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Grzegorz Lechowski

**Beyond “dependent development”
in a high-tech industry?
The interplay between domestic institutions
and transnational sectoral governance in the
trajectories of emerging Polish IT firms**

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Beyond “dependent development” in a high-tech industry?

The interplay between domestic institutions and transnational sectoral governance in the trajectories of emerging Polish IT firms

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Abstract

The present study adds to the ongoing discussions on the economic and industrial change in postcommunist Central Europe by investigating in-depth the case of a relatively successful development of two large domestic IT firms from Poland. The case is theoretically interesting because it calls into question the dominant perspective on industrial transformation in the region which focuses on the role of foreign direct investment (FDI). The presented empirical analysis uses rich historical data to reconstruct the strategies of the two Polish firms regarding: sales market operations, corporate finance, and productive organization. The study's general assumption is that the relatively successful development of the two analyzed companies has been shaped by the interplay between home-country conditions and the governance structure of the transnational enterprise IT (EIT) industry. The conducted analysis indicates, first, that the firms have benefited from a well-functioning local capital market, the domestic supply of high-skilled labor, and some characteristics of the home country sales market. Second, the study reveals that the firms' development has been conditioned by the ongoing "modularization" processes in the EIT sector. In their initially home market oriented operations, the analyzed firms focused on the downstream segments of the EIT value chain while sourcing the more high-tech components (e.g. databases) from collaborations with foreign suppliers. In general, the results of the study suggest that a more nuanced perspective on the ongoing processes of industrial change in Central Europe than the one proposed in the existing literature is needed.

Key words: IT industry, emerging-country firms, Poland, postcommunist Europe

JEL classification: P12, P16, L86

Über die „abhängige Entwicklung“ hinaus? Wachstumsstrategien aufstrebender polnischer IT-Firmen zwischen lokaler Einbettung und Transnationalisierung der Wertschöpfungsketten

Zusammenfassung

Die vorliegende Studie untersucht eine relativ erfolgreiche Entwicklung von zwei heimischen IT-Unternehmen aus Polen und trägt dadurch zu aktuellen Diskussionen über den Industriewandel im Mitteleuropa bei. Der analysierte Fall ist von theoretischer Relevanz, da er die dominante Perspektive auf die wirtschaftliche Entwicklung in der Region, die eine Abhängigkeit von ausländischen Direktinvestitionen (FDI) in den Vordergrund stellt, problematisiert. Die Analyse baut auf umfangreichen historischen Daten auf, um die Strategien der zwei Unternehmen hinsichtlich Produktmarktpositionierung, Unternehmensfinanzierung und Produktionsorganisation zu rekonstruieren. Die leitende Annahme der Studie ist, dass die relativ erfolgreiche Entwicklung der beiden polnischen Firmen durch ein Zusammenspiel von länderspezifischen Kontextbedingungen und der Governance-Struktur der globalen Enterprise-IT-Industrie geprägt wurde. Die Analyse zeigt erstens, dass die Unternehmen von einem gut funktionierenden lokalen Kapitalmarkt, dem inländischen Angebot an hochqualifizierten Arbeitskräften sowie einigen Charakteristiken des Binnenmarktes profitiert haben. Zweitens zeigt die Studie, dass die Entwicklung der Unternehmen durch die Modularisierungsprozesse im globalen Enterprise-IT-Sektor bedingt war. In ihren anfänglich binnenmarktorientierten Strategien konzentrierten sich die analysierten Unternehmen auf Downstream-Segmente der EIT-Wertschöpfungskette, während sie die Hightech-Komponenten (z. B. Datenbanken) aus Kooperationen mit ausländischen Lieferanten bezogen. Die Ergebnisse der Studie weisen darauf hin, dass eine differenziertere Perspektive auf die laufenden Prozesse des Industriewandels im Mitteleuropa als in der vorhandenen Literatur erforderlich ist.

Schlüsselwörter: IT-Industrie, Schwellenländerunternehmen, Polen, postkommunistisches Europa

JEL Klassifikation: P12, P16, L86

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1. Introduction

1.1. *Dependent growth, domestic IT firms, and varieties of economic coordination in Poland*

Following the adoption of neoliberal reform policies in Central Europe after 1989, the region's economic development has been largely driven by an inflow of foreign direct investment (FDI) into manufacturing sectors—such as automotive or electronics—and a specialization in lower-cost products and less innovative value-chain activities (Bohle, 2018; Bohle & Greskovits, 2012; Jürgens & Krzywdzinski, 2010; King, 2007; King & Szelenyi, 2005; Nölke & Vliegenthart, 2009; Pavlínek, 2017). According to the theory of “dependent market economies” (DME) proposed by Nölke and Vliegenthart (2009), the successful development of the foreign-led manufacturing sectors in the four “Visegrád” economies (Czechia, Hungary, Poland, and Slovakia) reflects the fact that these countries have created coherent “institutional frameworks” geared towards the needs of the incoming multinational firms (MNCs). Furthermore, Nölke and Vliegenthart (2009) suggest that the cross-border intrafirm “hierarchies” linking the innovation-critical resources in MNCs’ “home” countries with low-cost productive capabilities in Central Europe are the only mode of “economic coordination” (Hall & Soskice, 2001) able to foster the growth of internationally competitive industries in the Visegrád region.

While the emphasis put by Nölke and Vliegenthart (2009) on the role of transnational “linkages”—and, more broadly, on the role of external “dependencies”—for economic development in Central Europe has been generally well received in the literature, the DME theory also provoked much critical debate (see e.g. Bluhm, 2010; Drahekoupil & Myant, 2016; Jasiński, 2013; Myant, 2018). It was indicated, for instance, that the concept overemphasizes the influence of the foreign capital on institutional change in the Visegrád countries (Drahekoupil & Myant, 2016); or that its rather pessimistic view of the region's future trajectory has been challenged by the relatively good performance of the four economies—and especially Poland—since the last global crisis (Bluhm, 2014; Bohle, 2018; Šćepanović & Bohle, 2018). Taking a more dynamic perspective on the Central European capitalist “varieties”, Naczyk (2014) pointed out that recently, some governments in the region have started reversing the earlier neoliberal agendas in favor of more interventionist industrial policies—strongly supported by the local capital.

The present study wants to add to the ongoing discussions around the DME concept by highlighting the question about a relatively successful development of various *domestic firms* from Central Europe, whose emergence indicates that also other effective modes of economic coordination than FDI may exist in the region. And more specifically, this study does so by conducting an in-depth historical analysis of two emerging Polish IT multinationals, Asseco and Comarch, which are perceived as the country's most competitive firms in the IT sector (see e.g. PARP, 2017)¹. On the one hand, these two companies share various key characteristics with a few other relatively large or mid-sized Polish IT enterprises. For instance, both were established from scratch by private entrepreneurs after 1989, and both have specialized in the provision of software and services to organizational clients such as public administration, financial sector, or private businesses². But at the same time, these two firms represent “extreme” cases in comparison with other IT enterprises from Poland in that they have managed to grow large (in terms of both revenues and employment) and have significantly internationalized their operations. In general, their successful development may be seen as surprising given the strong presence of various large multinational players such as IBM, Oracle, or SAP in the Polish EIT market. Tables 1 and 2 below present some basic data on the two case-study companies and compare them with other emerging-market IT firms (see also Appendix 1 and 2 for historical revenues).

While the existing literature on industrial change in Central Europe has focused mostly on the MNC-led manufacturing sectors, several analyses of the region's IT industries and firms provide insights that may be helpful in explaining the successful growth of the two emerging Polish IT multinationals. First, many studies emphasize the role of the *local workforces*. For instance, authors investigating the offshoring of IT services to Central Europe drew attention to the region's comparative advantage based on the availability of highly educated but, in international comparison, relatively cheap labor (see e.g. Capik & Drahekoupil, 2011; Hardy & Hollinshead, 2016; Micek, 2015). The critical role of

¹ In addition to the IT sector, a further critique of the DME theory could focus on relatively strong domestic firms from various more traditional industries—for instance, in the Polish case, the large state-owned enterprises (SOEs) in the oil, gas, and energy sectors, or the medium-sized firms in the furniture industry.

² For the purpose of the present study, I will refer to this specialization within the IT sector as “enterprise IT” (EIT). Section 3 provides a more detailed characterization of the EIT industry.

this factor was emphasized also in the research on some successful domestic IT firms from Central Europe—such as the three globally active antivirus-software producers from Czechia and Slovakia examined by Beblavý and Kureková (2014), or the Hungarian IT startups discussed by Csonka (2013). Second, focusing on the characteristics of the Polish national context, Kubiela (2000) pointed to the positive influence of the country’s *capital market* and a relatively large *domestic demand* for IT products and services on the development of the local IT sector. And finally, *third*, some researchers drew attention to various *transnational conditions* contributing to the growth of indigenous IT firms from Central Europe. For instance, an early analysis by Linden (1998) highlighted the case of the Hungarian company GraphiSoft, specializing in architectural-design software, and emphasized the positive impact of a cross-border technological partnership and of a direct involvement by a foreign financial investor since the mid-1990s (see also Sadowski, 2001). Another author, Martin (2013), related the relatively successful development of some software firms from Central Europe to the structural characteristics of the IT industry, which gives the local producers more “autonomy” vis-à-vis the global sectoral players than, for instance, the capital-intensive and hierarchically organized automotive industry.

Table 1: Basic data on the two case-study companies

	<i>Asseco Group</i>	<i>Comarch Group</i>
<i>Sectoral specialization</i>	Enterprise software and services	
<i>Year established</i>	1991	1993
<i>Worldwide employment 2016</i>	ca. 22,000	ca. 5,300
<i>Consolidated revenue 2016</i>	7.93 billion PLN (1.82 billion EUR)	1.11 billion PLN (255.7 million EUR)

Note: revenues in Polish złoty (PLN) and euro (EUR), based on the 2016 avg. exchange rate (ECB, 2018)
Sources: Asseco (2017a), Comarch (2017b)

Table 2: Case-study companies compared with other emerging-market software producers

<i>Rank</i>	<i>Company</i>	<i>HQ Country</i>	<i>Software revenue (2014)</i>	<i>Total revenue (2014)</i>	<i>Software as % of total revenue</i>
1	Kaspersky Lab	Russia	\$695 m	\$711 m	98%
2	TOTVS	Brazil	\$584 m	\$752 m	78%
3	Neusoft	China	\$508 m	\$743 m	68%
...
13	Asseco	Poland	\$126 m	\$1,973 m	6%
...
19	Comarch	Poland	\$88 m	\$329 m	27%

Notes: all revenues in millions (m) of US dollars
Source: PwC (2016)

1.2. Overview of the analysis

The present paper uses qualitative case-study method (De Vaus, 2003) to account for the relatively successful growth of the two emerging IT multinationals from Poland, Asseco and Comarch. By focusing on two cases, the analysis will try to control for various firm-specific characteristics in order to develop more general observations about the influence of the Polish context and the transnational conditions of the EIT industry on the growth of domestic firms from this sector. When reconstructing the historical paths of the two analyzed firms, the study will use rich archival data covering the time between the early 1990s (when both companies were founded) and late 2017 (when the data collection ended). More specifically, the used dataset contains three different kinds of documents (*triangulation*): (1) current and annual *company reports*; (2) *media coverage* from trade press and mainstream media; and (3) various *scholarly articles*, including rare empirical analyses of the two studied firms (mostly from management studies). In quantitative terms, the dataset used in this paper contains over 6,500 documents on Asseco and over 2,700 on Comarch—with the difference resulting from the former firm’s more complex history, involving several large mergers and acquisitions both in Poland and abroad.

The following analysis is organized into five sections. In the next part, I develop a heuristic framework for the empirical investigation by integrating two sociological perspectives on the structural conditions of firm behavior—the comparative capitalism (CC) approach (Jackson & Deeg, 2008) and the

global value chains (GVC) analysis (Gereffi, Humphrey, & Kaplinsky, 2001). In Sections 3 and 4, using literature review and statistical data, I reconstruct relevant characteristics of the transnational EIT industry and introduce the context of the Polish political economy. The main focus of the third section is the historical process of “modularization” within the EIT sector—reflecting a broader structural change in the US-American IT industry (Borrus & Zysman, 1997; Sturgeon, 2002)—and its possible implications for the corporate strategies of emerging-country firms, like Asseco and Comarch. Following this, the fourth section answers the question about the extent to which the context of the Polish national economy has provided relevant support for domestic companies from the EIT sector. The in-depth historical analysis of the two case-study firms is presented in Section 5. The final part of the paper summarizes the results emphasizing to two key findings. *First*, it is indicated that the two Polish IT multinationals have followed relatively similar strategies, which benefited from various characteristics of the domestic political-economic context—such as from the well-functioning local capital market or from the specific “social structure” (Swedberg, 2005) of the domestic market for EIT products and services. And *second*, for the development of the two studied firms critically important was their embeddedness into the modularized value chains of the transnational EIT sector.

In sum, by highlighting various commonalities in the historical paths of the two emerging Polish IT multinationals, this study indicates that a more nuanced perspective on industrial change in Central Europe than the one suggested in the DME theory (Nölke & Vliegthart, 2009) is needed.

2. Analytical framework

2.1. A “multilevel” approach

My analysis starts from the assumption that in order to account for the relatively successful development of the two Polish IT multinationals, we need to take into consideration the *interplay* between the firms’ home-country institutional context and the organizational structures of the transnational EIT sector. By doing so, this study responds to numerous recent calls for a greater recognition of the “competing impact of different levels of governance” (Lane & Wood, 2009) on firm behavior (see also e.g. Bluhm, 2010; Cusmano, Morrison, & Rabellotti, 2010; Lane, 2008; Plank & Staritz, 2015; Teipen, 2016). At the same time, the proposed analytical framework should be seen as an extension of the theoretical perspective implied by the DME theory (Nölke & Vliegthart, 2009), which emphasized the complementary influence of various cross-border “dependencies” on nationally embedded economic processes.

2.2. The context of the national economy

In order to conceptualize the influence of the national context on firm development, the present analysis uses the perspective of comparative capitalism (Jackson & Deeg, 2008). This approach emphasizes that country-specific constellations of formal and informal institutions regulating various key aspects of economic activity—such as employment relations, the functioning of financial markets, or skill provision—create distinct national “logics” of firm behavior (Jackson & Deeg, 2008). A key contribution to the CC literature has been the ideal-typical distinction between two major capitalist “varieties” suggested by Hall and Soskice (2001). While the highly regulated institutional frameworks of the “coordinated market economies”, such as Germany, were thought to foster corporate strategies based on multi-actor coordination (evident, for instance, in matters of skill provision), the more “fluid” labor and capital markets characteristic of the “liberal market economies”, such as the USA, were said to incentivize more dynamic business models focused on “radical” innovations.

However, while the present study generally acknowledges the influence of the national institutional contexts on corporate strategies, the proposed analytical framework incorporates also two important suggestions from the critical debate on the overly deterministic implications of the original CC perspective. First, there is the question of *firm agency*. Several critics emphasized that firm practices cannot simply be “read off” (Casper & Soskice, 2004) from the characteristics of the country-level institutions and that economic actors are often able to take *entrepreneurial measures* in order to develop business models less suited to a given national framework. As specified by Herrmann (2008), besides simply pursuing “atypical” practices within their national contexts, firms may also follow an *internationalization* path by relocating their operations abroad or by “importing” the needed resources, such as labor or finance. The second widely recognized problem with the original CC perspective is that the theory disregarded the *internal complexity* of national-institutional settings. Several commentators have

suggested that even in the most established capitalist economies the institutional frameworks are internally diverse and able to support various dissimilar “logics” of corporate behavior (Lange, 2009; Schneiberg, 2007).

2.3. *Transnational sectoral governance*

Regarding the influence of the sectoral structures on firm strategies, the present study builds on the suggestion in the recent GVC literature that the dynamics of national IT sectors and firms cannot be adequately understood without putting them into the context of broader interdependencies within the *global* IT industry (Thun & Sturgeon, 2017). In order to unpack the influence of such cross-border sectoral factors, this study incorporates the basic ideas of the GVC analysis.

The starting point of the GVC theory is the observation that geographically dispersed economic activities in various industries are becoming increasingly integrated to form “globalized coordination systems” (Gereffi, 1994). The main conceptual tool which the GVC analysis uses to investigate this kind of cross-border organizational arrangements is the notion of value-chain *governance structure*, which can be defined as the overall logic of interorganizational relations within a given industrial value chain (Gereffi, 1994; Gereffi, Humphrey, & Sturgeon, 2005). According to the original GVC perspective, this overall logic is largely shaped by some particularly influential value-chain actors (the “lead firms”) who—given their market power or control over key assets—are able to influence the operations of other value-chain participants, including the latter’s entry and upgrading opportunities.

The GVC framework has been used and further specified to analyze various industrial sectors in different transnational contexts. For the purpose of the present analysis, particularly relevant is the application of the concept proposed by Brandt and Thun (2011), who investigated upgrading processes in the Chinese mobile telecom sector. For one thing, their analysis showed how globally changing product designs in this industry—and more specifically, the industry’s shift from integral to modular product architectures—lowered the technological barriers for domestic companies to enter into independent production and, thereby, redefined the position of the local firms vis-à-vis the global sectoral actors. In this way, Brandt and Thun (2011) showed that technological characteristics of a given value-chain product (e.g., its “design rules”, Baldwin & Clark, 2000) are themselves an important form of value-chain governance. And second, Brandt and Thun’s (2011) study of the Chinese mobile telecom sector demonstrated that a key variable explaining the upgrading outcomes of “latecomer” firms in global technology sectors is the question of which “end market” is targeted by a given value chain. More specifically, in the empirical case analyzed by Brandt and Thun (2011), the superior knowledge of the *local market* possessed by the domestic producers provided the latter an important advantage—at least a temporary one—over various global sectoral players.

2.4. *Empirical research question*

Drawing on these conceptual insights from the theories of comparative capitalism and the global value chains, the following empirical analysis examines the developmental paths of the two emerging Polish IT multinationals as processes embedded both in the institutional context of the home country and in the cross-border governance structures of the EIT industry. More specifically, the presented analysis attempts to assess *how various transnational–sectoral and within–country conditions influenced the development of the two firms* regarding their: (1) *sales market operations*, (2) *corporate finance*, and (3) *organization of productive and innovative activities*.

3. Governance structure of the transnational enterprise IT sector

3.1. *Technological and organizational change in the EIT sector*

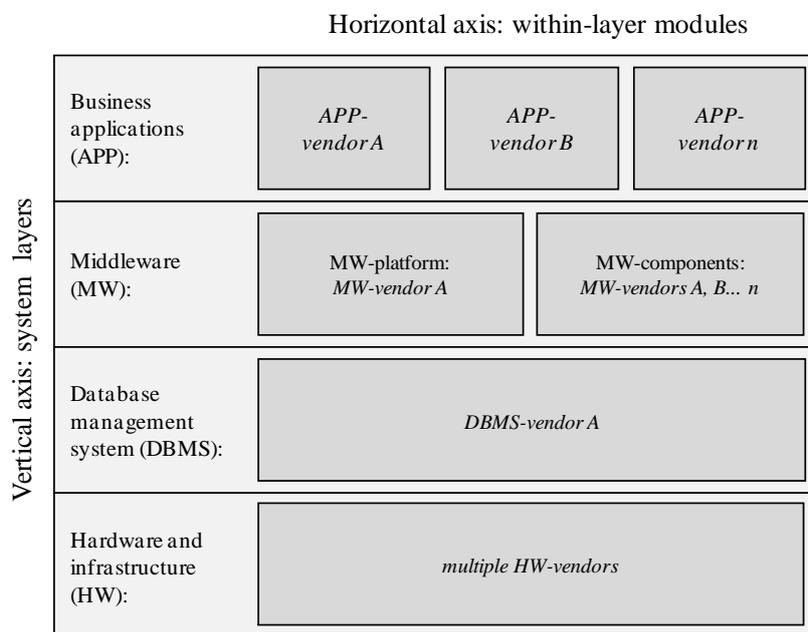
Around the time when the two case-study companies were founded (i.e., in the decade after the mid-1980s), the transnational EIT sector³ underwent a fundamental technological and organizational change. This was linked to a more general transformation across the entire IT industry, which moved from a

³ Using the NAICS classification, the sectoral specialization of the two case-study firms encompasses the following two categories: (1) NAICS 5112: “software publishers”, and (2) NAICS 54151: “computer systems design and related services” (see NAICS, 2017a; NAICS, 2017b). The third general category belonging to the EIT value chain is the production of enterprise hardware like data-center servers, large-scale storage systems, or enterprise network equipment by such companies as Hewlett-Packard, Dell, or Cisco.

vertically integrated mode of production towards a more fragmented, vertically specialized one (see e.g. Borrus & Zysman, 1997; Hart & Kim, 2002; Lazonick, 2009; Lüthje, 2004; Macher & Mowery, 2004). As Borrus and Zysman (1997) have shown using the example of the personal computer (PC) sector, in the mid-1980s, a new model of industrial governance characterized by loose cooperation and, at the same time, intense competition between highly specialized component suppliers emerged in the industry. Although it originally developed in the US context, this new paradigm has strongly influenced the way IT production has been organized globally.

Within the EIT sector itself, the technological and organizational change was equally profound. In earlier decades, the industry was dominated by a small number of large, vertically integrated companies which delivered “complete” enterprise information systems. The typical example of this historical productive model is the American giant IBM (see e.g. Borrus & Zysman, 1997; Campbell-Kelly, 2004; Hart & Kim, 2002; Yost, 2017), which until the mid-1980s developed mostly “closed” IT systems with proprietary interfaces and, as a services provider, focused on installing and maintaining its own proprietary products (see Gerstner, 2002). However, this vertically integrated paradigm quickly eroded in the mid-1980s (Mowery, 2009), resulting from two closely related developments. *First*, with the advent of technologies such as PCs, client-server architectures, and “open” operating systems (e.g. UNIX), the sector shifted from “integral” designs towards more “modular” ones. Enterprise IT solutions, which had hitherto been constructed as internally complex, tightly coupled systems, were now divided into functionally autonomous sub-units (or “modules”) communicating through standardized and more or less “open” interfaces. An important organizational implication of this was that the individual “modules” could—in principle—be designed and produced by *relatively independent firms* (Langlois, 2003). And *second*, originally in the US context, a number of *highly specialized EIT companies* emerged—such as Oracle and Informix for software, or Cisco for hardware components. The rapid market success of these “specialist” suppliers put the incumbent firms like IBM under enormous pressure—eventually forcing the latter to adjust their business strategies (Lazonick, 2006).

Figure 1: Schematic modular structure of an enterprise IT system



Source: author based on Fan, Stallaert, and Whinston (2000); Kude and Dibbern (2009); Kumar, Esteves, and Bendoly (2011)

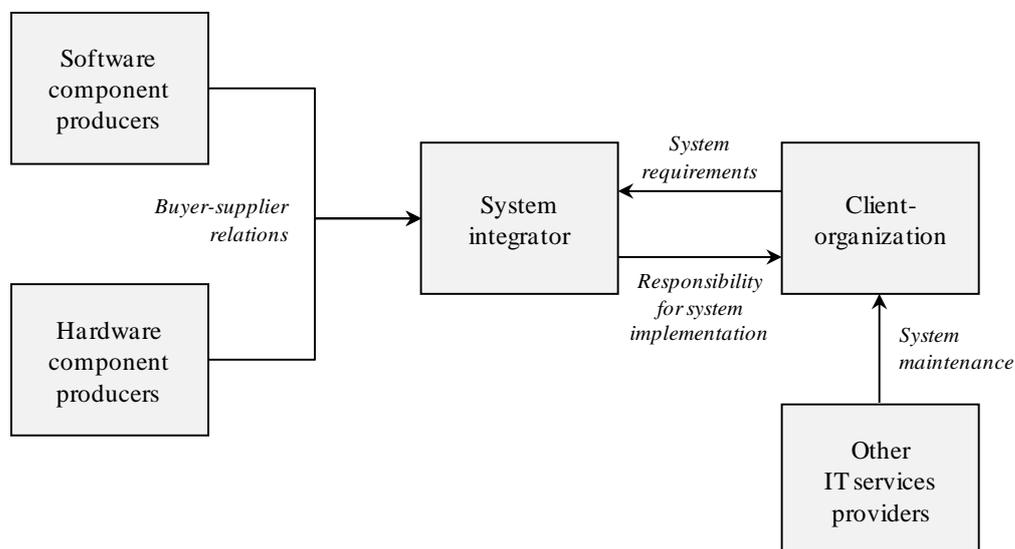
Figure 1 above, describes in more detail the technological structure of the new, “multivendor” (Davies, Brady, & Hobday, 2007) enterprise information systems. As the Figure suggests, we may generally identify two dimensions according to which the EIT systems have modularized. *First*, on the *vertical axis*, there are various layers of the EIT systems—*hardware*, comprising all the physical devices; and several *software* layers, including: database-management systems, middleware, and, at the highest level, business applications. As far as the specialist suppliers’ product market strategies are concerned, during the

decade or so after the shift to the modular architectures, the dominant tendency among the software firms was to develop products for a single system layer. For instance, the US company Oracle focused on producing database-management systems, while the German company SAP specialized in higher-level business applications. Today, however, the leading specialist software firms usually provide products for several system layers—as indicated, for instance, by the growing competition between SAP and Oracle in the business-applications segment (Campbell-Kelly & Garcia-Swartz, 2010). And *second*, along the *horizontal* axis shown in Figure 1, the system layers are further divided into various smaller functional units. While this “horizontal” modularity is already a well-established characteristic of at the level of hardware, it is a more recent development within the EIT software layers. As observed by Kude and Dibbern (2009), the emergence of various advanced middleware solutions (since the late 1990s or so) has been necessary to enable a smooth integration of multivendor applications. One of the main advantages of the ongoing “horizontal” specialization within the EIT software layer is that various business applications, such as ERP⁴ packages, can now be developed by more specialized producers in a more “customized” way (Kude & Dibbern, 2009).

3.2. New opportunities for emerging-country players

Drawing on the above observations about the technological and organizational modularization in the EIT sector, this section discusses the possible implications of these processes for emerging-country firms like Asseco and Comarch, who specialize in EIT software and services. *First*, regarding the services segment—which is seen as an important entry pathway into the IT sector for firms from developing contexts (Schware, 1987)—existing literature suggests that the vertical fragmentation of the EIT industry has created an increased *demand for integrative services*. This results from the fact that the diverse EIT components—including both the hardware and the standardized or tailor-made software “modules”—have to be “assembled” into a well-functioning, organization-specific “solution”. As was observed by Dosi, Hobday, Marengo, and Prencipe (2005), in many sectors undergoing processes of “modularization”—including the enterprise IT industry⁵—there emerges a new key technological capability: “integrative knowledge”, required to manage interfaces and compatibilities across multivendor technologies.

Figure 2: Schematic value chain for the EIT sector



Source: author, loosely based on Kashibe (2006)

And *second*, the literature indicates an important consequence of the modularization processes for emerging-country firms related to the dissemination of *platform-based strategies* (Gawer, 2014) in soft-

⁴ ERP stands for “Enterprise Resource Planning” and refers to business applications supporting various organizational operations like HR, production planning, sales, or distribution.

⁵ The authors refer to the EIT sector as an industry developing “corporate IT networks”.

ware production. While in the old, vertically integrated paradigm, the dominant firms wanted to prevent their products from being interoperable with those developed by competitors (Borrus & Zysman, 1997), in the modularized EIT sector, the strategies of leading producers focus on ensuring a widespread adoption of their component technologies (e.g., databases) among developers of higher-level “modules” (e.g., business applications). By doing so, the key software suppliers hope to turn their products into industry-wide “de facto standards” (Borrus & Zysman, 1997). From the perspective of the emerging-country firms, a key implication of this new sectoral logic of competition is that they are now able to create their own innovative products by building on the state-of-the-art “platform” technologies provided by global IT players. One example of a “latecomer” producer that followed this kind of strategy was the Indian IT company i-flex Solutions, specializing in software for the financial sector. The firm’s international success was conditioned by a number of factors—including its close ties to the multinational investment bank Citigroup, or its business model focused on clients from emerging rather than developed markets. But the firm’s ability to produce competitive software for the global financial sector resulted most directly from its close collaborations with several American suppliers of key components—such as Oracle, Microsoft, or IBM. As Baba and Tschang (2004) observed, i-flex’s successful financial IT products were, in fact, higher-level business applications based on database software provided by Oracle.

4. The enterprise IT industry in the Polish setting

4.1. A sector-in-country perspective

In this section of the analysis, a *sector-in-country perspective* (Donnelly, Grimshaw, & Miozzo, 2011) will be applied in order to assess how conducive the Polish political-economic context has been for the development of domestic companies from the EIT sector. In doing so, the analysis will focus on describing the potential support on which the firms could build regarding the three main dimensions of their developmental strategies: (1) the corporate finance; (2) the productive and innovative capabilities (or “technological capabilities”, Heeks & Grundey, 2004), and (3) the sales market operations. As to the *first* aspect, analyzed will be relevant sources of external financing available for entrepreneurially oriented IT firms in Poland. For the *second* dimension, the analysis focuses on the domestic supply of resources relevant for building in-house capabilities by firms. And finally, *third*, concerning the sales market strategies, examined are characteristics of the local demand for EIT products and services.

4.2. The national financial system

Access to external funding is a key issue for emerging EIT firms who want to develop new productive capabilities, bring innovative products to the market, or expand internationally—to name just a few possible upgrading strategies. Recognizing that IT industries are quite vulnerable to technology-related uncertainties, comparative capitalism literature suggests that the optimal institutional environment for the development of IT firms should include stock and private equity markets able to supply “risk-friendly capital” (Vitols & Engelhardt, 2005). In addition, this literature argues that due to their focus on more secure investments, the bank-based financial systems characteristic of Western European economies (e.g., Germany) represent a less optimal context for IT industries (Casper & Soskice, 2004).

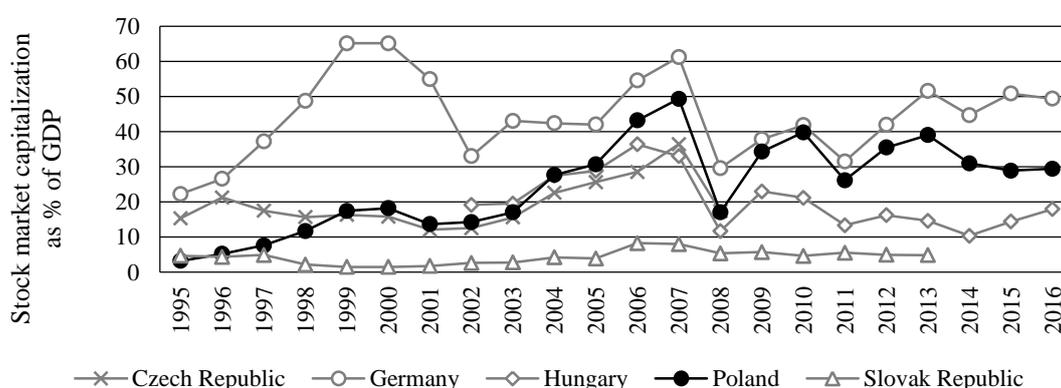
How conducive is the Polish context for the development of indigenous entrepreneurial IT firms—given their preference for “risk-friendly” finance? According to the “dependent market economy” concept (Nölke & Vliegenthart, 2009), the Polish financial system should not be in a position to provide much relevant support. As Nölke and Vliegenthart (2009) emphasized, a central characteristic of the DME economies is their reliance on financial capital supplied by foreign-owned banks. In the case of the Polish financial system, the foreign share of total commercial bank assets had risen dramatically from about 17 percent in 1998 to the level of 60–70 percent in the years 2000 to 2014 (NBP, 2016)⁶. In addition, as observed by Martin (2013), the locally operating foreign banks have focused their lending mostly on MNCs, and not on indigenous industries.

However, the Polish financial landscape is, in fact, more heterogeneous than the DME concept suggests. Most importantly from the standpoint of domestic IT firms, apart from the largely foreign-con-

⁶ Most recently, the foreign share of total bank assets in Poland fell below 50 percent, resulting from a state-supported takeover of the country’s second largest bank by domestic investors in 2017 (ITA, 2017).

trolled banking sector, the country also has a relatively well-developed *capital market* that may be able to supply the required risk-tolerant finance (see e.g. Martin, 2013). One general indication of this is that, in 2017, an established global benchmark provider, FTSE Russell, reclassified Poland’s stock market from “emerging” to “developed”—the first such case in postcommunist Central Europe (FTSE, 2017). Additional support for this thesis emerges when we consider the historical development of Poland’s capital markets in regional comparison. The Warsaw Stock Exchange (WSE), the key institution of the Polish financial market, has grown dynamically since its launch in 1991 and become the largest stock market in postcommunist Central Europe—both in relative and absolute terms (Figure 3). In the early 1990s, WSE’s development was boosted by the government’s privatization policy, which used stock trading as one of the key mechanisms of ownership transfer to nonstate investors (Tamowicz, 2006). Furthermore, since 1999, the growth of WSE has been stimulated by investments of domestic private pension funds, who are legally required to invest 40 percent of received contributions in WSE-listed companies (Wilinski, 2012). And second, regarding private equity funding⁷, the market started developing in Poland as early as 1989—initially driven by foreign actors. For instance, the first private equity fund established in Poland was sponsored by the Danish government, and the second one had US Congress support (Kalinowska-Beszczynska, 2013). Looking at the contemporary Polish private equity sector, we see that although foreign capital has generally remained dominant, the share of domestic investors has slightly increased—reaching about 13 percent in 2009 (Kalinowska-Beszczynska, 2013). And regarding its overall size, the country’s private equity market is currently the largest in postcommunist Central Europe (Dunin-Wąsowicz & Pradelle, 2014; Klonowski, 2011; Martin, 2013). But at the same time, both the stock and the private equity markets in Poland remain small when compared with those in the most advanced capitalist economies—the ratios of stock capitalization and private equity investment to GDP are comparable to, but lower than those observed in Germany, a traditional bank-based economy (Figures 3 and 4).

Figure 3: Stock market capitalization of listed domestic companies as percentage of GDP in Poland and selected countries



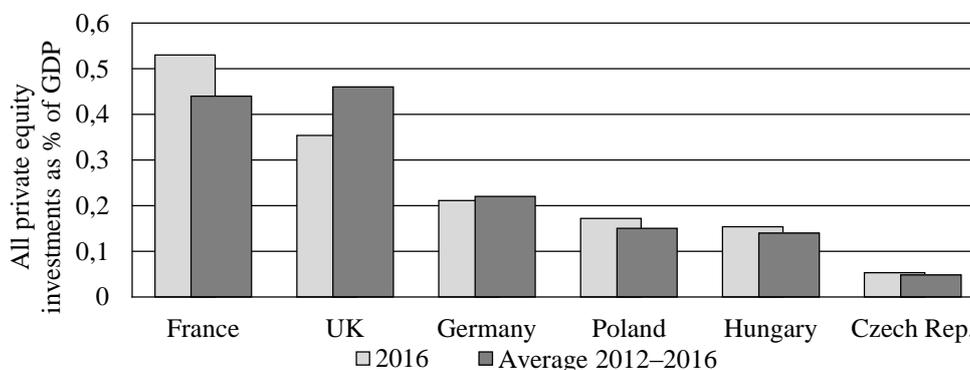
Source: World Bank (2017)

From the microlevel perspective of firms, however, the mere presence and size of a capital market is not the crucial point. Vitally important are also regulations regarding, for instance, the firms’ market-entry or corporate governance. In this respect, the WSE’s institutional design presents both advantages and disadvantages for emerging entrepreneurial companies. *First*, its rather stringent disclosure standards (Bluhm, 2007)—e.g., the requirement to publish quarterly reports—may be seen as a “beneficial constraint” (Streeck, 1997). On the one hand, these regulations impose an obvious burden on firms; but at the same time, they may increase investors’ trust in the market. *Second*, the WSE’s code of conduct follows a “comply or explain” approach (Martin, 2013), which sets clear corporate governance standards, but leaves the firms some important leeway regarding their actual behavior. A perhaps more problematic issue relates, *third*, to the regulations on shareholder power, which allow a differential weighting of shares (Federowicz, 2003; Martin, 2013). While this gives the listed firms the possibility to combine equity financing with concentrated strategic control, the presence of unequal power structures within a listed company may discourage involvement of external investors. And finally, *fourth*—and

⁷ By private equity funding, I mean various forms of medium- to long-term finance (including venture capital) provided by external investors in exchange for a stake in a hitherto unquoted company (Arnold, 2010).

perhaps most unfavorably for emerging entrepreneurial companies—the WSE has relatively stringent listing requirements, which may represent a serious entry barrier for young firms (Köke & Schröder, 2002; Stringham, Boettke, & Clark, 2008). In order to mitigate this negative effect, the WSE has, however, created various “secondary” floors with lower requirements (Klonowski, 2011)—like the so-called “free market” (until 2001) or “parallel market”.

Figure 4: Total private equity investments as percentage of GDP in Poland and selected countries (considering location of the portfolio company)



Source: Invest Europe (2017)

4.3. Technological capabilities

In this section, I analyze the external domestic support on which EIT companies operating in Poland can rely when building and upgrading their in-house technological capabilities. In doing so, I rely on the following two assumptions. *First*, I start from the observation that because both IT services and software production are *skill-intensive* activities (Berrebi-Hoffmann, Grimshaw, Lallement, & Miozzo, 2010; Rousseva, 2010), the development of the EIT sector is likely to depend on the presence of an academic education system able to supply a sufficient number of *tertiary graduates in computer sciences*. In addition, as suggested by the comparative capitalism literature (Casper & Soskice, 2004), *flexible labor market regulations* allowing firms to adapt their human capital strategies to technological change will be beneficial for the companies—although disadvantageous for the employees. And *second*, related to the enterprise-software segment, I assume that because software firms require significant *R&D inputs* to develop innovative products (Kozul-Wright & Howells, 2002; Mowery, 1999), the growth of domestic EIT industry will benefit from a high availability of extramural R&D support—either directly from the state (e.g., in the form of financial subsidies) or from various public research institutions (e.g., in the form of external knowledge inputs).

Given these two above assumptions, what kind of relevant support can EIT companies operating in Poland rely on? First, regarding the *external provision of R&D inputs*, the existing literature suggests that the Polish “innovation system” (Mowery & Oxley, 1995) suffered a major crisis after the transition to capitalism—and has not yet entirely recovered (Hardy, 2007; Jasiński, 2013; Martin, 2013). One possible indicator of this can be found in the data on *gross R&D expenditure*. For instance, in 2001, total spending on R&D in Poland was at 0.6 percent of GDP—which was low even in comparison with the other post-communist economies (Hungary: 0.9%, the Czech Republic: 1.1%; see: OECD, 2017b)⁸. The gap between spending in Poland and in more advanced countries was, of course, much larger⁹. The picture only slightly improves if we consider indicators more directly reflecting the *availability* of extramural public R&D support to firms. For instance, the data on the *public R&D spending* between 2007–2011 quoted by Jasiński (2013)¹⁰ suggest that Poland (with 0.53% of GDP) lagged behind the Czech Republic (0.72%) also in this respect—although, admittedly, the country already scored higher than Hungary and Slovakia (both 0.43%). At the same time, also regarding this second variable, the gap between Poland and various developed economies (e.g., Germany, with 0.94%) was significant. A similar situation prevails when we consider the data on the R&D activities conducted by the country’s *academic organizations* (Figure 5). According to OECD (see UIS, 2017), the total value of the R&D performed at Polish universities in years

⁸ In Slovakia, R&D expenditure after 1989 was comparable to, but usually lower than in Poland.

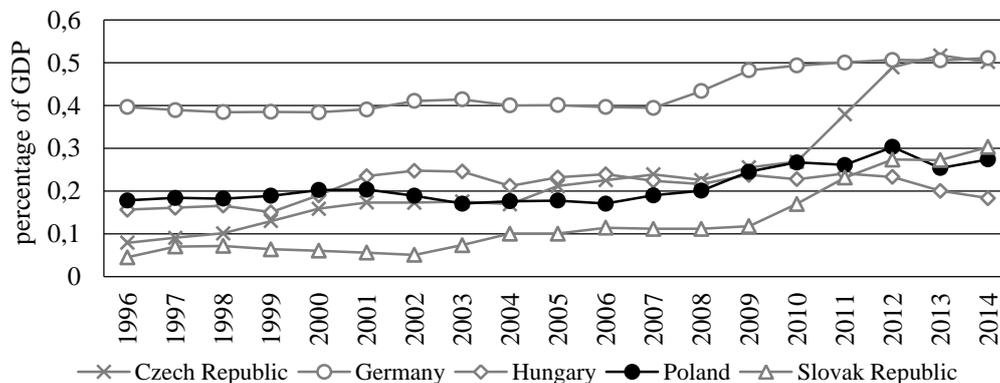
⁹ For instance, between 2000–2015, the average German gross R&D expenditure was 2.6% of GDP (OECD, 2017b).

¹⁰ The author relied on the European Commission’s annual European Innovation Scoreboard.

1996–2014 oscillated between 0.2 and 0.3 percent of GDP. This was comparable to the levels observed in other Central European countries¹¹—but was, again, much lower than the levels typical for most advanced economies. For instance, in 2014, German universities performed R&D activities worth about 0.5 percent of the country’s GDP.

In sum, considering both the existing literature and the statistical data, we may generally expect that the public innovation system in Poland has not provided strong support for indigenous firms from the EIT sector.

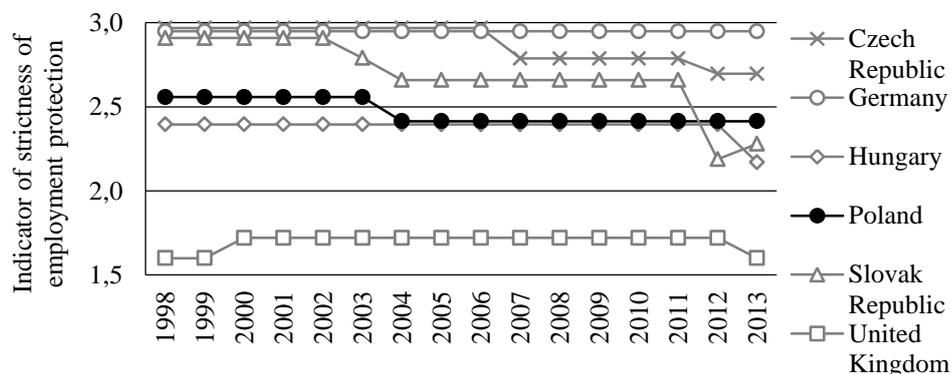
Figure 5: R&D activities performed by higher education as a percentage of GDP



Source: UIS (2017)

At the same time, the context of the Polish economy seems to offer locally operating EIT firms various advantages regarding their human-capital strategies. *First*, with respect to the labor-market regime, local regulations are rather flexible and grant employers considerable leeway regarding their hiring and firing decisions. In general, the existing literature suggests that a transformation towards a more “liberal” model of employment relations has been taking place in the country (Jasiecki, 2017). This is indicated, for instance, by the massive expansion of limited-term work contracts since the early 2000s (Trappmann, 2011), the weakening political influence of trade unions on industrial relations (Gardawski, Mrozowicki, & Czarzasty, 2012), or the dramatically falling unionization rates after 1989 (Krzywdzinski, 2010). And perhaps most directly relevant from the perspective of the IT firms’ rapidly changing workforce strategies, the stylized OECD (2017c) data suggest that the strictness of employment protection in Poland has clearly decreased since the late 1990s—reflecting a general trend in all Visegrád countries (Figure 6).

Figure 6: Strictness of employment protection in Poland and selected countries (individual and collective dismissals, regular contracts)



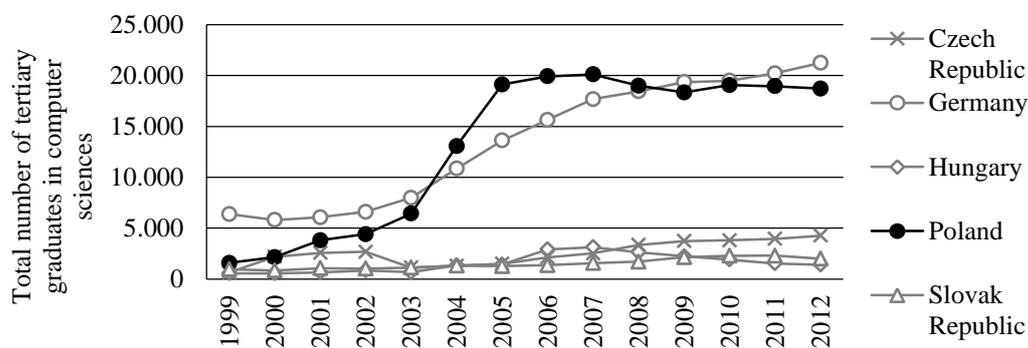
Source: OECD (2017c)

And second, regarding the supply of a high-skilled workforce, the EIT firms operating in Poland should be able to benefit from a large availability of tertiary graduates in computer sciences. This characteristic of the country’s institutional environment is related to a broader transformation of its skill-for-

¹¹ With the exception of the Czech Republic since 2011 (see Figure 7).

mation system after 1989: a dramatic expansion of academic education at the expense of vocational training (Kogan, Gebel, & Noelke, 2013). Statistical data indicate that the share of the Polish population aged between 25 and 34 with tertiary qualifications almost tripled between 1995 and 2016—rising from 14.6 to 43.5 percent (OECD, 2017d). And interestingly, this development was much stronger in Poland than in other countries in the region, where the share of tertiary graduates reached slightly over 30 percent in 2016 (Czech Republic: 32.6%, Hungary: 30.4%, Slovak Republic: 33.4%; and Germany: 30.5%). And most importantly for the present analysis, this dramatic expansion of academic education was also reflected in the number of graduates in computer sciences, who constitute the “talent pool” for locally operating IT firms. As shown in Figure 7, the absolute numbers of IT graduates per year in Poland were comparable to and periodically even higher than in Germany—a country with an overall population that is twice the size. Moreover, the number of Polish tertiary graduates in computer sciences also remains high in relative terms compared to the region’s other economies. For instance, in 2012, there were about 492 computer science graduates per million inhabitants in Poland compared to 406 in Czechia and 141 in Hungary¹².

Figure 7: Tertiary graduates in computing (ISC 48) in Poland and selected countries



Source: OECD (2017a)

4.4. The domestic EIT market

This final part of the sector-in-country analysis explores the characteristics of *the Polish market for EIT products and services* in order to find out whether this market has created a suitable environment for the development of indigenous firms. The existing literature suggests that domestic demand has played a key role in the development of many national IT industries. For instance, Kenney (2017) observed that the phenomenal growth of many Silicon Valley start-ups was related to the large demand for high-quality products and services in the US market. According to Nakagawa (2001), the global success of the German ERP vendor SAP was facilitated by an extensive base of large organizational clients in the firm’s home country. Focusing on Brazil, Botelho, Stefanuto, and Veloso (2005) explained the relatively successful growth of the domestic IT sector by pointing to the role of various sophisticated IT-system buyers operating in the country—primarily in the Brazilian financial and telecom industries. Complementing these arguments, D’Costa (2002) observed that the absence of high-quality domestic demand might have negatively influenced the development of the Indian IT giants by locking them into the path of “dependent,” export-oriented, and noninnovative growth.

The existing literature has also suggested that in order to assess the influence of the domestic market on domestic IT firms, we also need to consider the regulations governing the entry of foreign, potentially more competitive players. Gentle and Howells (1994) observed that the emergence of EIT industries in several West European countries (e.g., in France) was related to various country-specific characteristics of national markets, which advantaged indigenous over foreign firms. Apart from mere market size, the factors include: large domestic clients’ *procurement policies* (e.g., those of governmental organizations), *language barriers* that created a demand for country-specific solutions, or *distinct technological standards*, often supported by local hardware producers (Gentle, 1996; Gentle & Howells, 1994). And although Gentle and Howells (1994) emphasized that such national barriers have substantially eroded since the early 1990s, empirical research provides examples of how they may, indeed, “protect”

¹² As calculated by dividing the total number of tertiary graduates in computer sciences (OECD, 2017a) by the countries’ overall populations (in millions, with two decimal places) in 2012. For Germany the ratio is: 264.

indigenous IT sectors today, too. For instance, in their analysis of the domestic IT industries in Russia and China, Heeks and Nicholson (2004) observed that the relatively successful development of these sectors was greatly facilitated by the fact that the countries' growing sales markets were difficult to penetrate for foreign vendors. As the authors emphasized, the "local laws, local customs and local languages" (Heeks & Nicholson, 2004) created serious entry barriers for MNCs.

In light of these two suggestions from the literature, did Poland's EIT market create favorable conditions for the development of domestic companies?

In answering this question, the first thing to note is the dramatic growth in demand for IT services and software in Poland since the early 1990s. According to the data quoted by Kubiela (2000), the value of the domestic market for "software services"¹³ increased twenty-fold between 1991 and 1995 alone. This was related, among other factors, to the launch of several large-scale computerization projects in sectors like banking or public administration. Looking at more recent comparative data, we find that the Polish EIT market is the region's largest in absolute terms. For instance, for "project-based IT services"¹⁴ (EITO, 2013a), domestic turnover in Poland between 2010 and 2014 was, on average, almost twice as high as in the Czech Republic and about four times as high as in Hungary (Table 3). But at the same time, we must note that the Polish market remains relatively small compared to more advanced European economies like Germany or the UK.

Besides the mere demand volume, let us take a look at relevant formal and informal institutions governing MNC access to the country's EIT market. Here, we need to take into account, *first*, the general regulatory changes in Poland in the early postcommunist era, which greatly facilitated entry of foreign firms. One of the central assumptions of the neoliberal reform package introduced in the early 1990s (the "shock therapy") was that the country's economy needed a sudden and radical opening to competition from abroad (Sachs & Lipton, 1990). And accordingly, all preexisting trade barriers and disincentives to FDI (e.g., limitations on the profit transfers abroad) were abolished or substantially reduced. *Second*, there was an international regulatory change more specifically affecting the local IT sector: a gradual lifting of the COCOM embargo¹⁵—a Cold War-era ban on high-tech exports from the West to communist countries (Heeks & Grundey, 2004; Lipton, Sachs, Fischer, & Kornai, 1990). And finally, a *third* important regulation facilitating the entry of foreign IT vendors was the government's new procurement policy introduced in the early 1990s. Already in the first transformation years, Poland's public sector shifted from "closed," vendor-specific solutions (which could, theoretically, be developed on-demand by indigenous firms) to "open" systems, based on international standards (Computerworld, 1991)¹⁶. In this way, a technological barrier potentially inhibiting MNC entry into the country's governmental organization segment disappeared.

Table 3: Total market value of project-based IT services in Poland and selected countries

	2010	2011	2012	2013*	2014*
<i>Czech Republic</i>	686	700	663	671	689
<i>Germany</i>	8,033	8,319	8,512	8,720	8,982
<i>Hungary</i>	271	264	272	280	292
<i>Poland</i>	1,065	1,084	1,219	1,257	1,310
<i>United Kingdom</i>	13,437	13,317	12,918	13,108	13,515

Notes: (1) data in million euro; (2) "project-based IT services" include: IT consulting, systems integration, and applications development. * Forecasts.

Source: EITO (2013a)

Due to these and other regulatory changes, foreign vendors were able to start developing their operations in Poland very soon after the transition to capitalism. For instance, two of the leading global EIT firms, IBM and HP, opened their subsidiaries in the country in 1991 (UPI, 1991) and immediately became

¹³ We should note, however, that the data to which the author referred probably also included individual-user software, and not only enterprise software.

¹⁴ This statistical category was proposed by EITO (2013b) and includes three kind of activities: IT consulting, systems integration, and applications development. We must note, however, that the category covers only a fraction of the EIT market—it excludes, for instance, standard enterprise software.

¹⁵ COCOM stands for: the Coordinating Committee for Multilateral Export Controls, which existed between 1949 and 1995 and gathered major "first-world" economies.

¹⁶ In other countries, the governmental support for open-system-oriented IT procurement was often a more disputed topic—see e.g. Anchoy (2000) on the Japanese case.

significant players on the local market. But at the same time, there are also indications that MNC entry was not always trouble-free. Perhaps most significantly, some established foreign firms who wanted to operate as local system integrators encountered difficulties in working in the local context. The most notorious example of this was the French company Bull, which—arguably due to a failure to adapt to local regulations and organizational practices (Kubiela, 2000)—never managed to complete the centralized tax collection system for the Polish government. In order to avoid such hazards, many other MNCs operating in the country developed close collaborations with local integrators able to undertake the “downstream” coordination tasks (Kubiela, 2000, 2004). Another sign that foreign EIT firms encountered entry barriers is the weakness of their presence in multiple segments of the Polish market—for instance, in the emerging sector of new private banks or small and medium-sized enterprises (SMEs) (Kubiela & Yegorov, 2000). In these and many similar “niches”, the entry of foreign firms might have been complicated both by particular product expectations of the local clients (relating, for instance, to country-specific formal regulations) and by the fact that these customers—as small or emerging players in a transition economy—required low-cost rather than state-of-the-art products.

5. Developmental paths of the two case-study companies

5.1. Introduction

In the previous parts of the study, I have reconstructed the sectoral and home-country environment within which the two case-study companies, Asseco and Comarch, have operated. The *third section* developed two suggestions regarding the possible influence of the “modularization” processes in the EIT sector on emerging-country firms. *First*, I have pointed out that the fragmentation of the industry’s value chain has prompted an increased demand for integrative IT services—which is a segment regarded as an important entry path for developing-country players (Schware, 1987). The *second* suggestion was that the new competitive logics within the EIT industry, resulting from an ongoing modularization of EIT system architectures, has effectively lowered the technological barriers for the entry of emerging-market software producers by enabling the latter to pursue platform-based production strategies. In the *fourth section* of the analysis, I reconstructed the general “fit” between the hypothetical requirements of entrepreneurial EIT companies and various relevant characteristics of Poland’s national-institutional framework. The analysis has revealed a rather mixed picture. *First*, I have suggested that the EIT firms operating in the country should be able to benefit from the presence of a relatively well-developed capital market. This finding is important since, as suggested by the CC literature, equity financing is the type of external funding particularly suited to the IT sector. *Second*, the analysis has indicated that, when developing their in-house technological capabilities, the EIT companies operating in Poland have probably not received strong support from the country’s public innovation system. Yet, I have also shown that such firms can take advantage of a large local pool of flexible and highly qualified labor¹⁷. *Third*, and finally, the analysis has suggested that, despite the opening of the Polish market to foreign IT firms, some local characteristics may, indeed, have created advantages for domestic producers—such as in the case of projects for governmental organizations or of various niche markets like the new private banking and the SMEs sectors.

In the following, I will build on the above insights and investigate to what extent and in what way the developmental paths of the two emerging Polish IT multinationals have been shaped by such sectoral and country-specific conditions. First, regarding *sales market strategies*, I focus on the role played by the domestic market and its specific “social structures”. Second, concerning *corporate finance*, I analyze the firms’ reliance on various sources of external funding—principally, on equity and bank-based funding. And third, regarding *productive organization*, the analysis focuses on the question of the range and organization of productive activities performed by the two companies in-house, as distinct from the inputs acquired externally.

5.2. Sales market strategies

Regarding sales market strategies, my analysis suggests that relations with public organizations and revenues from various local market niches have, indeed, played an important role in the strategies of

¹⁷ Due to the limitations of the available empirical material, I am not able to thoroughly discuss the actual employment practices of the studied firms. The topic remains an open question for further investigation.

the two studied companies. Yet, the reliance on the domestic market was largely characteristic for the firms' early developmental paths—more recently, a clear tendency towards internationalization has emerged.

5.2.1. The first case-study company

The first case-study company, Asseco, has a quite complex history, which includes several large mergers and acquisitions in Poland and abroad. The company started operating in the early 1990s as COMP Rzeszów¹⁸ and was initially active in the relatively less developed, south-eastern region of the country. At the beginning, the firm focused on providing information systems for domestic cooperative banks. In the 1990s, this sector included mostly very small, provincial banks that could not afford any state-of-the-art IT solutions—which made it a less attractive target for foreign IT MNCs. As historical accounts suggest (Asseco, 2011; Matys, 2014), when operating in this niche market, the company often used its pre-existing personal connections with bank managers to develop trust-based relations. At the beginning, when COMP still had limited competences in financial IT, they partly relied on the knowledge of the banks themselves, who helped the firm understand technological requirements and processes involved (Asseco, 2011; Hej Rzeszów, 2009). Over the years, the company extended its operations in the cooperative banking sector to other regions and developed a strong client base all over Poland. By 2004, COMP had secured contracts with over 200 banks—and by 2011, Asseco, the firm's legal successor, had further increased the number to about 400 (Asseco, 2011). Furthermore, drawing on its experiences with cooperative banks, the company managed to gradually enter into other segments of Poland's financial system. For instance, in 2003, 42 percent of the firm's revenues already came from contracts with universal and retail banks—compared to 22 percent from the cooperative and regional banking segment (COMP Rzeszów, 2004).

In the mid-2000s, operating already under the name of Asseco, the company took over two significantly larger domestic EIT companies—both of which were active in more “high-profile” segments of the home market but were undergoing difficult economic periods. *First*, in 2007, Asseco bought Softbank¹⁹, which had been providing IT solutions to the country's main financial institutions since 1989. In the mid-1990s, Softbank's key client was the country's largest bank—the state-controlled PKO BP, which used the firm's proprietary software for its retail operations (Szafranski, 2011). However, already in the late 1990s, due to the withdrawal of the company's main technological partner (the British-Japanese firm ICL, Computerworld, 1999b), Softbank started facing difficulties in new product development and gradually refocused its business model on the implementation and distribution of third-party software (Puls Biznesu, 2006).

And *second*, in 2008 Asseco acquired Prokom—at that time, Poland's largest IT firm, which had been operating in the market since 1987. In its early years, Prokom produced software for domestic organizations in various sectors, from finance to manufacturing industries. For instance, its ERP applications were used by several of the country's largest firms—like KGHM, a globally active copper-mining company, or PZU, Poland's biggest insurer (Computerworld, 1999c). However, over the years, Prokom refocused its business model from standard software to large-scale, tailor-made IT systems developed mostly for state-controlled enterprises or governmental organizations. The best example this business strategy was the huge computerization project implemented for the public Social Insurance Institution (ZUS). The project lasted a few years longer than planned²⁰, during which both Prokom and its foreign suppliers (e.g., IBM, Hewlett-Packard, Microsoft, or Siemens) signed numerous additional contracts with ZUS (Computerworld, 2004b; Puls Biznesu, 2004c, 2005). While the value of the initially ordered IT system was at about 700 million PLN, Prokom's total revenues from the project as of 2008 were estimated at 2.1 billion PLN (Forbes, 2010). One important factor contributing to this increase pertained to the original contract terms agreed with ZUS, which allowed Prokom alone to make any modifications in the implemented IT system (PAP, 2007b). It was not until 2014 that Asseco Poland, as Prokom's legal successor, transferred the rights to the system to the state-controlled insurer.

If we now take a look at Asseco's current market strategy, it is evident that while the company has followed many of the paths opened by its predecessors (e.g., regarding its enduring focus on the domes-

¹⁸ Rzeszów is a city of around 200,000 inhabitants (as of 2017) located in south-eastern Poland.

¹⁹ Not to be confused with the Japanese multinational SoftBank, which was not related to the Polish integrator.

²⁰ Officially, the development of the KSI ended in 2010, when Prokom no longer existed.

tic banking and public sectors²¹), it has nevertheless largely redefined its approach by expanding into foreign markets. For instance, in 2012, overseas revenues amounted to already 70 percent of the group's total sales; and in 2016, the proportion further increased to 80 percent (Asseco, 2017e). However, one characteristic feature of Asseco's internationalization strategy is that the company neither exports their own software nor establishes green-field subsidiaries abroad. Instead, the firm has entered foreign markets by acquiring local IT firms, who already have well-developed client and product bases (Radło, 2012, 2016). Initially, Asseco focused on making acquisitions in Central, Southern, and Western Europe (Kaszuba, 2010); but more recently, it has taken a much more global approach. Perhaps most importantly, in 2010, the company took a controlling interest (50.2%) in Formula Systems, a NASDAQ-listed Israeli IT holding with significant operations abroad. Later, Asseco also extended its operations into the Global South—in 2015, for instance, the company acquired a controlling stake in a mid-sized Portuguese EIT vendor (Exictos SGPS) with a well-developed client base in several Sub-Saharan markets (Puls Biznesu, 2015).

5.2.2. The second case-study company

The second case-study company, Comarch, started operating as an independent software producer in the early 1990s when it developed IT support systems for Telekomunikacja Polska SA (TPSA)—the then state-owned Polish telecom monopolist. The close collaboration with this client dated back to the activities of Comarch's founder and CEO as a researcher in the telecommunication division at AGH University in Krakow. While the company also produced software for other customers and industries in the 1990s (e.g., banks, insurance companies, or SMEs), its primary field of activity during the first decade or so remained IT systems for the telecommunications sector.

Initially, the collaboration between Comarch and TPSA developed well, allowing the company to grow quickly and to significantly upgrade its technological capabilities. In 1993, TPSA commissioned Comarch to provide technological analyses and feasibility studies for its various computerization projects (Comarch, 2004a). A year later, the company received an order to develop a billing system for TPSA's satellite service (World Bank, 2007). Subsequently, the national telecom provider awarded Comarch further contracts for various tailor-made IT support systems—such as the centralized database for its network inventory (in 1994), or a billing solution for its newly launched mass-market internet services (in 1996; Comarch, 2013). But Comarch's biggest contract with TPSA came in 1998, when the telecom company issued a tender for an IT system to support its operations in the Warsaw area—the country's largest territorial division in terms of the number of telephone users. The tender results were announced in August 1998, and TPSA selected Tytan, the standardized IT solution developed by Comarch. As commentators noted, one of Tytan's advantages over its numerous competitors was that the system had already been implemented in TPSA's other, smaller territorial division about a year earlier (Wolas, 2000).

However, the close cooperation between Comarch and the national telecom provider ended unexpectedly in the early 2000s, when TPSA started integrating all its regional billing systems in order to reduce costs (Puls Biznesu, 2001). And although Comarch—whose solutions were processing over 40 percent of the operator's total revenues—was perceived by many as TPSA's preferred IT supplier, the telephone company decided to purchase an integrated billing platform from another domestic firm²². This shift in TPSA's procurement strategy led to dramatic revenue losses for Comarch. Available data indicate that in 1999, over 45 percent of the firm's overall income was generated by various contracts with TPSA (46.5% in the first half of 1999, see: Comarch, 1999b; Przybylska & Pilarska, 2005). In the following years, this proportion fell gradually and significantly—to 26.3 percent in 2001 and to less than 10 percent in 2003 (Comarch, 2002, 2004b, 2004c).

Facing the withdrawal of its main organizational client, Comarch was forced to fundamentally revise its market strategy. Most importantly, the company intensified its internationalization efforts. Initially, Comarch started selling its software in the most developed Western countries. In the early 2000s, the company entered the American telecommunications market and managed to sign a few relatively large contracts with both governmental and private clients—later on, however, Comarch's operations in the US clearly stagnated. The firm's expansion into Western European markets was much more

²¹ However, the public sector has clearly been losing importance in the company's business model since Poland's new conservative government introduced a leaner IT procurement policy in 2015 (Bankier, 2017c).

²² Interestingly, the selected supplier was a subsidiary of Prokom (later acquired by Asseco).

successful. In Germany, where the company has operated since 2000 (Comarch, 2000b), its sales strategy initially focused on delivering support systems to various “niche” mobile operators (Przybylska & Pilarska, 2005). But within a few years, Comarch managed to enter into several large contracts with the country’s biggest mass-market network carriers—like o2, one of Germany’s dominant providers, or E-Plus, an important low-cost challenger (Comarch, 2003; PAP, 2010b). Starting from 2003, the company pursued a similar market entry strategy in France—also targeting various local “niche” operators, such as Auchan Télécom (Przybylska & Pilarska, 2005). In sum, looking back over 15 years and considering all the foreign markets where Comarch successfully gained a foothold, the firm’s internationalization efforts can be considered quite successful—given, for instance, that the company’s current overseas sales already amount to over 50 percent of its total revenue (Comarch, 2017b).

But in addition to its ambitious internationalization strategy, Comarch has also focused on diversifying its domestic operations beyond the telecom industry. For instance, since the 1990s, the company has developed a stronger presence in the Polish banking and public sectors²³. However, one particularly successful domestic market segment for the firm has been ERP applications for SMEs. In general, the Polish market for standard business software was dominated by a small number of MNCs from the start. For instance, in 1999, the three largest foreign vendors operating in Poland—SAP (Germany), Oracle (USA), and IFS (Sweden)—jointly captured over 50 percent of the domestic demand (Computerworld, 2000a). Yet, these and other multinationals have not been able to penetrate the entire Polish market. And in particular, their position has been very weak in the SME sector—predictably, resulting from the fact that the smaller organizational clients in Poland often could not afford any state-of-the-art solutions designed originally for users in high-income countries. In contrast to the MNCs, Comarch performed strongly in this market “niche”—with SME revenues growing very dynamically from the early 2000s. In 2014, the firm controlled over 50 percent of the segment and thus became the second largest ERP vendor in the country (Puls Biznesu, 2017b).

5.3. Corporate finance

Turning now to the *corporate finance* strategies of the two studied firms, the analysis indicates that both companies have relied on the domestic capital market to finance their growth to a significant degree. But at the same time, some clear differences between the two firms can also be observed—with Comarch following a rather “hybrid” approach, focused on both the stock market and bank-based finance.

5.3.1. The first case-study company

An important step in the development of Asseco Group was when COMP Rzeszów, building on its commercial success in the cooperative banking sector, decided to go public through an initial public offering (IPO) on the Warsaw Stock Exchange in 2004. During the whole public-listing process, the company was supported by an American-financed private equity fund operating in Poland, Enterprise Investors (EI), who held a 50-percent interest in the firm from February 2003 (Kaszuba, 2010). Beyond advising the management on internal organizational matters, EI promoted COMP Rzeszów among potential investors and helped the company to develop a positive media image (Matys, 2014; Puls Biznesu, 2004a). Building on this support, the firm launched a successful IPO in September 2004: the initial offer was oversubscribed by some 15 times in the primary market, the first-day stock price exceeded the issue price by 28 percent, and the EI fund multiplied its investment more sevenfold by selling its 50-percent stake in the firm (Financial Times, 2005; Interia, 2004).

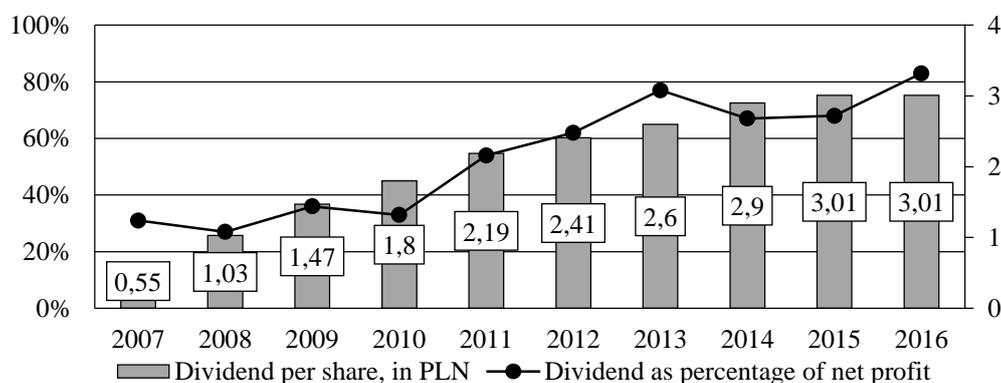
Since its successful IPO, Asseco Poland has largely relied on the stock exchange to finance its growth. Perhaps most importantly, the company has used the capital accumulated by issuing new shares for its aggressive merger and acquisition strategy focused on both domestic and foreign IT enterprises with relevant technological capabilities—a strategy already indicated in the firm’s 2004 prospectus (COMP Rzeszów, 2004). For instance, in 2008, when the company merged with Prokom (a WSE-listed company since 1997), Asseco first entered into a credit agreement for up to 580 million PLN with the BPH bank (foreign-owned), and a few weeks later, when the merger was already settled, the company issued a large volume of new shares (worth over 325 million PLN) for institutional investors in order to repay the debt quickly (Bankier, 2017a; PAP, 2007a; Puls Biznesu, 2007). In a similar manner,

²³ Although, as in the case of Asseco, the role of the domestic public sector in the firm’s revenues clearly diminished when the new conservative government introduced a leaner IT procurement approach after the parliamentary elections in 2015 (Computerworld, 2017).

the takeover of the Israeli IT holding Formula Systems in 2010 was also financed through a large issue of stock on the WSE (worth about 270 million PLN)—with the main difference being that in this case, Asseco had already decided to issue the new shares in advance of the transaction (Asseco, 2010b; Bankier, 2017a; PAP, 2010a).

But the reliance on the stock market to finance the firm’s growth has come at a price. Given the central role which issuing new shares has played in the firm’s development, Asseco has had to take various measures to maintain a high stock price and deliver the “shareholder value.” The company has attempted to do so by implementing a generous “redistributive” agenda. For instance, Asseco Poland has considered large stock-buybacks in order to boost its share price several times. In late 2011, when the firm’s stock price on the WSE was falling, the shareholder meeting agreed to spend as much as 450 million PLN on repurchasing shares (PAP, 2011). However—for reasons not explicitly described in the collected material, but probably related to a spontaneous increase in the stock price—the instrument was ultimately not used by the management (PAP, 2014). Second, and more importantly, the company has redistributed a large percentage of its income by means of regular—and increasingly high—dividend payments (Kaszuba, 2010). In the very first year after its IPO, COMP Rzeszów paid out 35 percent of its profit as dividends. And later, between 2007 and 2016, dividend payouts at Asseco Poland amounted to about 54 percent of its annual income on average—reaching as much as 83 percent in 2016 (Asseco, 2017d; see Figure 8)²⁴.

Figure 8: Dividend policy at Asseco Poland 2007–2016



Source: Asseco (2017d)

At the same time, we should note that Asseco’s corporate finance strategy is not solely stock-market based, but also relies—to a certain degree—on bank credit. As mentioned above, bank-based funding played a supportive role in the company’s large acquisitions, as in the case of Prokom. Nevertheless, a closer look at the firm’s balance sheet ratios indicates that bank-based funding remained a secondary source of capital for the company. For instance, at the end of 2009, when the short-term loan used to finalize the Prokom merger had largely been repaid, Asseco Poland reported an outstanding bank debt of about 43 million PLN—which represented only 6 percent of its total liabilities and amounted to slightly over 1 percent of the total shareholder equity (Asseco, 2010a). And in 2016, when the company was paying off an investment loan taken to finance the construction of some new office facilities in Warsaw, Asseco’s total outstanding bank debt stood at about 86 million PLN—which amounted to less than 2 percent of the shareholder’s capital and represented about 17 percent of the firm’s total liabilities (Asseco, 2017c). The relatively low reliance on credit indicated by these numbers becomes clear when we compare them to the values characteristic for companies in typical bank-based economies—for instance, in Germany, the average share of loans in firms’ total liabilities amounted to as much as 43 percent in the early 2000s (Byrne & Davis, 2002).

²⁴ One should also note that the other WSE-listed companies within the Asseco Group (e.g., Asseco Business Solutions) followed somewhat less generous dividend policies than Asseco Poland.

5.3.2. The second case-study company

In early 1998, Comarch—after relying primarily on internal funding²⁵ for the first few years of its existence—decided to list its shares on the Warsaw Stock Exchange (Comarch, 1999a). The management reasoned that this would provide the firm with new opportunities to raise capital for goals such as product development or infrastructure investments (Comarch, 1999a), and, at the same time, would increase the company's prestige in the eyes of organizational clients (Computerworld, 1998a). Following several months of preparation, Comarch's IPO took place in May 1999, allowing the company to gather the targeted 14 million PLN in the primary market. The firm's initial offering was oversubscribed by almost 20 times—a WSE record at that time (Comarch, 2000a). However, an important aspect of Comarch's IPO was that the company listed its shares on WSE's least prestigious market—the “free market”—and progressed towards the main floor on a step-by-step basis (with an intermediary listing on the “parallel market”; Parkiet, 1999). We may speculate that the management's decision to enter the stock market through WSE's least demanding floor was related to the fact that Comarch did not have organizational and promotional support during its IPO comparable to the support which the EI fund provided to Asseco.

Following the successful IPO—and similarly to what we observed in the case of Asseco—Comarch started using the stock market to finance its growth. In late 1999, the management decided to issue a significant number of new shares (increasing the equity capital by about 20 percent) in order to acquire capital for various goals, including: the construction of new production and office facilities in Krakow, software-product development, and expansion into the segment of internet-based services (Puls Biznesu, 1999). This first issue of shares was targeted mostly at selected institutional investors and allowed the company to raise 70 million PLN for the planned investments (Bankier, 2017b; Comarch, 2000c). Similarly, in the early 2000s, the capital market played an important role in the firm's strategy for coping with the sudden withdrawal of its main organizational client, TPSA. When Comarch's share price fell to historically low levels in late 2001 and the firm urgently needed new funds to finance its internationalization, the management decided to issue a large quantity of convertible bonds (instead of shares), which allowed the company to still raise a relatively large amount of new capital (Puls Biznesu, 2002). The offering was launched in April 2002, and the 4,000 five-year bonds were mostly acquired by institutional investors, such as the domestic pension funds (Computerworld, 2002b).

But at the same time, although Comarch has used the stock exchange to raise the required funds in many cases over the years, the firm's corporate financing was, in fact, not only oriented towards the capital market. This becomes especially clear when we compare the company's strategy with the approach of Asseco, described above. *First*, Comarch has issued new stock much less frequently than Asseco—in fact, as of late 2017 (when the data collection for this analysis ended), Comarch's last issue of shares to external investors had taken place in early 2006 (Bankier, 2017b). *Second*—related to the firm's generally lower reliance on share issues—Comarch's “redistributive” measures to deliver the “shareholder value” have been less intensive. For instance, the management decided to pay first dividends in 2003—and did so for the second time almost a decade later, in 2012 (Puls Biznesu, 2012). A *third* important difference is the fact that, despite its public listing, Comarch has actually remained a family-controlled enterprise. Ever since the firm's IPO in 1999, the company's founder and CEO together with his wife have always owned a block of shares large enough to pass any proposal at the shareholder meeting. This was possible because Comarch has not followed the “one-share/one-vote” rule and has granted varying voting rights to different groups of shareholders. And finally, *fourth*, Comarch has developed a more “hybrid” corporate finance strategy than Asseco, in that it has mixed market-based with bank-based funding. If we take a look at the balance sheets of Comarch SA²⁶ between 2008 and 2016, we will find that the share of bank debt in the firm's total liabilities was quite high—amounting, on average, to 44.5 percent (Comarch, 2010, 2012, 2014, 2016a, 2017a)²⁷. This is a much higher level than is evident for Asseco Poland (17 percent in 2016)—and is similar to what the existing literature has observed among business enterprises in Germany (about 43 percent in the early 2000s; see: Byrne & Davis, 2002).

²⁵ This can be cautiously assumed based on the observation that no outstanding long- or short-term debt was reported by the company for the fiscal year preceding its IPO (i.e. for the time between 01.11.1996 and 31.10.1997 (Comarch, 1999c); no detailed data was available for earlier periods.

²⁶ This is the dominant unit within the Comarch Group.

²⁷ We may also note that the loans were granted to the company by both foreign-owned and domestic banks.

5.4. Productive organization

Finally, let us discuss the productive organization strategies followed by the two case-study companies. For the purpose of this study, the concept of “productive organization” refers to the scope of value-chain activities performed by the firms in-house, as distinct from the inputs acquired externally. The conducted analysis suggests that the two firms have been deeply embedded in the transnational, “modular” production system of the EIT industry. Both companies have focused on the production of higher-level business applications and the provision of related services—and both have sourced the more “infrastructural” IT components through collaborations with foreign MNCs. At the same time, there is some evidence that the productive and innovative activities of the two firms have relied—and perhaps increasingly rely—on domestic resources.

5.4.1. The first case-study company

The productive models developed by Asseco’s three predecessor firms—COMP Rzeszów, Softbank, Prokom—largely relied on an external acquisition of technologies from various global suppliers. The *first* of the three companies discussed here, Softbank, was even majority controlled by the British-Japanese IT multinational ICL in the mid-1990s. The development of relatively competitive financial software by Softbank greatly benefited from the transfer of state-of-the-art proprietary technologies by ICL (Kubielas, 2004; Linden, 1998). In addition, the two firms also entered into an agreement designating Softbank as the exclusive distributor of ICL’s hardware in the Polish financial sector (Kubielas, 2000). The *second* firm acquired in the mid-2000s by Asseco, Prokom, followed a very similar strategy. The relatively successful software products developed by the company from the early 1990s onwards—like its ERP applications or support systems for retail banks—were based on various high tech inputs supplied by foreign, mostly American vendors (Computerworld, 1993; Kubielas, 2004). And similarly to Softbank, Prokom used to combine technological cooperation with distributive agreements focused on selling the MNCs’ products in Poland (Kubielas, 2004; Radosevic, 2004). Finally, *third*, the business model of Asseco’s direct predecessor, COMP Rzeszów, also relied on a close collaboration with foreign technology suppliers. In this case, however, the software developed by the Polish firm proved more successful in the long run. Around 1995, COMP Rzeszów entered into a strategic partnership with Oracle—the American producer specializing in database-management systems (COMP Rzeszów, 2004)—and became a local integrator and distributor of various Oracle products (Computerworld, 1998b). But importantly, this alliance also allowed the Polish firm to develop its own proprietary software based on the partner’s components and engineering tools—as was the case, for instance, with COMP’s successful support systems for the financial sector (COMP Rzeszów, 2004).

Looking at the productive organization at Asseco today, we find both some continuity with the strategies of the three predecessors and an ongoing transformation towards more self-reliant software production. On the one hand, the company still remains focused on the development of higher-level business applications and on the provision of related integrative services. Complementing its in-house capabilities, the firm maintains several external collaborations with foreign technology providers in order to secure the supply of the more “infrastructural” IT components, such as databases or middleware (see e.g. Asseco, 2011, 2013). But on the other hand, there are some indications that Asseco has largely upgraded its capabilities in the field of business-applications development. The company has achieved this, *first*, through an asset-seeking acquisition program, both domestically and abroad. For instance, between 2006 and 2007, the company established a new subsidiary by merging a few smaller Polish and German ERP producers—Asseco Business Solutions, which specializes in the production of software for SMEs (Computerworld, 2007; Interia, 2006). And *second*, in addition to the path of “inorganic” development, Asseco seems to have recently intensified its own R&D activities. One general indication of this is the company’s position in the European Commission’s ranking of the largest EU R&D investors—the company has jumped from 902nd position in 2009 to 656th position in 2017 (European Commission, 2009, 2017). Moreover, there is some evidence that the firm’s R&D activities are becoming increasingly embedded in various domestic and EU-wide support programs. For instance, more than 30 percent of Asseco’s latest investment in an IT “Innovation Hub” in Rzeszów (worth about 80 million PLN and creating 400 new R&D jobs²⁸) has been financed by the Polish state from EU funds

²⁸ This investment provides one important indication regarding the firm’s human-capital strategy. When launching the new R&D center, Asseco plans to create a large number of high-skilled jobs in the region—which signals the firm’s confidence regarding the local availability of an adequately qualified workforce.

(Asseco, 2017b). In addition, the company has also started developing more intensive research collaborations with academic institutions. As observed by Melnarowicz (2017), based on his interviews with Asseco's managers, while the company still regarded this kind of cooperation as rather unproductive in the mid-2010s—primarily due to perceived slow pace and abstract nature of academic research—more recently, it has decided to launch various projects with several domestic universities.

5.4.2. The second case-study company

As was observed above, at the beginning of its operation, Comarch largely focused on the development of proprietary IT solutions for various kinds of organizational clients—and primarily, for the telecom sector. However, an important aspect of the firm's early production model was its reliance on platform technologies provided by various global IT firms. During its first decade or so, the company was using mostly software components supplied by Oracle. For instance, the IT systems for telecom operators that the Polish firm developed in the mid-1990s—like the Tytan billing platform—relied on Oracle's relational database-management system (Computerworld, 2001; Markowski, 2005; Parkiet, 2002). Furthermore, Comarch's early ERP applications both relied on Oracle's databases and were designed with the aid of toolkits provided by this producer (Computerworld, 1999a). And in addition to using Oracle's platform technologies for their proprietary software, Comarch's cooperation with the American firm also included integrative services. When developing various on-demand IT systems for large domestic clients (e.g., data warehouses for financial institutions), the Polish company often simply implemented standardized Oracle solutions (see e.g. Computerworld, 2004a; Puls Biznesu, 2000). In an interview, Comarch's founder and CEO observed that this close and multidimensional partnership with the American giant proved very beneficial in the long run, because Oracle's products—in contrast to those offered at that time in Poland by other firms, like Informix or DEC—have since become industry-wide standards (Comarch, 2013).

When we now look at Comarch's business model since the 2000s, we find both a clear continuity with the firm's earlier strategy of platform-based software production and various indications of an ongoing technological upgrading. Regarding the *first* aspect, Comarch, as a software-product company, has remained focused on the development of higher-level business applications, and still acquires infrastructural components through collaborations with MNCs. Throughout the years, the only change in their value-chain position is seemingly an increasingly diverse key-supplier base. For instance, in the early 2000s, Comarch—while remaining an important local partner of Oracle—had already entered into a close cooperation with Microsoft (Computerworld, 2002a). Like the alliance with Oracle, this alliance also encompassed multiple productive and service activities. Perhaps the most important benefit from this collaboration for Comarch as a software producer is that the Polish firm has been able to use Microsoft's platform technologies (primarily the .NET-framework and the database management system SQL Server) to develop a new family of ERP applications (Computerworld, 2009).

Regarding the *second* aspect—the upgrading activities—the collected material indicates that Comarch has put much effort into developing technological capabilities within the scope of its value-chain specialization. Remarkably, when doing so, the company has only relied on mergers and acquisitions to a limited degree. In fact, Comarch's largest domestic takeover to date took place in the early 2000s, when the company purchased another local ERP producer—a mid-sized company named CDN, worth between 15 and 20 million PLN (Bankier, 2003; Computerworld, 2000b). This takeover allowed Comarch to extend its productive capabilities in the segment of less expensive business applications for SMEs (Puls Biznesu, 2004b). In the foreign markets, Comarch's merger and acquisition program has also been rather modest. The company's most significant takeover abroad took place in 2008, when, for about 11 million euros, it acquired a German ERP vendor, SoftM AG—again, primarily in order to strengthen its position in the market for SME software (Computerworld, 2008).

Much more significant for the upgrading of the firm's technological capabilities have been its investments in in-house production base. Probably the most visible manifestation of this is the ongoing development of the company's main office, production, and R&D campus in Krakow, where Comarch currently employs about 3,000 people—more than a half of its global workforce (Comarch, 2017c). The construction of the campus began in 1999, when the firm received a permission to move its operations into the local Special Economic Zone²⁹—the “Kraków Technology Park” (Comarch, 2000a). Since

²⁹ Special economic zones in Poland are territorially delimited areas within which the state creates preferential investment conditions for the private sector (e.g., tax benefits or subsidized infrastructure).

then, the company has invested huge resources in developing various production and office facilities in the zone—with the last one (as of late 2017) being a laboratory for software and hardware from the “internet of things” segment, worth over 70 million PLN (Puls Biznesu, 2017a). Apart from the infrastructural investments, another indication of the firm’s upgrading efforts has been its R&D collaborations. Early on, the company started to build alliances with local academic institutions—like the AGH (its CEO’s alma mater), or the Cracow University of Technology (Kozioł-Nadolna, 2013). And more recently, Comarch has also entered a cooperation with several foreign European universities—in most cases, supported by EU-financed frameworks for joint business-academic R&D projects (Kozioł-Nadolna, 2013).

6. Summary and conclusions

The purpose of the present study was to contribute to the ongoing discussions around the concept of “dependent market economies” (Nölke & Vliegenthart, 2009), which is used in the literature as a perspective on the processes of economic and industrial change in Central Europe, by highlighting the case of two relatively successful domestic IT firms from Poland. As I have generally indicated in the introductory section, the emergence of internationally competitive indigenous companies from the Visegrád countries calls into question the central assumption in the DME literature about the FDI as the only mechanism able to effectively support industrial development in the region. In the presented empirical analysis, I reconstructed the historical paths of the two emerging Polish IT multinationals and, in doing so, attempted to find out what kind of within-country and transnational-sectoral conditions have contributed to the firms’ relatively successful growth and in what way.

The third section of the paper reconstructed the relevant characteristics of the *modularized production regime* of the global EIT industry and made two broad suggestions regarding the related entry and upgrading opportunities for emerging-country firms like Asseco and Comarch. First, I have pointed to the increasing importance of integrative services within the EIT value chain—which can be seen as the industry’s segment offering significant entry opportunities for less technologically advanced producers. And second, I emphasized the lowered technological entry threshold into autonomous software production related to the sector’s vertically specialized division of labor and the adoption of platform-based competitive strategies by various global EIT players. My subsequent observations in the empirical part of the paper have shown that the two companies have indeed taken advantage of these new sectoral opportunities. Both Asseco and Comarch have consistently focused on the development of higher-level business applications and, at the same time, have acted as local IT integrators cooperating with global component suppliers such as Oracle, Microsoft, or IBM. As I have shown in the analysis, the EIT solutions delivered by Asseco and Comarch have relied on various kinds of externally sourced “modules”, like relational databases or middleware. But as the analysis has indicated, while using such imported technologies in their productive activities, the two studied firms have nevertheless become active innovators within their value-chain specializations—for instance, by developing business applications suited to the needs of local financial clients or SMEs. In this way, the analysis provides evidence of upgrading opportunities for emerging-market players related to the modularization processes within high-tech industries (Brandt & Thun, 2011).

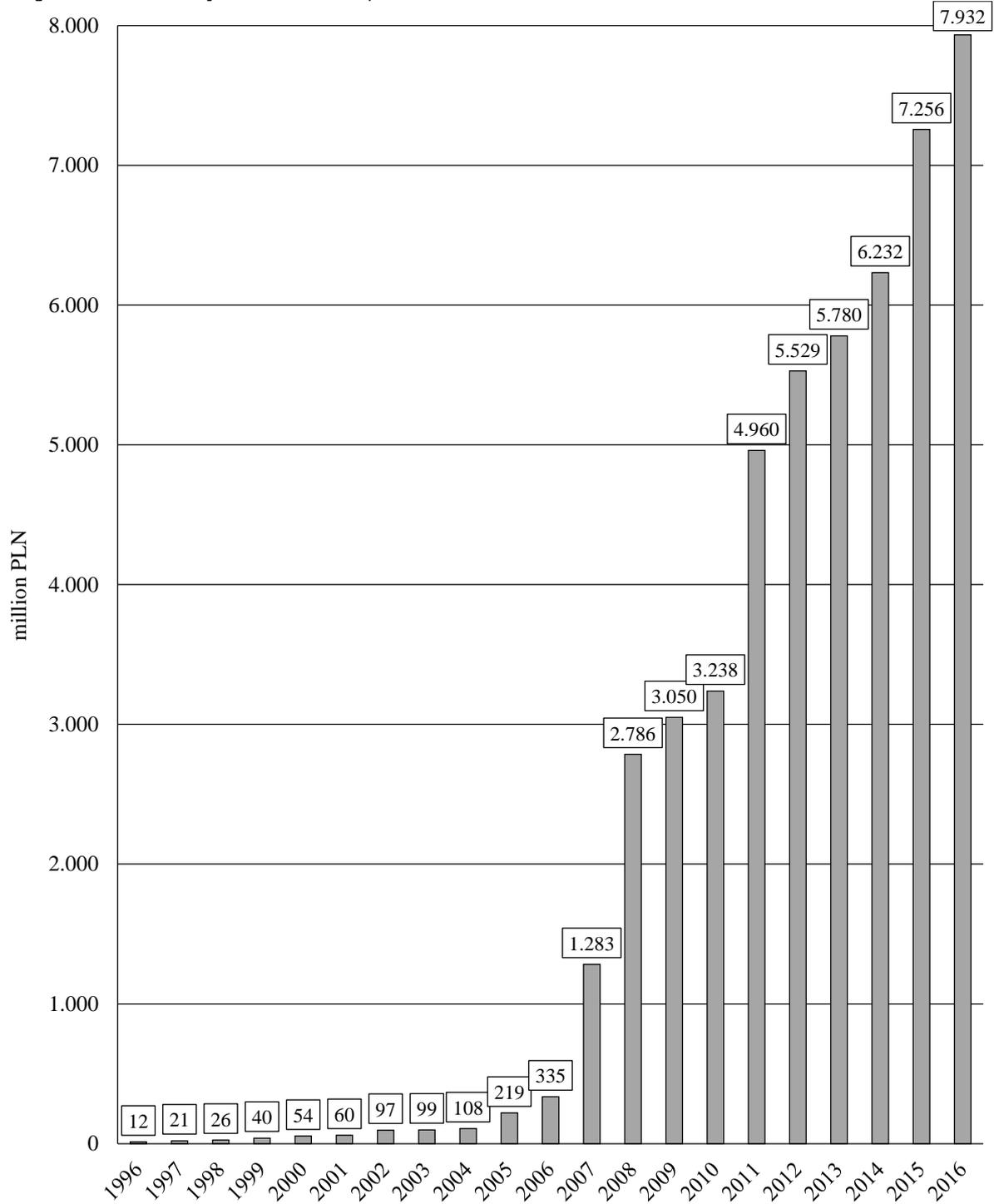
In the fourth section of the paper, I used a sector-in-country perspective in order to reconstruct the general “fit” between the hypothetical corporate strategies of indigenous entrepreneurial EIT firms and the relevant characteristics of the context of the Polish political economy. In the following sections of the paper, I used these insights to guide my empirical investigation of the developmental paths of the two case-study companies. The conducted analysis has shown that the national context in various ways contributed to the relatively successful growth of the two firms. *First*, regarding the *sales market operations*, close relations with big domestic buyers in various sectors (e.g., telecom or governmental organizations) as well as revenues from various local “niche” segments were of crucial importance for the development of both Asseco and Comarch. In both analyzed cases, however, the role of the domestic market has clearly diminished over the years. *Second*, regarding *corporate finance*, the analysis has shown that the two studied firms have largely relied on the domestic capital market to finance their growth. This finding generally confirms the expectation developed in the fourth section, according to which the relatively well-functioning stock exchange and private equity markets in Poland should be able to supply the needed risk-tolerant funding to entrepreneurial EIT firms. And finally, *third*, there is also some evidence (although, admittedly, rather unsystematic) that the *productive activities* performed by the firms within their value chain specializations have become increasingly embedded within rele-

vant domestic support structures. As I have observed in the case of both Asseco and Comarch, the companies have upgraded their in-house capabilities building on the resources provided by the state and, more recently, the EU. In this regard, the analysis indicates that a more thorough investigation of the country's innovation system and its recent changes is needed—more thorough, indeed, than was possible within this present paper.

In sum, this study's contribution to our understanding of the economic systems in postcommunist Central Europe is that Poland presents a more complex case than it has been assumed in the DME theory. The relatively successful growth of the two studied firms has largely relied on within-country resources whose potential for stimulating the domestic industrial development has not been addressed by Nölke and Vliegenthart (2009). At the same time, however, one must emphasize that—broadly corresponding to the general idea behind the DME theory—the relative entrepreneurial success of the two studied EIT firms from Poland was enabled by their embeddedness within transnational production networks and collaborations with foreign suppliers.

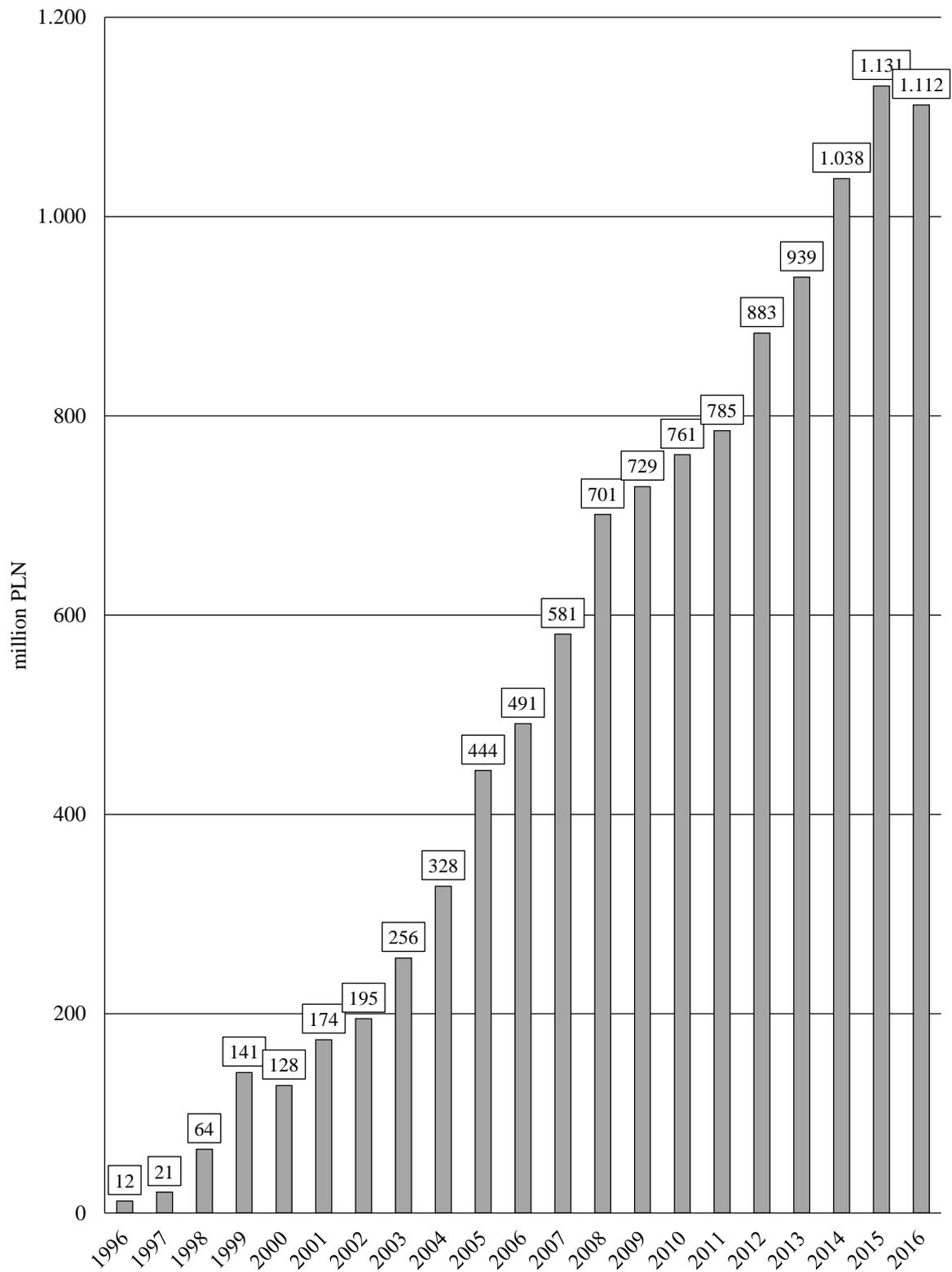
7. Appendix: historical revenues of the two case-study companies

Figure 9: Revenues of the Asseco Group 1996–2016



Note: between 1996–2005 COMP Rzeszów; for 2006: Asseco Poland before its merger with Softbank.
Sources: Asseco (2007, 2008, 2017a); Computerworld (2006)

Figure 10: Revenues of the Comarch Group 1996–2016



Sources: Comarch (2016b, 2017b); Computerworld (2005)

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