 4-6 years</td>
<td>177</td>
<td>25.29</td>
<td>6.15</td>
<td>10.16</td>
</tr>
<tr>
<td>3 7-10 years</td>
<td>133</td>
<td>19.00</td>
<td>8.98</td>
<td>15.13</td>
</tr>
<tr>
<td>4 11+ years</td>
<td>108</td>
<td>15.43</td>
<td>14.53</td>
<td>19.60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employer branch</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td>1 agriculture, mining, manufacturing, energetics and construction commerce, car reparation, transportation, gastronomy and hotels</td>
<td>576</td>
<td>82.29</td>
<td>7.79</td>
<td>13.92</td>
</tr>
<tr>
<td>2 communication, financial, real estate, scientific and administrative services</td>
<td>79</td>
<td>11.29</td>
<td>5.63</td>
<td>10.47</td>
</tr>
<tr>
<td>3 public administration, national defense, social security, education, health care, social aid, culture and entertainment</td>
<td>45</td>
<td>6.43</td>
<td>8.82</td>
<td>14.56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unemployment history</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td>0 none in 2 years before leave</td>
<td>549</td>
<td>78.43</td>
<td>8.74</td>
<td>14.69</td>
</tr>
<tr>
<td>1 yes in 2 years before leave</td>
<td>151</td>
<td>21.57</td>
<td>3.51</td>
<td>7.44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td>1 16-25 years</td>
<td>115</td>
<td>16.43</td>
<td>2.90</td>
<td>5.77</td>
</tr>
<tr>
<td>2 26-30 years</td>
<td>268</td>
<td>38.29</td>
<td>6.97</td>
<td>12.52</td>
</tr>
<tr>
<td>3 31+ years</td>
<td>317</td>
<td>45.29</td>
<td>9.87</td>
<td>15.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Job continuation</th>
<th>Exit state</th>
<th>1. Unemployment</th>
<th>2. Other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>PctN</td>
<td>Mean duration</td>
<td>StdDev duration</td>
</tr>
<tr>
<td></td>
<td>700</td>
<td>100.00</td>
<td>7.61</td>
<td>13.62</td>
</tr>
</tbody>
</table>

Source: Own calculations based on Social Insurance database. Only completed spells included.
Duration of the parental leave – estimation results

Life tables

Figure 2 shows the life table hazard and survival function estimates of the spells of parental leave by type of exit. Parental leaves are most frequently terminated by a transition to the interrupted job. Hypothetically, provided that no other reason for termination occurs, 30% of leave-takers would survive 40 months without a transition to the same job, compared with 50% for another job and 43% for unemployment. The author implicitly presumes transition to employment earlier than 36 months is voluntary while any transition to unemployment is involuntary. Such an assumption justifies using a competing risks approach that requires the random arrival times associated with each risk to be orthogonal. Going further, to reveal the real intended length of a spell of parental leave, more attention should be paid to the transition to employment rather than to unemployment.

FIGURE 2. Life Table hazard and survival estimates of parental leave spell

Source: own preparations based on Social Insurance database.

Among the hypotheses to be tested, a crucial role is played by that which shows the expected impact of child-raising allowance on the duration of parental leave. Figure 3 presents the life table hazard and survival function estimates by income level on those spells of parental leave terminated by a return to the previous job.

There are two peaks in the hazard function – the first slightly after 24 months and another one after 36 months from the beginning of the spell of parental leave. Note that the first peak is not observable for well-paid female employees that do not meet the eligibility criterion for the child-raising allowance. Moreover, the peak after the 24th month is present for all classes of every other labor market characteristic that are used for modelling, i.e. unemployment record, employer branch, years of service (though the peak is quite small for some of them). Therefore, the author assumes the first peak in the
FIGURE 3. Life Table hazard and survival estimates of parental leave spells terminated by return to the same employer – the effect of earnings (eligibility criterion)

Source: own preparations based on Social Insurance database.

hazard rate can be adequately explained by cancelling the child-raising allowance. The second peak responds to the maximal spell for the majority of cases (except when taking care of disabled children or when using overlapping parental leaves for another child). Except for the two aforementioned peaks, the hazards are relatively small (though higher for well-paid female workers) and time-invariant.

The comparison of the hazard rates for low and high-earners suggests the assumed hazards proportionality for the Cox model is not to be satisfied for the entire leave period, yet it appears to be satisfied considering separately period before and after the allowance has been granted.

Corresponding SDF shows the differences between low and high-earners. One can observe a significant drop in surviving leave-takers with earnings below 0.7 average wages from about 74% to 55% between the 24 and 27th month and only a minor drop from 46% to 42% for female individuals with earnings above 1.2 of the average wage within the same period.

Similar analysis conducted for the transition to other employment shows a lower intensity of transition for lower wages but no peak after the first two years of the parental leave.

Cox models

The estimation results of the proportional hazards model are presented in Table 3. Three models of parental leaves have been estimated, the first for the event defined as leave termination followed by a return to the same job, the second for leave termination due to transition to another job and the final one for transition to unemployment.

The results for model 1 and 2 confirm that child-raising allowance increases the effective duration of parental leave for female individuals entitled to it. Women with higher earnings have a higher intensity of termination due to the transition to the same
<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Category</th>
<th>0 – main effect; 1 – interaction effect for first 22 months</th>
<th>Transition to the same job</th>
<th>Transition to the other job</th>
<th>Transition to unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of service (ref=0-3 years)</td>
<td>4-6 years</td>
<td>0</td>
<td>0.037</td>
<td>-0.129</td>
<td>-0.145*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.048)</td>
<td>(0.071)</td>
<td>(0.067)</td>
</tr>
<tr>
<td></td>
<td>7-10 years</td>
<td>0</td>
<td>0.099*</td>
<td>-0.197**</td>
<td>-0.289***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.05)</td>
<td>(0.076)</td>
<td>(0.077)</td>
</tr>
<tr>
<td></td>
<td>11+ years</td>
<td>0</td>
<td>0.045</td>
<td>-0.381***</td>
<td>-0.392***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.054)</td>
<td>(0.088)</td>
<td>(0.090)</td>
</tr>
<tr>
<td>Earnings (ref≤ 0.7 avg. wage)</td>
<td>0.7 avg. wage ≤ x &lt; 1.2 avg. wage</td>
<td>1</td>
<td>0.343**</td>
<td>1.006***</td>
<td>0.510</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.125)</td>
<td>(0.234)</td>
<td>(0.275)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0.152</td>
<td>-0.384</td>
<td>-0.720**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.105)</td>
<td>(0.214)</td>
<td>(0.222)</td>
</tr>
<tr>
<td></td>
<td>≥1.2 avg. wage</td>
<td>1</td>
<td>0.903***</td>
<td>0.748*</td>
<td>0.662</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.233)</td>
<td>(0.327)</td>
<td>(0.700)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0.003</td>
<td>0.187</td>
<td>-1.403*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.210)</td>
<td>(0.294)</td>
<td>(0.586)</td>
</tr>
<tr>
<td>Employer branch (ref = public administration, national defense, social security, education, health care, social aid, culture and entertainment)</td>
<td>agriculture, mining, manufacturing, energetics and construction</td>
<td>1</td>
<td>-0.514***</td>
<td>-0.484*</td>
<td>-0.146</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.108)</td>
<td>(0.190)</td>
<td>(0.23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>-0.253**</td>
<td>-0.267</td>
<td>0.700***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.088)</td>
<td>(0.163)</td>
<td>(0.180)</td>
</tr>
<tr>
<td></td>
<td>commerce, car reparation, transportation, gastronomy and hotels</td>
<td>1</td>
<td>-0.532***</td>
<td>-0.705***</td>
<td>-0.461*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.104)</td>
<td>(0.176)</td>
<td>(0.223)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>-0.401***</td>
<td>-0.042</td>
<td>0.898***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.085)</td>
<td>(0.151)</td>
<td>(0.174)</td>
</tr>
<tr>
<td></td>
<td>communication, financial, real estate, scientific and administrative services</td>
<td>1</td>
<td>-0.262*</td>
<td>-0.398</td>
<td>-0.274</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.131)</td>
<td>(0.205)</td>
<td>(0.262)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>-0.364***</td>
<td>0.191</td>
<td>0.643**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.109)</td>
<td>(0.179)</td>
<td>(0.205)</td>
</tr>
</tbody>
</table>
Female employment and parental leave: the case of Poland

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Category</th>
<th>0 – main effect; 1 – interaction effect for first 22 months</th>
<th>Transition to the same job</th>
<th>Transition to the other job</th>
<th>Transition to unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment</td>
<td>yes within 2 years before leave</td>
<td>1</td>
<td>-0.525*** (0.117)</td>
<td>-0.226 (0.184)</td>
<td>-0.264* (0.121)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0.057 (0.083)</td>
<td>-0.196 (0.144)</td>
<td>0.839*** (0.088)</td>
<td></td>
</tr>
<tr>
<td>Number of spells (events + censored)</td>
<td>9115</td>
<td>9115</td>
<td>9115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of events</td>
<td>3377</td>
<td>1368</td>
<td>1462</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBC without covariates</td>
<td>29928</td>
<td>15031</td>
<td>14858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBC with covariates</td>
<td>29534</td>
<td>14908</td>
<td>14647</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** significant at 0.1%; ** significant at 1%; significant at 5%.

Note: Numbers in parenthesis are standard errors. Estimates are unstandardized Cox regression coefficients.

Source: own elaboration.

or other job than those with lower earnings (who are thus more likely to be entitled to child-raising allowance). This difference diminishes after the 22nd month – the earnings level loses its significance as soon as the period of eligibility for child-raising allowance is about to finish. High earnings increase the intensity of voluntarily exiting from parental leave, due to high opportunity costs. This goes in line with the neoclassical economic model of fertility [Becker, 1960]. Transition to unemployment is less likely for women with higher wages and this becomes more visible after the 22nd month; perhaps high earnings can be seen as a proxy for human capital. Length of service plays a relatively small role in the termination of leave due to transition to the same job, but it gains in importance for transition to another job or unemployment (the intensity of both decreases with length of service), though this is rather concerned with the first two years on leave. A decreasing intensity of transition to another job is coherent in view of decreasing mobility in the labor market. Public sector branches are related to a higher intensity of return to the same or other job (though after two years on parental leave the difference is reduced in the case of the same job and it diminishes in the case of another job). This could be explained by the more family-friendly policy that seems to characterize the public sector [Pylkkänen and Smith, 2004]. Direct transition to unemployment is more likely for private sector branches and this effect becomes more pronounced after two years of leave. A record of unemployment is related to a lower intensity of transition to a job in the first two years whilst on leave. It
is possible that women with spells of unemployment are not going to make a successful professional career and therefore they have a smaller opportunity cost of taking longer parental leave. A past record of unemployment is related to a higher risk for the next spell of welfare, which coincides with empirical research for other countries [Harris, 1996].

**Duration of employment after parental leave – estimation results**

**Life tables**

Figure 4 shows the life table hazard and survival estimates of job tenure following parental leave (continuation of the previous job) by type of exit. Transition to unemployment is more rapid during the first 6 months and then the intensity of unemployment significantly falls. The unemployment transition intensity prevails during the first 5 months and then the intensity of transition to another job or self-employment becomes greater. The author used a competing risks approach, assuming implicitly the risk of transition to unemployment and to other employment or self-employment is irrelevant. Because transition to other jobs might be either voluntary or involuntary, modeling exits to unemployment has a clearer interpretation and is more suitable for indicating the possible negative impact of leave on any future professional career.

**FIGURE 4. Life Table hazard and survival estimates of job tenure**

![Life Table hazard and survival estimates of job tenure](source: own preparations based on Social Insurance database.)

Figure 5 presents the life table hazard and survival function estimates on the continued job tenure stratified by the length of the parental leave. Job termination and moving elsewhere but not to unemployment is treated as censoring.
FIGURE 5. Life Table hazard and survival estimates of job tenure terminated by transition to unemployment – the effect of parental leave duration

Source: own preparations based on Social Insurance database.

The intensity of transition to unemployment is high during the first six months and is related to the length of parental leave; then it rapidly decreases. Job protection is warranted under Polish law until the return from parental leave or – in the case of fixed-term contract – the expiry of the contract. However, women that return from leave are at a relatively high risk of redundancy despite the initial warranty of a return to the same position with financial remuneration not lower than before the parental leave. Interestingly, there is no significant peak in the transition to unemployment after 12 months following return from leave. Higher exit rates to unemployment in this period could be expected as the additional job-protection expires for those women who switched to part-time employment after returning from leave.

The duration of parental leave can be a strong determinant when considering job termination due to unemployment; censoring other exit reasons, the survival rate after six months would be respectively 90%, 86% and 70% for females that spent less than 6 months on parental leave, 6 months or more but less than 2 years, 2 years or more. Hazard curves for the crucial determinant are mirroring the proportionality. Therefore, building Cox models for transition to unemployment seems to be justified.

Figure 6 shows the life table hazard and survival estimates of the continued job tenure interrupted by the transition to another job or self-employment, censoring transition to other states. Contrary to the transition to unemployment, it cannot be clearly stated if job termination is voluntary. Therefore, the job switch presented below should not be interpreted as the result of dismissal due to earlier parental leave.

Within the first six months, the transition to another job or self-employment affects slightly more than 20% of female workers. The intensity rapidly decreases after the first 2 months. Consequently, about 64% and 58% women survive respectively 24 and 36 months, given that other exit reasons are treated as censored.
The results of the life table estimation by the length of the parental leave give little evidence that the duration of the parental leave determines the time to a change in employment or transition to self-employment. The shapes of hazard and survival distribution curves as well as tests of equality over strata suggest there is only a slight difference between the intensity of a job switch for both short-term and long-term parental leave. It is possible the leave might have a more pronounced impact during the first year after return than in any subsequent year. However, statistical tests of correlation between the duration of parental leave classes and Schoenfeld residuals do not confirm this claim.

**Cox models**

The estimated results of the Cox model for continued job tenure after parental leave are presented in Table 4. Two models have been estimated: one for the event defined as job termination followed by transition to unemployment and the other for the event defined as job termination followed by transition to other employment or self-employment.

According to Model 4 the risk of unemployment increases along with the duration of parental leave. There are many explanations for this – a very long break in employment leads to human capital depreciation and it is poorly perceived by employers who consider the taking of leave as a signal of low job commitment or, alternatively, the employee is no longer considered necessary because the employer hires another worker that is fulfilling all the duties of the employee currently on leave. Kotowska et al. [2007] notes that finding a replacing worker is one of the most problematic factors for the employer that grants parental leave – therefore the leave-taker may encounter a negative reaction from the employer.

One of the most typical questions related to a reconciliation of the work/family imbalance is about the time female individuals need to work in order to secure their
### TABLE 4. Job tenure after parental leave – Cox models with covariates

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Category</th>
<th>Transition to unemployment</th>
<th>Transition to other job or self-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>parental leave duration (ref &lt; 6 months)</td>
<td>6 months ≤ parental leave &lt; 24 months</td>
<td>0.453***</td>
<td>0.169</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.152)</td>
<td>(0.093)</td>
</tr>
<tr>
<td></td>
<td>≥ 24 months</td>
<td>1.103***</td>
<td>0.468***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.148)</td>
<td>(0.099)</td>
</tr>
<tr>
<td>Years of service (ref = 0-3 years)</td>
<td>4-6 years</td>
<td>-0.339***</td>
<td>0.147</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.102)</td>
<td>(0.092)</td>
</tr>
<tr>
<td></td>
<td>7-10 years</td>
<td>-0.561***</td>
<td>-0.042</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.112)</td>
<td>(0.095)</td>
</tr>
<tr>
<td></td>
<td>11+ years</td>
<td>-0.540***</td>
<td>-0.051</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.120)</td>
<td>(0.099)</td>
</tr>
<tr>
<td>employer branch (ref = public administration, national defense, social security, education, health care, social aid, culture and entertainment)</td>
<td>agriculture, mining, manufacturing, energetics and construction; commerce, car reparation, transportation, gastronomy and hotels</td>
<td>1.379***</td>
<td>-0.612***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.159)</td>
<td>(0.076)</td>
</tr>
<tr>
<td></td>
<td>Communication, financial, real estate, scientific and administrative services</td>
<td>0.985***</td>
<td>-0.077</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.190)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>unemployment (ref = no unemployment spell within 2 years before parental leave)</td>
<td>unemployment spell within 2 years before parental leave</td>
<td>0.794***</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.102)</td>
<td>(0.125)</td>
</tr>
</tbody>
</table>

| | Number of spells (events + censored) | 3565 | 3565 |
| | Number of events | 700 | 1031 |
| | SBC without covariates | 6126 | 8607 |
| | SBC with covariates | 5751 | 8572 |

*** significant at 0.1%; ** significant at 1%; significant at 5%.
Note: Numbers in parenthesis are standard errors. Estimates are unstandardized Cox regression coefficients.

Source: own elaboration.
position on the labor market so that they are able to interrupt their professional career by having and taking care of children. According to the estimated model, the intensity of transition to unemployment decreases with service length for the first seven years, but then we observe stabilization in the intensity for the length of service for periods of more than seven years.

Unemployment record is another determinant for the duration of job tenure following parental leave. Women that have experienced a spell of unemployment in the past are more likely to return to unemployment after returning from parental leave, though the effect can diminish along with time spent in the job after return from the leave. It coincides with other research [Böheim and Taylor, 2002; Gregg, 2001]. It is also worth to refer to Heckman and Borjas [1980] who claim past unemployment changes preferences, prices and constraints that may determine future spells of unemployment. Spells of unemployment are a strong indicator for the prospective employers the candidate is ineffective and therefore workers with an unemployment record are often able to get only less attractive or less secure job positions [Phelps, 1972; Pissarides, 1992].

Public sector branches are more secure for women taking leave than other branches, run mainly by private entities. Such results are coherent with the research from other countries, including the UK [Böheim and Taylor, 2002]. Indeed, public sector is not geared to profit generation and often lacks performance-based orientation. Consequently, while it may pay wages lower than in the private sector, it often supports reconciliation between the work/family imbalance. On the other hand, employment stability for parents returning from leave is also a result of a more complex process of dismissal for those employed in the public sector.

Model 5 confirms the first conclusions from the nonparametric model (Figure 6) that there is no significant impact of the duration of parental leave on transition to another job. We observe only a slight increase in the intensity of such transition for women that have taken very long periods of leave (two years and longer). It may be assumed that these women are redundant, but they have managed to find another job without taking unemployment benefits. Furthermore, the remaining females might move to other jobs voluntarily rather than the as a result of dismissal. The effect cannot be precisely examined as one cannot distinguish between voluntary and involuntary job termination.

Conclusions

The paper has examined the impact of eligibility for child-raising allowance on the length of parental leave as well as the impact of the duration of parental leave on female job tenure following the taking of such leave in Poland. To achieve this, the author has used nonparametric and Cox models with time-varying covariates. Models have been based on a 1% sample of the Polish Social Security’s administrative database.
The estimated models suggest a positive relation between the eligibility for child-raising allowance and the duration of the parental leave. Significant peak of hazard for women quitting the leave to the previous job about 24\textsuperscript{th} month for low-earners along with no such a peak for high-earners might be clear evidence even modest child-raising allowance influences the parental leave length. Therefore, the government might manipulate the effective length of parental leave by changing the eligibility period for child-raising allowance. Past unemployment periods are related to postponing returns to the previous job within first 22 months and with increased risk of returning to unemployment after the leave. Among parental leave takers, workers employed in public sector branches are usually returning faster to their jobs.

The duration of parental leave is positively related to the intensity of transition to unemployment after returning to the same job, due to human capital depreciation, finding a replacing worker or employer antipathy. Increased intensities of transition to unemployment are observed during first 6 months after the return from the long parental leaves. Past periods of unemployment have a scarring effect on the employers that therefore offer less secure jobs; unemployment also indicates low-quality workers that more frequently return to unemployment. Females employed by private enterprises seem to have a higher intensity of transition to unemployment compared to the public sector. Taking long-term parental leave seems not to shape voluntary job switching.

Measuring the impact of the parental leave length on any further employment career progression is possible using the Social Security’s dataset, promotion can be approximated by indicating an arbitrarily defined “significant” rise in the ratio of the individual to the average wage. For example, the relation between unemployment and subsequent earnings for men in the UK between 1984 and 1994 [Gregory and Jukes, 2001] has been examined using an average earnings setback of 10\% on the initial re-engagement as an indicator. Job-protected parental leave aims not only to keep female workers in the labor market but also to improve both the mother’s and child’s health. The economic risks as loss of earned income should be taken into account along with weakening of the relationship with a spouse or partner and weakening of the ties with an employer. Looking at U.S. data, Galtry and Callister [2005] suggested a 6 month leave as optimal for maximizing these criteria in the U.S. context. Therefore, more detailed analysis could be still done to set the optimal length of parental leave for Poland.

The conclusions presented in the article should draw the policymakers’ attention towards the optimal length for parental leave. Regardless of whether very long periods spent on leave are the cause or the consequence of poor work performance, women that take them should be perceived as prone to the transition to unemployment shortly after their return to work. Splitting the parental leave between both parents without the possibility of its transfer from one to another and therefore shortening the parental leave for one parent could be one of the possible solutions. Such a change would reduce the opportunities for long breaks in employment and would also support activities aimed
at reducing the gender gap. The idea should be fostered that remaining out of touch with the employer for a long period reduces the chances for a successful professional career and may actually result in a speedy return to lack of employment. Therefore, mothers spending long periods on parental leave should be encouraged to maintain their competences and keep in touch with their employers during their absence.

Notes

1 Women represent 97% of all parental leave-takers and due to the sample size the analysis has been limited to them.

2 The data contains many ties and therefore the choice of an appropriate method for handling the ties gains importance. Data on employment spells is reported on a monthly basis while the transition to and out of employment may happen on any day during the month. However, for the employees with a permanent contract and a length of service longer than 6 months, periods of notice in Poland finish on the last day of the month. Therefore, the author assumed all permanent contracts were terminated at the last day in the month, which makes the discrete method of dealing with ties more appropriate.

3 Other spells have been excluded from semi-parametric models due to censoring or missing data.

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1. Adamowicz Elżbieta, Department of Economics I, Warsaw School of Economics
2. Bochniarz Zbigniew, University of Washington
3. Confente Ilenia, University of Verona
4. Chłoń-Domińczak Agnieszka, Institute of Statistics and Demography, Warsaw School of Economics
5. Chrabonszczewska Elżbieta, Department of International Finance, Warsaw School of Economics
6. Czarny Elżbieta, Institute of International Economic Relations, Warsaw School of Economics
7. Czyżewska Dorota, Adam Mickiewicz University in Poznan
8. Desalegn Abraha, University of Skövde
10. Dragomirescu Horatiu, Bucharest University of Economic Studies
11. Drelich-Skulska Bogusława, Wroclaw Economic University
12. Dziawgo Leszek, Mikolaj Kopernik University in Torun
13. Fazakas Gergely, Corvinus University in Budapest
14. Freeman Duncan, Brussels Institute of Contemporary China Studies, Vrije Universiteit
15. Głogosz Dorota, Institute of Work and Social Affairs, Warsaw
16. Jones Daniel, Department of Psychology, University of Texas
17. Kerekes Sándor, Corvinus University of Budapest
18. Kluza Stanisław, Institute of Statistics and Demography, Warsaw School of Economics
19. Koleśnik Jan, Collegium of Management and Finance, Warsaw School of Economics
20. Konarski Marcin, Lodz University
21. Koszewska Małgorzata, Technical University of Lodz
22. Kowalski Arkadiusz, Institute of World Economy, Warsaw School of Economics
23. Kowalski Jan, Karlsruher Institut für Technologie
24. Krysiak Andrzej, Collegium of Management and Finance, Warsaw School of Economics
25. Latusek-Jurczak Dominika, Kozminski University, Warsaw
26. Leven Bozena, The College of New Jersey
27. Maciejczyk-Bujnowicz Iwona, University of Łódź
28. Małuszyńska Ewa, Adam Mickiewicz University in Poznan
29. Marczewski Krzysztof, Warsaw School of Economics
30. Maszczyk Piotr, Department of Economics II, Warsaw School of Economics
31. Matysiak Anna, Institute of Statistics and Demography, Warsaw School of Economics
32. Mehta Rajiv, New Jersey Institute of Technology, Newark
33. Mielecka-Kubień Zofia, Economic University in Katowice
34. Mikolajczyk Marcin, Department of Banking, Warsaw School of Economics
35. Mucha-Leszko Bogumila, Maria Curie-Sklodowska University
36. Pietrzak Boguslaw, Collegium of Social and Economic Science, Warsaw School of Economics
37. Płoszajski Piotr, Collegium of Management and Finance, Warsaw School of Economics
38. Próchniak Mariusz, Department of Economics II, Warsaw School of Economics
39. Radło Mariusz-Jan, Institute of World Economy, Warsaw School of Economics
40. Roberts Andrew, Northwestern University
41. Rockett Katharine, University of Essex
42. Rószkiewicz Małgorzata, Collegium of Economic Analysis, Warsaw School of Economics
43. Shi Jian, Sichuan University
44. Starzyk Kazimierz, Torun Private University
45. Suszyński Cezary, Institute of Management, Warsaw School of Economics
46. Szemán Zsuzsa, Hungarian Academy of Sciences
47. Szambelaneczyk Jan, Adam Mickiewicz University in Poznan
48. Szumlich Tadeusz, Collegium of Social and Economic Science, Warsaw School of Economics
49. Tiganașu Ramona, Alexandru Ioan Cuza University of Iași, Romania
50. Williams Jonathan, Bangor Business School, Bangor University
51. Witek-Hajduk Marzanna, Institute of International Management and Marketing, Warsaw School of Economics
52. Ziółkowska Marta, Institute of Management, Warsaw School of Economics
53. Żukrowska Katarzyna, Collegium of Social and Economic Science, Warsaw School of Economics
54. Zachorowska-Mazurkiewicz Anna, Jagiellonian University