REGIONAL CHARACTERISTICS AND EFFECTS OF INWARD FDI: THE CASE OF UKRAINE

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Abstract. *This paper contributes to the analysis of the impact of FDI on host countries by taking into account the regional dimension of spillover effects. Focusing on the case of Ukraine, we explore the effects of inward FDI on changes in productivity, technology, and efficiency in local firms. For the country as a whole, the results suggest that the presence of foreign-owned firms had a negative impact on productivity change in local firms during the period 1999-2003. However, there were notable differences between the effects in the western and eastern parts of the country: the overall findings were mainly driven by the development in western Ukraine, whereas inward FDI in eastern Ukraine did not seem to have any impact on local productivity growth and technical change. These results arguably reflect deep economic and institutional differences between the two parts of Ukraine, which have led to differences in the character of incoming FDI and differences in the ability of local firms to benefit from FDI. The conclusion is that the impact of FDI on the host economy may vary even at the sub-national level, depending on the specific local environment.*

Key words: *FDI, regional spillover effect, Malmquist productivity index*

Introduction

It is well established in the literature on foreign direct investment (FDI) that the entry or presence of foreign multinational corporations (MNCs) may result in various kinds of spillover benefits for host country firms, but that these positive externalities are not likely to materialize automatically. In order for FDI to be a catalyst for economic growth and a source of spillovers, rather than an obstacle for the development of local industry, it is necessary that both the local business environment and the foreign investors entering the country exhibit some specific features. Earlier studies have explored the

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role of several host country characteristics, such as local absorptive capacity, market structure, and trade and FDI policies, as well as investor characteristics, such as the nationality of the investor, the degree of technological sophistication, and the role of the foreign affiliate in the MNC's international production network. All have been shown to condition the impact of FDI on local enterprises to various degrees (Damijan et al., 2003; Hagemejer & Tyrowicz, 2012; Havranek & Irsova, 2011; Javorcik, 2004a; Kokko & Kravtsova, 2008; Konings, 2001; Meyer & Sinani, 2009; Nicolini & Resmini, 2010; Sinani & Meyer, 2004).

However, one area that remains relatively unexplored is the role of the institutional environment in the host economy. Although several studies have shown that formal institutions such as secure property rights, an efficient bureaucracy, banking reform, trade liberalization, and legal development are important for the location and entry mode decisions of international investors (Bénassy-Quéré et al., 2007; Bevan et al., 2003; Dikova1 & van Witteloostuijn, 2007; Globerman & Shapiro, 2002; Henisz, 2000; Meyer, 2001a: Mudambi & Navarra, 2002; Pornakis & Varsakelis, 2004) there are few analyses of how these factors influence the impact of FDI on local industry. In particular, few if any analyses have focused on whether and how informal institutions influence the characteristics of inward FDI and the spillover effects on local industry.

The purpose of this study is to go beyond the existing literature on FDI spillovers by examining the regional dimension of the impact of FDI. We hypothesize that the impact of FDI may vary between different parts of a country, and that these variations are to some degree attributable to interregional differences in the institutional setting, which may influence both the quality of incoming FDI and the ability of local firms to benefit from inward FDI.

The empirical case chosen for the analysis is Ukraine during the period 1999-2003. The economic and political developments in Ukraine during the past decades indicate that there is a strong division between the East and the West of the country. Historically, the eastern part of the country was under the influence of the Russian empire, while the western region, formerly part of the Austro-Hungarian Empire, was more strongly influenced by the West. Soviet rule did not fully eradicate the cultural and institutional differences between these two parts of the country. The remaining differences can, for instance, be seen in the attitudes towards FDI of the leading political groupings in these two parts of Ukraine. Whereas the pro-western political groups, which have their power bases in the western part of Ukraine, are positively inclined to inward FDI, the eastern block is more inward-oriented, preferring domestic rather than foreign investment, especially when foreign investment comes in the form of mergers and acquisitions (M&A). These regional differences may also be reflected in the attitudes of local firms towards FDI, which is probably one of the determinants of how FDI influences local industry. For example, local firms in different parts of the country may differ when it comes to their willingness and ability to adopt technologies and managerial practices used by foreign firms.

Moreover, regional differences may affect the character of inward FDI. We will argue that for the time period under study, it is possible to distinguish between two principal

types of FDI capital flows to Ukraine: one which had its origins in more developed countries and another which had its origins in offshore banking centers such as Cyprus and the Virgin Islands. Whereas the former type of FDI was mainly attracted to western Ukraine, the latter type was concentrated in the eastern parts of the country. The main differences between these two types of FDI concern knowledge intensity and technological capability: FDI from traditional investor countries is likely to be based on the existence of firm-specific intangible assets (e.g., in the form of skills and proprietary technology), whereas FDI from offshore banking centers may have other explanations related to capital costs and taxation. Although the direct short term effects of the two types of FDI (in terms of job creation, tax revenue, and impact on the balance-of-payments) may be similar, there is reason to expect that the indirect effects will be different. In particular, it is likely that FDI from traditional investor countries will influence the technology and productivity of local firms. For example, some of the superior skills and technologies used by MNCs from traditional investor countries may eventually spill over to local firms, contributing to technical change and higher efficiency. If FDI projects from offshore banking centers do not embody superior technologies, there is no reason to expect any similar spillover effects on local firms.

The choice of the time period 1999-2003 is motivated by data availability and history. Detailed firm level data sets for the years before 1999 have not been available for this study. At the same time, there is reason to believe that some of the regional differences in Ukraine have diminished gradually after 2003. In particular, the "orange revolution" in 2004 was the beginning of a process towards increased democracy, rule of law, and outward orientation (Åslund, 2009). One result was a distinct increase in inward FDI flows from traditional investor countries, also directed towards eastern Ukraine. The complex privatization of the country's largest steel maker Kryvorizhstal, located in eastern Ukraine, illustrates the change in the country's economic and political environment. In 2004, before the "orange revolution", the company was privatized to a consortium controlled by then-President Leonid Kutchma's son-in-law for a price of USD 800 million, or roughly a quarter of its estimated value at the time (Åslund, 2009). Soon after taking power, the new President Viktor Yushchenko annulled the agreement – in 2005, Kryvorizhstal was auctioned off to Indian Mittal Steel for USD 4.8 billion, making it the country's largest FDI venture.

The paper is set out as follows: Section 2 discusses previous studies on FDI and regional aspects of FDI spillovers, particularly in transition economies, and Section 3 presents an overview of FDI in Ukraine and its regions. Section 4 describes the data set used in this analysis and discusses the methodological strategy employed. Section 5 presents and discusses the main results. Section 6 concludes.

Literature review

The findings from recent empirical analyses of foreign direct investment and technology transfer have yielded ambiguous results, particularly relating to transition economies.

While some studies report positive effects and in particular a positive outlook for the future, others are more pessimistic. The 2005 World Investment Report serves as an example of the more optimistic assessments, noting that the inflows of FDI into transition economies increased significantly from the late 1990s, and arguing that the prospects for further growth were positive. The degree of foreign business involvement, including FDI in high-tech sectors, was foreseen to increase in several of the Eastern Europe economies. The report also identified new potentially profitable opportunities in the primary sectors that were expected to attract more FDI in the future. Some notable examples were oil and gas in Russia and some of the former Soviet republics in Central Asia, and steel and metallurgy in Ukraine and other transition economies. Many other contemporaneous assessments were equally optimistic, and led to strong expectations about positive spillover effects from advanced foreign knowledge in several East European countries (Benacek et al., 2000; Bohle, 2000; Jindra et al., 2009; Sinani & Meyer, 2004).

There are several studies of FDI in transition economies that have found positive growth effects on local industry (Barrel & Holland, 2000; Benacek et al., 2000; Dries & Swinnen, 2004; Kolasa, 2008; Yudaeva et al., 2003). However, other analyses have failed to find systematic evidence of positive externalities on local firms (Damijan et al., 2003; Konings, 2001; Sabirianova et al., 2005) or only small effect (Hagemejer & Tyrowicz, 2012; Hanousek et al., 2011; Havranek & Irsova, 2011. In some cases, there is even evidence of negative spillovers.[1] For instance, analyzing the impact of FDI in Estonia, Sinani & Meyer (2004) found that although competition from foreign firms promoted sales growth in domestic firms, domestic firms failed to catch up with foreign firms in most industries.

Some of the methodological explanations for the mixed results focus on possible differences between intra and inter-industry effects, and have been examined by Javorcik (2004a).[2] Since multinationals have an incentive to prevent information leakages that might enhance the performance of their local competitors, it is likely that the potential positive effects are concentrated to other industries, in particular those that are vertically linked to sectors with FDI. Hence, inter-industry spillovers, where local firms benefit from knowledge transfers as a consequence of vertical linkages with foreign firms, may be more prominent than intra-industry spillovers, where local firms benefit from the technologies and skills of their foreign-owned competitors (Javorcik, 2004a).

Several studies have also found evidence of inter-industry spillovers that are not directly related to vertical linkages but rather to geographical proximity to foreign MNCs, both generally (Audretsch & Feldman, 1996; Baldwin et. al., 2008; Bottazzi & Peri,

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1 Negative spillover effects are related to situations where less efficient domestic firms lose market shares after the entry of foreign competitors, with weaker economies of scale and perhaps also weaker opportunities to invest in R&D and new technology as a result.

2 Different types of knowledge may also have different propensities to spill over. Marketing and management knowledge, for example, appears to be more generally applicable than product and process technology, and is, therefore, more likely to spill over to domestic firms, given the appropriate conditions. For a discussion of other factors, see Kokko & Kravtsova (2008).

2003; Crespo et al., 2009; Girma, 2003; Henderson, 2003; Keller, 2002; Sjöholm, 1999; Thorton & Flynne, 2003) and in the context of transition economies (Halpern & Muraközy, 2007; Torlak, 2004).[3] Part of the reason why economic activities cluster is to realize various benefits from agglomeration. One sub-group of agglomeration economies is generally labeled localization externalities (Arrow, 1962; Romer, 1986). Such spillovers reduce transport and transaction costs for goods, people, and ideas. To benefit from these externalities, firms belonging to a specific industry locate near other firms along the supply chain (be they customers or suppliers), near other firms that use similar types of labor, or near other firms that share a similar knowledge base (Ellison et al., 2007).[4]

The need for close physical proximity (and density) is mainly predicated on the notion that a significant part of the knowledge that affects economic growth is tacit (and therefore difficult to codify). Such knowledge does not move readily from place to place as it is embedded in individuals and firms and the organizational systems of different places (Gertler, 2003). This means that many kinds of spillovers are also limited by distance: the key channels for FDI spillovers – labor turnover, demonstration effects, competition and cooperation with upstream suppliers (backward linkages) and downstream customers (forward linkages) – are geographically restricted in many industries.

Having established that proximity to foreign firms is likely to be an important determinant of spillovers, it must be noted that geography matters also for other reasons. Empirical evidence shows that the "ability to adapt new technologies depends on the institutional infrastructure, education, geography, and resources devoted to R&D" (Maurseth & Verspagen, 1999). It is commonly assumed that the nation state is the appropriate economic unit for the analysis of these issues, as national borders determine the limits of indigenous formal institutions, like chambers of commerce, credit registries, moneylenders, land inheritance norms, disclosure requirements on companies, judicial systems, competition laws, and so forth (North, 1990). However, economic performance is also influenced by informal institutions, such as norms and habits – the way formal institutions work in practice and people's attitudes to them, reciprocity among business partners, culture, and ethical norms and values. These factors often vary within countries, meaning that regions are likely to show differential capabilities to absorb and translate available knowledge into economic growth. The concept of the "learning region" is one indication of the importance of the regional innovation system in facilitating firms to acquire external knowledge (Cooke & Morgan, 1998; Oughton et al., 2002; Cooke et al., 2003; Howells, 2002; Asheim & Gertler, 2005).

Although the importance of institutional development has been widely recognized in the institutional economics literature (Acemoglu et al., 2005; North, 1990; Stiglitz, 1999), there is no consensus on the path of institutional change in the transition pro-

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3 For a recent review on the spatial dimension of the spillover literature see Harris et al. (2011).

4 Other agglomeration benefits are related to the reduction in transportation and trade costs that are possible when firms are located close to large consumer markets, input markets, and sources of raw materials.

cess. Not only every transition country, but also every region within the country, has had its own specific history of institutional development during the unique experiment of evolution from the planned economy to the market economy (Meyer, 2001b). Furthermore, with a few exceptions, there is little discussion in extant literature on how differences in institutional characteristics, especially at the regional level, may influence economic outcomes of FDI. One of the exceptions is Javorcik (2004b), who finds that weak institutional protection in Eastern Europe and the former Soviet Union deters foreign investors in those sectors that are technology-intensive and, therefore, heavily reliant on intellectual property rights. She also finds that a weak intellectual property rights regime encourages investors to undertake projects focusing on distribution rather than local production. These inter-regional differences in the character of incoming FDI, in turn, are likely to influence the potential benefits of FDI for local industry. The conclusion by Javorcik & Spatareanu (2008), that joint ventures tend to result in stronger positive spillover effects than wholly-owned foreign affiliates, may also be related to the institutional context, e.g., the institutional characteristics that facilitate local participation in FDI projects. Another relevant study is Altomonte & Colantone (2008), who provide an empirical analysis of the regional growth disparities in Romania. They find that the spillover effects from FDI are unbalanced across regions, with positive spillovers detected only in the best performing areas and some evidence of crowding out of domestic firms in the lagging regions. They observe heterogeneous behavior on the part of foreign firms over time and argue that the presence of foreign multinational enterprises tends to exacerbate regional disparities, magnifying the different initial conditions. Similarly, Pavlínek (2004) highlights the relation between FDI and uneven regional development in Central and Easter Europe. Carrington's (2003) findings from a spatial analysis of spillover effects also clearly distinguish between convergent and divergent movements within European countries. The economic convergence of regions (driven, e.g., by spillover effects) depends on such factors as location, previous economic performance and the formal and informal institutions present in the region.

However, none of these studies focus explicitly on the links between FDI, the host country's informal institutions, and spillovers. One reason is that it is complicated to undertake cross-country analyses of the role of informal institutions in economic development, because formal institutions also differ across countries. One way to detect the role of informal institutions could be to analyze the impact of FDI across regions within a given country (where the formal institutional setting is fixed), although it is difficult in practice to disentangle the effects of informal institutions from other factors that differ between locations. Yet, differences in informal institutions sometimes lead to differences in the attitude towards FDI and foreign presence in the region, and may also have an effect on the capacity and willingness of local firms to learn from foreign investors. This can influence both the type of FDI that enters the region and the pace and nature of the diffusion of new technologies to domestic firms – consequently, these differences may condition the overall impact of foreign presence on the local economy.

Previous evaluations of spillover effects using standard econometric methods have rarely been sensitive to the institutional differences that exist across countries and across regions within countries. This study seeks to identify the possible importance of inter-regional differences using Ukraine as a case study and as an example of a country with notable social, historical and cultural differences between its eastern and western regions.

To visualize the East-West divide in Ukraine, it is convenient to use a map of the outcome of presidential election in November 2004, which brought a pro-western president, Viktor Yushchenko, to power. Figure 1 suggests that there was a clear regional division of people's ideas about the direction that Ukrainian economy should take. The political map shows that nine provinces in eastern and southern Ukraine supported the pro-eastern contender, Viktor Yanukovych, while the country's other provinces supported the "orange revolution" and Mr. Yushchenko. The same pattern holds for the Parliamentary election held in March 2006 and the presidential elections in 2010 where the vast majority of people in the nine south-eastern provinces supported the party led by Mr. Yanukovych (Regions' Party). Katchanovski (2006) argues that this East-West divide in electoral behavior has been more or less stable during the entire period of Ukrainian independence since 1991.

FIGURE 1. **Illustration of the Political Polarization of Ukraine after the Presidential Election in 2004.**

Source: http://www.globalsecurity.org/military/world/ukraine/images/041124-election.gif

Although the voting results are influenced by a variety of factors that have limited direct impact on the economic sphere, the distinct voting pattern also reflects deep institutional differences that influence day-to-day economic activity, including attitudes

towards FDI. Openness to FDI is officially endorsed by both parties, but attitudes and values differ in practice. An extensive literature has documented the various differences between the western and eastern parts of the country, identifying history, language, religion, economic structure, and relations to Russia as a few of the distinguishing characteristics of the two regions (Barrington & Herron, 2004; Birch, 2000; Christensen et al., 2005; D'Anieri, 2005; Kubicek, 1997, 2000; Liber, 1998; Wolczuk, 2006). Table 1 compares some of the stylized characteristics of the two regions, highlighting in particular the differences in attitudes towards Russia.

TABLE 1. **Stylized Profiles of Western and Eastern Ukraine**

	"West"	**"East"**
Density of population	Low	High
Urbanization	Low	High
Ethnic composition	Ukrainian	Ukrainian and Russian
Language spoken	Ukrainian	Ukrainian and Russian
Religion	Catholicism	Orthodoxy
Economic profile	Agriculture	Industrial
Geopolitical preferences	Pro-European	Pro-Russian / CIS
Historical memories	Soviet Union as "invader" Russians as "enemy"	Soviet Union as legitimate state Russians as "Slavic brothers"

Source: Adapted from Wolczuk (2002).

Regarding political attitudes, Birch (2000) notes that:

> "residents of the industrialised and heavily Russian east of Ukraine have been found to be more left-wing and pro-Russian in their political orientations and voting proclivities, whereas those of the more agricultural and ethnic Ukrainian west of the country tend to favour market reforms and closer ties with the West".

However, it would be wrong to characterize the main "eastern" party, Mr Yanukovich's Region's Party, as a traditional leftist party. Instead, it is more appropriate to describe it as a representative of business interests from the region. According to Wolczuk (2006), the Region's Party

> "mainly represents the business interest of the regional Donbas elites. Donbas is the heavily industrialised [southeastern] region of Ukraine, which used to act as a model region in Soviet Ukraine. Since 1991 independence, the region has witnessed a growth of powerful business elites who benefited from the opacity and laxness of the economic and legal situation in the 1990s to acquire extensive assets."

Consequently, the political views in eastern Ukraine have tended to favor local business interests at the expense of outsiders. Some of the differences regarding the attitudes towards FDI were revealed after the privatization of the country's largest steel

plant Kryvorizhstal and its purchase by Arcelor Mittal in 2005. This step was supported by the pro-western government but severely criticized by its opponents in the east. The potentially damaging nature of "home-base exploiting" FDI is often emphasized by the (eastern) Regions' Party, which stresses that reliance on domestic investment is a more appropriate strategy for economic development in Ukraine.[5]

Foreign vs. domestic knowledge: two sides of one economy

As in most other post-Soviet countries, the first statistics on FDI inflows into Ukraine were published after the demise of the Soviet Union in 1992. Figure 2 shows how the official inflows of FDI (as registered in the balance-of-payments) into Ukraine and five neighboring countries – Belarus, Poland, Slovakia, Hungary, and Romania – developed from this time until 2008.

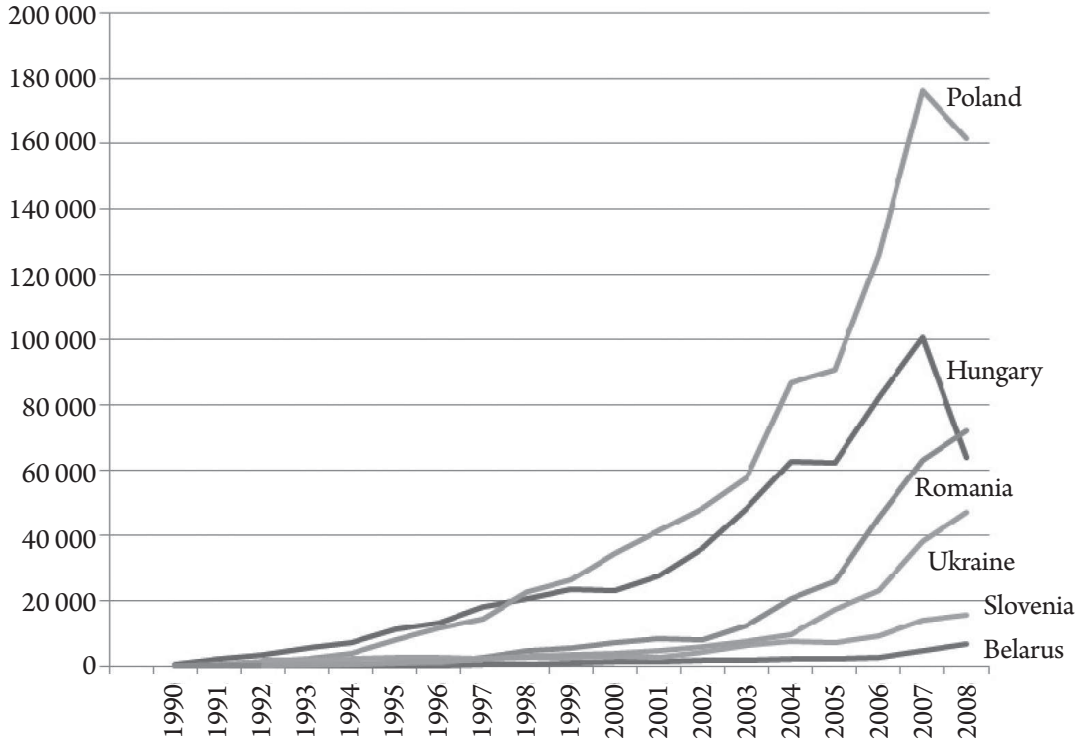

FIGURE 2. **FDI in Central and Eastern European Economies (million USD)**
Source: UNCTAD, FDI/TNC database, http://stats.unctad.org/fdi.

As revealed by the figure, Ukraine was not any major recipient of FDI during this period and ranked near the bottom of the list, with only totalitarian Belarus and Slovenia recording smaller inflows. The top performers in this group of countries have been Hungary and Poland, where fundamental economic reform, including outward orienta-

5 A similar polarization regarding the views on FDI is reported by King and Váradi (2002) for the case of Hungary, while Sinn and Weichenrieder (1997) discuss the resentment against foreign acquisitions in Eastern Europe in general.

tion and other policies welcomed by foreign investors, created a relatively attractive investment environment already in the 1990s. In Ukraine, FDI inflows developed slowly until 2004, but have accelerated since that time, partly because the more outward-oriented policy environment introduced by the "orange revolution".

There are several reasons for the low level of FDI in Ukraine, particularly during the first few years after independence. The macroeconomic environment was highly unstable and the country suffered from hyperinflation – Ukraine had the second highest level of inflation of all post-Soviet countries. The break-up of the Soviet Union had a severe impact on economic structure in Ukraine, as value chains were fragmented and linkages to other parts of the USSR were destroyed. Unemployment was a major problem, and the privatization process did not contribute much stimulus to the economy because of limited domestic investment capacity. These problems contributed to high hopes regarding inflows of foreign investment. It was expected that FDI would bring modern technology and management skills from more advanced market economies, which might eventually spill over to domestic firms in Ukraine (Ishaq, 1999). However, although the official policy was to welcome inward FDI, Ukraine was not able to attract the large amounts of FDI that would have been needed to kick-start the reform process.

This notwithstanding, the total amount of FDI received by Ukraine since the early 1990s is not trivial. In 1998, the FDI stock in Ukraine amounted to some USD 2.8 billion, with an increase to about USD 7.5 billion by 2003 and USD 47 billion by the end of 2008. Another interesting observation concerns the country of origin of the foreign investors in Ukraine. As Figure 3 shows, Ukraine was not only host to investments from major economies like the United States (13.81% of total FDI stocks at the end of 2004), the United Kingdom (10.72%) and Germany (7.5%); offshore tax havens like Cyprus (12.4%), Virgin Islands (6.51%), and Russia (5.48%) also held significant shares.

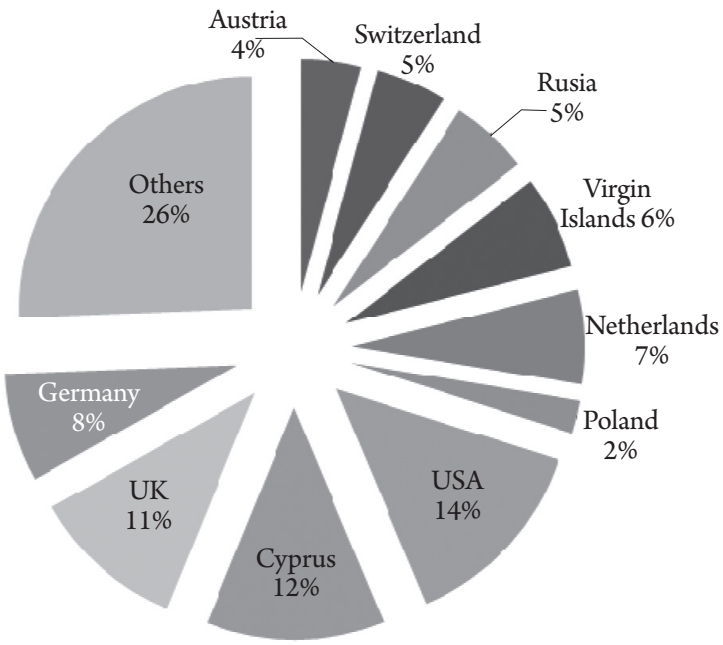

FIGURE 3. **Country Breakdown of Inward FDI Stocks in Ukraine, 2004**

Source: Vienna Institute for International Economic Studies (WIIW) database, 2005.

The relatively large share of offshore investors at this time was not unique to Ukraine, but could also be observed in several of the other post-Soviet economies. While many offshore investments are completely respectable, it has often been suspected that others are associated with money laundering via offshore banking centers. The weakness

of the public sector and the failure to establish rule of law during the early stages of transition resulted in a substantial "grey economy" that was exacerbated by widespread corruption among public officials (Cuervo-Cazurra, 2008; Andvig, 2006). As a result, it is believed that much illicit wealth was cumulated during this period (Cule & Murray, 2005). A substantial share of the investment from countries like Cyprus and the Virgin Islands was arguably made up of such illicit funds from Ukraine and Russia that were laundered in offshore tax havens, and then returned as legal FDI funds (Kononov, 2010), in many cases, benefiting from various FDI incentives.[6] This practice is known as "roundtripping FDI" (Hong & Smart, 2010; Bjorvatn & Soreide, 2005; Cheloukhine & King, 2007). While most of the "traditional" FDI can be assumed to have taken place in western Ukraine, "roundtripping FDI" is part of the explanation for the relatively good performance of eastern Ukraine in attracting foreign investments.

For the Ukrainian economy, one of the main differences between the two types of FDI – that which originates in "traditional" home countries of multinational firms, and that which flows from offshore banking centers – is related to the knowledge intensity and potential to generate spillover effects. This means that their indirect effects on the overall economy may also be very different. Since FDI from traditional investor countries is based on the unique skills and technologies of the investing MNCs, they are likely to exert a stronger influence on local firms than the "roundtripping" FDI that enters Ukraine via offshore tax havens.

Although the theoretical nature of the spillover effect is well-defined, the methodologies used in empirical studies vary. In particular, there are differences between studies when it comes to controlling for differences in the behavior of foreign firms and differences in the local economic and institutional environment. Given the particular features of FDI in Ukraine, this paper makes a distinction between the two main regions of the country – East and West – and focuses in particular on the distinction between two components of productivity change – technical and efficiency change.

Empirically, this task meets several challenges. For reasons of confidentiality, it is hard to trace the origin of FDI at the firm or even industry level. "Roundtripping" FDI has probably affected many parts of Ukraine, but there are reasons to believe that most of it has been directed to eastern Ukraine, where the economic and institutional environment was most favorable for this type of investment, at least before 2004. The eastern region is home to numerous large scale manufacturing plants built during the Soviet era, but these were not highly competitive in the more market oriented economic environment that was established after the collapse of the Soviet Union. The existing

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6 For obvious reasons, it is hard to measure the size of the illicit sector. However, there are frequent media reports on the use of offshore havens for money laundering purposes. For instance, the official government media representative Ukrinform notes that: "According to State Tax Administration Vice Chairperson Mykola Katerynchuk, [...] 65 percent of their (metallurgical plants) exports were through commercial deals which involved offshore zones. In this way, [...] this scheme allows financial-industrial clans to launder huge sums of money." For evidence of similar schemes in other countries, see also Cardenas & Barrera (1997), where analysis of the effectiveness of capital controls in Colombia during 1990s is presented.

capital stock was exploited without much-needed maintenance or new investment, and the technologies used were often obsolete. Hence, most existing firms were not very attractive acquisition targets for western multinationals aiming to enter the country. One indication that eastern Ukraine was host to a disproportionate share of investments from offshore havens is data for the special economic zone in Donetsk *Oblast*, which is one of the largest provinces in the eastern parts of the country. It is reported that the province had received 63 projects with foreign investment amounting to 845.1 million USD as of June 1, 2007. About 40 percent (338.2 million USD) of this capital came from the Cyprus offshore zone.[7]

A further challenge is the search for accurate measures of institutional differences at the regional level. In this study, we estimate separate regression equations for the two regions, to examine whether the relation between FDI and local productivity varies depending on the local institutional environment, controlling for several observable differences between the regions, e.g. size, development level, growth rate, and R&D investment.

Data analysis and model estimation

This study makes use of three datasets: firm level data (Bureau van Dijk Amadeus database), data on economic and innovative activity in the provinces of Ukraine (Statistical Yearbook of Ukraine), and a producer price index for Ukraine (PPI) (WIIW dataset).

Some of the regional features of the firm-level data set (Amadeus) during the period 1999-2003 are highlighted in Table 2. The table shows that around 8 percent of the firms in the sample had some foreign ownership shares.[8] The total sample size almost tripled over the period under study, from 923 firms in 1999-2000 to 2,758 firms in 2002-2003. For the first two-year period 1999-2000, the data set includes more firms from eastern Ukraine than from the western parts of the country, but the pattern is the opposite for later time periods. The changes in the population of firms – in particular, the increase in total sample size and the growing share of western Ukraine – do not reflect changes in underlying populations, but rather the specific features of the data collection process. Similarly, the fluctuations in the shares of individual industries are not related to any systematic pattern of structural change. It should be noted that firms from the cities Kiev (the capital) and Sevastopol (a special military zone) have been excluded from the comparison between eastern and western Ukraine, because of the special character of these two locations.

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7 This data was obtained from the official web-site of Donetsk Regional State Administration - http://www.donoda.gov.ua.

8 For descriptive purposes, Table 2 defines foreign investment enterprises (FIEs) as firms with any foreign ownership share. In the subsequent analysis, only firms with a foreign capital share exceeding 10 percent are categorized as foreign.

TABLE 2. **Number of Sample Firms by Origin, Industry, and Region 1999-2003**

Industry	Total No of firms	FIEs, %	West, %	East, %	Total No of firms	FIEs, %	West, %	East, %	Total No of firms	FIEs, %	West, %	East, %	Total No of firms	FIEs, %	West, %	East, %
	1999-2000				2000-2001				2001-2002				2002-2003			
Food products, beverages and tobacco	305	6.56	54.43	42.62	932	3.22	62.88	33.91	1150	5.04	65.91	31.22	1085	5.53	65.62	31.34
Textiles and textile products	149	7.38	53.02	37.58	290	7.59	52.76	35.52	380	9.47	57.63	32.37	337	10.39	58.75	30.86
Leather and leather products	19	26.32	84.21	0.00	60	10.00	78.33	10.00	85	15.29	82.35	8.24	88	15.91	84.09	6.82
Wood and wood products	33	6.06	36.36	30.30	90	7.78	37.78	31.11	113	8.85	38.94	29.20	115	7.83	39.13	28.70
Pulp, paper and paper products; publishing and printing	18	38.89	11.11	88.89	29	27.59	44.83	51.72	24	33.33	45.83	54.17	30	26.67	43.33	53.33
Coke, refined petroleum products and nuclear fuel	49	18.37	22.45	59.18	119	14.29	34.45	48.74	150	13.33	36.67	48.00	144	14.58	35.42	49.31
Chemicals, chemical products and man-made fibres	17	11.76	41.18	35.29	49	8.16	36.73	46.94	71	9.86	43.66	42.25	71	8.45	46.48	39.44
Rubber and plastic products	102	6.86	48.04	46.08	269	2.60	50.56	41.26	341	2.93	51.91	40.76	326	3.37	51.23	40.80
Other non-metallic mineral products	94	17.02	14.89	84.04	189	11.64	27.51	62.96	243	9.88	31.28	57.61	223	11.66	30.49	57.85
Basic metals and fabricated metal products	137	8.76	26.28	59.12	254	5.12	31.89	54.33	338	4.44	38.76	50.59	339	4.72	38.35	50.44
Total	923	9.86	42.47	49.19	2281	5.96	50.90	40.20	2895	6.94	54.30	37.55	2758	7.47	54.06	37.38

Notes: FIEs – Foreign Investor Enterprise; West - Western Region of Ukraine; East - Eastern Region of Ukraine (see Figure 2 for the definition of the East and the West).
Source: Amadeus dataset, 2005

To explore whether there are any differences in the impact of FDI on local firms at the regional level, and to get some further insights into where these differences originate, we base the empirical analysis on productivity measures calculated from the Malmquist productivity index (MPI). Figure 4 can be used to explain the intuitive and technical details of the concept of productivity, efficiency, and technical change that are involved in the analysis. The figure shows two technological frontiers in period *s* and *t*. Each frontier represents the connecting points between observations with the best performance. Here, performance is evaluated in terms of one output (the firm's turnover), which is maximized, and three inputs (the costs of capital, labor, and materials). The fact that the technological frontier envelopes data points without any specific assumption about the error distribution is reflected in the name of the technique used to estimate it - Data Envelopment Analysis (DEA).

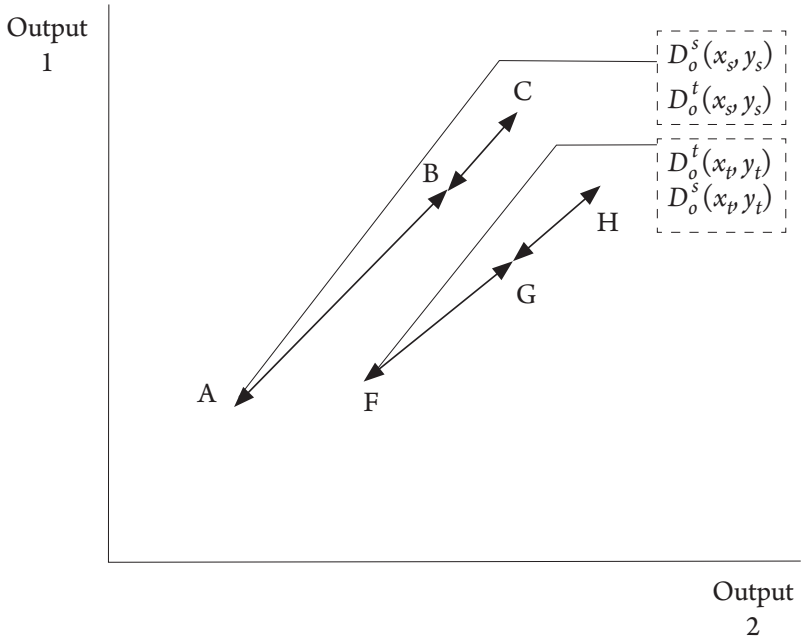

FIGURE 4. **Distance functions, TFP, efficiency and technical change.**

Note: s-base period and t-current period of time, x – input, y – output. $D_o^s(x_t, y_t)$ is the output-oriented Shephard's distance function of observations with a set of inputs and outputs (x, y) in period t, measured with respect to technology set in periods.

Next, Shephard's distance functions are used to estimate a geometrical mean with different technology base periods: two relative to the frontier at time *s* and two relative to the frontier at time *t*. The example of the DEA linear program used to estimate the distances of each point to the frontier is given in the Appendix (as Step 1). These four distance measures are used to form the MPI as described in Step 2 of the Appendix.[9] To this end, all firms were grouped in consecutive two-year balanced panels, where the chain method

[9] The relation between the Malmquist Productivity Index and other estimations of economic index numbers (Fisher and Tornquist Indices) has been discussed, e.g., by Caves et al. (1982).

was used to identify a current period t and a base period s. The time lag with which MPI is estimated can influence the second step evaluation results of the spillover effects from foreign presence (see, e.g., Javorcik, 2004a). However, no time lags are used in this analysis to avoid losing observations: to use a specification with a time lag, it would be desirable to have a more balanced dataset with additional time periods.

The MPI is distinguished by the possibilities it offers for decomposition and aggregation. The most popular decomposition of the index was proposed by Fare et al. (1994) and comprises two sources of productivity change: technical change and efficiency change (see Step 3 in the Appendix for details). Graphically, (using Figure 4) technical change entails a shift of the technological frontier and efficiency change a move on the part of the firm relative to the changing technological frontier.

Algebraically, for output oriented distance functions, an MPI greater than (smaller than) unity implies an increase (a decrease) in total factor productivity (TFP) in the current period *t* relative to the base period s. The results of a decomposition of the sources of TFP change should be interpreted in a similar manner. Technical change (TC) is illustrated by a shift in technological frontier, when the technological frontier is defined as a surface enveloping the hyperspace of *N x M* dimension of the most efficient firms (where *N* and *M* is a number of inputs and outputs). This frontier also serves as a benchmark for the rest of the firms. If TC is greater than unity, then technology improvement is observed and the frontier moves upward to envelope more efficient observations: the magnitude of technical change is equal to (TC-1)*100 percent. Similarly, a technical change score less than unity indicates technology deterioration by (1-TC)*100 percent. Efficiency change (EC) shows the movement of a firm relative to the technological frontier. It can be interpreted as a catching-up effect if this component is greater than one, and a lagging behind effect when it is less than one.

In the second stage of the empirical investigation, the regional differences in Ukraine are introduced into the analysis. We first estimate three separate models to relate the MPI and our measures of efficiency change and technical change to a set of data reflecting various characteristics of provinces, industries, and firms covering our entire data set on Ukraine. Our focus lies particularly on how FDI at the industry level influences the three performance measures. Thereafter, we make separate estimations for eastern and western Ukraine, in order to examine whether results differ between the two parts of the country.

The three empirical models that are estimated are:

$$(i)\quad MPI_{irt} = f(FDI\_Spill_{rt}, Ind\_Dev_{rt}\, Prov\_Size_{rt}, R\&D\_Activity_{rt}\, Size_{it,} Age_{it,}\, IA_{it,}\, Private_{it}, Tech\_level, industry\ dummies) + u_{it}$$

$$(ii)\quad EC_{irt} = f(FDI\_Spill_{rt}, Ind\_Dev_{rt}\, Prov\_Size_{rt}\ R\&D\_Activity_{rt}\, Size_{it,} Age_{it,}\, IA_{it}\, Private_{it}, Tech\_level, industry\ dummies) + u_{it}$$

$$(iii)\quad TC_{irt} = f(FDI\_Spill_{rt}, Ind\_Dev_{rt}\, Prov\_Size_{rt}\ R\&D\_Activity_{rt}\, Size_{it,} Age_{it,}\, IA_{it}\, Private_{it}, Tech\_level, industry\ dummies) + u_{itt}$$

where i identifies the individual domestic firms, r is the provinces (there are 24 provinces in all), t the time period, MPI is the Malmquist productivity index, EC is the measure of efficiency change, and TC the measure of technical change, (see equation 6 in the Appendix).

All three models are estimated using the Generalized Method of Moments (GMM) systems approach available in STATA 10 (Arellano & Bond, 1998). This is done to allow for potential endogeneity of factor inputs and output (in our case MPI, TC, and EC). This method is sufficiently flexible to allow for both endogenous regressors (through the use of appropriate instruments involving lagged values – in levels and first differences – of the potentially endogenous variables in the model, such as performance measures, firm size, and age) and a first-order autoregressive error term.[10]

The variable FDI_Spill_{rt}, which measures foreign equity in province r normalized by total investment in the province at time t, is included among the explanatory variables to examine the impact of foreign presence on local firms. We interpret a significant positive (negative) impact of this variable on our measures of productivity, efficiency, and technical change as an indication of positive (negative) spillovers from FDI. The variable Ind_Dev_{rt} is defined as provincial gross product per capita in each province r at time t. The variable is introduced into the model to take account of differences in provincial economic development, something which might potentially cause bias in the estimation of the spillover effects. We expect a positive impact of this variable. The variables $Prov\_Size_{rt}$ and R&D_Activity are proxied by the economically active population (aged from 17 to 70) and spending on R&D in the province, respectively. Firms operating in a larger province with more spending on R&D are expected to be more productive and efficient irrespective of the degree of foreign presence in their industry.

Firm-specific intangible assets, age and size effects are captured by the $IA_{it,}$ $Size_{it,}$ and Age_{it} variables for each firm i at time t. Size is proxied by the number of employees in each firm I at time t, data for intangible assets are from the Amadeus data base, and age is expressed as the number of years since the establishment of the firm. Larger firms and firms with more intangible assets are expected to be more productive, but it is unclear *ex ante* what the effect of age should be: older firms might have more experience, but it is uncertain whether experience from the Soviet period is of much value in a market economy. In addition, the regressions include dummies for ownership ($Private_{it}$ distinguishes privately owned firms from state-owned firms), the technology level of the industry (Tech_level. based on OECD's classification of low, medium, and high-technology industries), as well as industry dummies at the two digit level (Hatzichronoglou, 1997). The analysis covers the period 1999-2003, and Ukraine is divided into 24 provinces.

The correlations between the main variables are presented in Table 3.

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[10] When using the GMM systems approach, the model is estimated in both levels and first-differences. Blundell and Bond (1999) argue that including both lagged levels and lagged first-differenced instruments lead to significant reductions in finite sample bias as a result of exploiting the additional moment conditions inherent in the system approach.

TABLE 3. **Correlation Matrix.**

Description	Variable										
Productivity change	**MPI_{rt}**	1.00									
Technical change	**TC_{rt}**	0.69*	1.00								
Efficiency change	**EC_{rt}**	0.18*	-0.28*	1.00							
Log (FDI capital / Total investment in the province)	**FDI_Spill_{rt}**	-0.02	-0.01	0.01	1.00						
Log(Number of employees)	**$Size_{it}$**	-0.01	-0.01	0.05*	0.02	1.00					
Log(years since the establishment)	**Age_{it}**	-0.03*	-0.04*	0.02	0.06*	0.34*	1.00				
Intangible assets of the firm, mln.USD	**IA_{it}**	0.01	0.01	-0.01	0.00	0.09*	0.04*	1.00			
Log(Number of employees in the province)	**$Prov\_Size_{rt}$**	-0.02	-0.01	0.02	0.02	0.12*	0.11*	0.03	1.00		
Log(Per capita gross provincial product)	**Ind_Dev_{rt}**	-0.04*	-0.03*	0.01	0.09*	0.00	0.10*	0.01	0.73*	1.00	
Log (R&D activity in the province)	**$R\&D\_Activity_{rt}$**	-0.02	-0.01	0.01	0.07*	0.07*	0.05*	0.02	0.81*	0.73*	1.00

Notes: * Significant at the 10-percent level

The most noticeable, statistically significant correlation is that between productivity change and technical change. While both technical change and efficiency change are statistically significantly correlated to productivity change (both by definition and according to the results presented), Table 3 suggests that technical change contributes relatively more to productivity change in our sample.

Another significant correlation is that between the age of the plant and its size, indicating that the older plants in Ukraine are usually the larger ones. The plant level variables do not exhibit any high correlations, although it should be noted that there is a mild (but significant) negative correlation between age and productivity and technical change. This can be interpreted as a weak sign that older plants, built to benefit from economies of scale in the Soviet economy, have suffered from the transition from a planned to a market economy. Table 3 also reveals a distinct relation between the province level variables. The size of the province, its level of economic development (as indicated by the province's gross product per capita) and its R&D activity are highly correlated: these correlations are likely to complicate the regression analysis.

Estimation results

Table 4 examines the regional dimension of the relations between FDI and local productivity in Ukraine. Columns (1) to (3) include results for the entire country, with column (1) showing results for MPI (i.e., overall productivity change) and columns (2)

TABLE 4. **Regression Analysis: Determinants of Domestic Firm Performance in Eastern and Western Ukraine**

		Total economy			East of Ukraine			West of Ukraine		
		MPI	**EC**	**TC**	**MPI**	**EC**	**TC**	**MPI**	**EC**	**TC**
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Provincial characteristics										
Log (FDI capital /Total investment)	**FDI_Spill$_{rt}$**	-0.664**	1.537	-2.769***	0.309	-1.260	0.043	-1.067***	2.529*	-3.932**
		(0.289)	(1.056)	(0.931)	(0.809)	(2.266)	(2.801)	(0.372)	(1.454)	(1.574)
Log(Labor force in the region)	**Prov_Size$_{rt}$**	1.534	-8.050	7.328	-2.540	-12.552	7.823	0.120	2.705	0.363
		(1.909)	(8.015)	(6.802)	(3.942)	(12.740)	(14.739)	(1.034)	(4.558)	(4.849)
Log(gross provincial product per capita)	**Ind_Dev$_{rt}$**	-2.428	11.110	-9.258	-2.198	4.948	-9.621	-0.764	0.490	-2.921
		(2.327)	(9.736)	(8.248)	(3.283)	(9.690)	(13.504)	(1.644)	(6.251)	(7.367)
Log (R&D activity in the province)	**R&D_Activity$_{rt}$**	0.006	-0.567	0.273	0.171	-0.536	0.592	0.064	-0.235	0.376
		(0.132)	(0.528)	(0.445)	(0.247)	(0.718)	(0.970)	(0.127)	(0.554)	(0.575)
Firm characteristics										
Log(years since the establishment)	**Age$_{it}$**	0.616	-2.823	1.416	0.894	-3.854	5.291	-1.074	4.637*	-4.840
		(1.148)	(4.803)	(4.030)	(1.800)	(5.248)	(7.105)	(0.700)	(2.449)	(2.952)
Intangible assets of the firm, mln. USD	**IA$_{it}$**	-0.000	0.011	-0.003	0.001	0.003	-0.001	0.006	0.025	0.043
		(0.003)	(0.010)	(0.009)	(0.002)	(0.006)	(0.008)	(0.014)	(0.060)	(0.060)
Log(Number of employees)	**Size$_{it}$**	-0.973	5.854	-5.018	0.046	2.476	-3.236	-0.473	1.983	-2.930
		(0.960)	(3.985)	(3.427)	(1.372)	(4.124)	(5.468)	(0.640)	(2.251)	(2.702)
Private owner (dummy)	**Private$_{it}$**	2.883	-5.667	1.076	6.733	-17.799	25.928	-3.683	22.772*	-21.471
		(5.032)	(21.063)	(17.513)	(8.226)	(23.916)	(32.201)	(3.354)	(11.739)	(14.149)

		Total economy			East of Ukraine			West of Ukraine		
		MPI	**EC**	**TC**	**MPI**	**EC**	**TC**	**MPI**	**EC**	**TC**
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Industry characteristics										
Dummies for three technological groups of industries, OECD classification	**Tech_level Medium**	-0.157**	-0.134	-0.272	0.080	-1.054	1.247	-0.068	-0.705	0.140
		(0.072)	(0.267)	(0.209)	(0.594)	(1.740)	(2.362)	(0.201)	(0.839)	(0.938)
	Tech_level High	0.273	-2.300	1.887	0.180	-1.756	2.637	0.131	-1.284	1.637
		(0.488)	(2.040)	(1.740)	(1.097)	(3.213)	(4.349)	(0.315)	(1.161)	(1.302)
	_cons	1.554	-8.307	6.809	19.741	63.062	-18.491	7.788	-43.921	39.640
		(5.335)	(22.615)	(18.048)	(19.623)	(66.038)	(74.574)	(6.875)	(30.211)	(30.183)
AR(1) z-statistic[1]		0.000	0.730	0.064	0.000	0.044	0.294	0.000	0.000	0.000
AR(2) z-statistic[1]		0.299	0.175	0.070	0.172	0.544	0.800	0.007	0.000	0.002
Hansen test c2(13)[2]		0.881	0.425	0.403	0.445	0.919	0.967	0.514	0.307	0.455
	# of obs	7702	7702	7702	3263	3263	3263	4439	4439	4439

Notes: Robust standard errors are presented below each coefficient. Each regression is estimated using the Generalized Method of Moments (GMM) systems approach available in STATA (Arellano & Bond, 1998). (1) AR1 and AR2 are tests for first- and second-order serial correlation in the first-differenced residuals. The null hypothesis for the second-order serial correlation test states that the errors in the first-differenced regression do not show second-order serial correlation. (2) The Hansen test (J-statistic) is used in GMM estimation to evaluate the suitability of the model. A rejection of the null hypothesis implies that the instruments do not satisfy the required orthogonality conditions - either because they are not truly exogenous or because they are being incorrectly excluded from the regression.

* Significant at the 10-percent level.

** Significant at the 5-percent level.

*** Significant at the 1-percent level

and (3) focusing on the two components of MPI: efficiency change (EC) and technical change (TC). Columns (4) to (6) show the same information for eastern Ukraine, while columns (7) to (9) refer to western Ukraine.[11]

For the whole country, the results suggest that FDI did not contribute to raising the productivity of domestic firms: on the contrary, FDI had a significant negative impact on MPI. This negative overall effect is mainly driven by a significant negative effect of FDI on technical change (TC). The estimated impact of foreign presence on efficiency change is positive, but not significant at conventional levels of confidence. Few of the other variables in the model record significant coefficients – instead, most of the variation in productivity, efficiency, and technical change is explained by industry dummies. Unlike the simple correlation, the multiple regression does not yield any significant relation between firm and productivity change, which suggests that environmental factors are likely to be important. However, none of the province level variables are significant in the estimation – one reason could be that the high simple correlation between provincial size, income level, and R&D activity makes it hard to disentangle their separate effects. At the same time, the Hansen test statistic suggests that we should not reject the null hypothesis that the model specification is correct and that all overidentified instruments are exogenous (Greene, 2000). Moreover, the AR(1) and AR(2) statistics indicate that there are no serious problems with first or second order serial correlation in the first-differenced residuals.

A possible explanation for the apparent lack of positive spillovers is that local firms have lost market shares as a consequence of the entry of foreign firms, which has forced them to move up their average cost curves. In the short term, this may have reduced productivity, because fixed costs were distributed across smaller volumes of output. A likely response to smaller sales volumes in the medium term is to reduce fixed costs, which may be a partial reason for the limited investments in technological upgrading of domestic firms noted earlier.

Another point to keep in mind for the country-level regressions is that the analysis is limited to the years 1999 to 2003. This was a period when the total stock of FDI in Ukraine was still comparatively low, which may explain some of the lack of positive spillover effects. The time period may also be too short to determine whether or not knowledge from foreign countries was accumulated in foreign affiliates operating in Ukraine and subsequently diffused to domestic firms: learning is a lengthy process and it may take several years before the results of technology spillovers are visible in the kinds of productivity and technology measures employed in this study.

Yet another possible explanation is that the results might reflect the "weak" quality of FDI in Ukraine. As discussed earlier, Ukraine has experienced substantial inflows of

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[11] All equations are estimated using the GMM systems approach, but we have also experimented with other models (where we have replaced MPI with simpler productivity measures based on firm level sales data) and other estimation techniques (OLS on pooled data, as well as fixed effects models). Results are broadly similar to those discussed below, in the sense that there are differences in the impact of FDI in the two parts of the country, and are available on request.

so-called "round-tripping" FDI. With a formal origin in offshore banking centers, this type of FDI does not necessarily embody high technology, and it is therefore not likely to have any distinct impact on the technologies used by domestic firms.

Columns (4) to (9) present results from separate estimations for the two parts of the country. A first observation is that the results for the country as a whole are mainly driven by the patterns for western Ukraine. The estimated effect of the variable FDI_Spill_{rt} on technical change is strongly negative and highly significant, resulting in a negative impact on productivity (although FDI seems to promote positive efficiency change). Some of the firm level variables, like age of establishment and ownership, also record significant effects on efficiency change in western Ukraine. The pattern for eastern Ukraine, by contrast, is very unclear. Neither overall productivity growth in eastern Ukraine nor the variables EC and TC seem to be influenced by inward FDI or any of the firm level variables.

Although the estimation results are relatively weak (in the sense that few of the variables have significant effects), they are consistent with the hypothesis that there are differences between the flows of FDI reaching the two parts of the country. While the main impact of inward FDI in the western part of Ukraine is probably related to lost market shares – resulting in lower investments in technology upgrading – it appears that competition has had a balancing positive effect on efficiency change: local firms have simply been forced to work harder to maintain their market positions. Since the foreign firms entering the western parts of the country arguably have strong technological advantages, it is possible that some foreign knowledge and skills may also spill over in the longer term. However, this requires that local firms raise their investments in R&D and machinery and equipment, so that new insights (or technologies) are embodied in new products, processes, or organizational solutions (Wang & Blomström, 1992). In the eastern part of Ukraine, by contrast, the variable FDI_Spill_{rt} did not seem to make any significant impact at all on the operations of domestic firms. This is consistent with the assumption that the inflows of FDI to eastern Ukraine during the period 1999-2003 were to a large extent made up of "roundtripping" investments without significant technological advantages. A larger share of this type of FDI in total investment should not have any significant impact on technical change and efficiency change in local firms – this is indeed what the results show.[12]

Summary and conclusions

Earlier studies have shown that FDI can be a catalyst for economic development, both directly, through its effects on employment, tax revenue, and exports, and indirectly, through spillover effects that help local host country firms improve their technology

[12] This should not be interpreted to mean that "roundtripping" FDI will not influence local firms. On the contrary, to the extent that "roundtripping" results in a larger absolute amount of investment, it will raise aggregate production and contribute to stronger competition in the market. This effect is no different than the impact of an increase in domestic investment, and will therefore not be captured by the variable FDI_Spill_{rt} (which measures FDI as a share of total investment).

and productivity. However, the results from empirical studies of FDI spillovers are mixed: in particular, many studies of FDI in the transition economies of Eastern Europe have failed to find systematic spillover benefits for the local economy.

This paper has contributed to the debate by highlighting another factor that may explain some of the mixed results from earlier studies: the impact of regional differences in informal institutions within individual countries. More specifically, focusing on the case of Ukraine, we have argued that the eastern and western parts of country exhibit large differences when it comes to economic and political orientation. While western Ukraine has a stronger orientation towards Western Europe and a stronger emphasis on the market economy, eastern Ukraine is more conservative and oriented towards Russia. One area where these differences have been manifested is the attitude towards inward FDI. The attitudes toward inward FDI are more positive in western Ukraine and more reserved in the eastern parts of the country. Consequently, much of the FDI from western countries, in particular before the "orange revolution" in 2004, was located in western Ukraine. Eastern Ukraine also received some inflows of FDI during this period, but these inflows were to a larger extent made up of "roundtripping" investments, where domestic funds were exported to offshore tax havens like Cyprus and the Virgin Islands before being re-imported to the country. The two types of FDI – from "traditional" investor countries in the OECD region and from tax havens – differ particularly when it comes to knowledge and technology. Traditional FDI is based on firm-specific assets that make it possible for the investing company to overcome various "disadvantages of foreignness" and compete successfully with local host country firms. The introduction of new skills and technologies may influence the productivity and efficiency of local firms through various kinds of spillover effects. It is less likely that these kinds of effects will occur as a result of "roundtripping" FDI, since the firm-specific ownership assets of the investors are probably not related to technology and skills.

To test the hypothesis that FDI has had different effects on local firms in the two parts of Ukraine, we have calculated measures of productivity growth, efficiency growth, and technical change in local firms using the Malmquist productivity index. These measures, covering the period 1999-2003, have then been regressed on a set of variables measuring the characteristics of provinces, firms, and industries in Ukraine. The main explanatory variable of interest measures the foreign share of investment at the provincial level: any systematic impact of FDI on local firms should result in a significant coefficient estimate.

Overall, the regression results suggest that FDI was not beneficial for productivity growth in local firms in Ukraine during the period under study, with a negative impact in particular on the rate of technical change. The likely reason is that foreign-owned enterprises captured market shares from local firms, who were forced to reduce fixed costs, e.g., by reducing investments in technological upgrading. However, this finding is driven mainly by the results for western Ukraine, where foreign presence was a significant determinant of local productivity growth and technical change. The results for western Ukraine also suggest that the competition from foreign firms was beneficial for

efficiency change. In eastern Ukraine, by contrast, the foreign share of investment did not appear to have any significant impact on local firms. This is consistent with the hypothesis that much of the investment flowing to eastern Ukraine was "roundtripping" FDI, which did not differ much from local investment in terms of its technological characteristics.

These results highlight the need to take into account regional differences in informal institutions and the business environment in analyses of the impact of FDI on the local economy. In the case of Ukraine, it is clear that economic and political attitudes have differed between the eastern and western parts of the country, and that the effects of FDI on local firms have differed accordingly. The policy recommendations that can be drawn from the two regional experiences are different. Whereas the externalities observed in western Ukraine may motivate specific policies to promote or discourage FDI inflows (depending on whether the long-term impact is positive or negative), there is no obvious reason to implement different policies for FDI and local investment under conditions resembling those in eastern Ukraine during the period of study. To the extent that formal policies must be defined at the national level – and applied equally in all regions of the country – there may be reason to distinguish between foreign direct investment projects on the basis of the nationality of the investors: in particular, it is difficult to see any reasons to provide favorable treatment for "roundtripping" FDI.

However, for completeness, it should also be noted that the differences in the estimated impact of FDI on local industry may be related to the informal institutional environments in the two parts of the country through another channel – the behavior of local firms. In the same way that the local context may influence the character of inward FDI, it may also condition the responses of local firms to the challenges posed by foreign-invested enterprises. The data available for this study does not allow us to distinguish in detail between these two reasons why FDI has different effects in eastern and western Ukraine. Together with analyses spanning longer periods of time and exploring how the political changes in Ukraine after the "orange revolution" in 2004 influenced the differences between the two regions of the country, this is clearly an interesting topic for further study.

References

Acemoglu, D., Johnson, S.& Robinson, J. (2004). Institutions as a Fundamental Cause of Long-Run Growth. In P. Aghion & S.N. Durlauf (eds.), *Handbook of Economic Growth (pp.385-472)*. Amsterdam: Elsevier.

Altomonte, C. & Colantone, I. (2008). Firm Heterogeneity and Endogenous Regional Disparities. *Journal of Economic Geography 8*(6), 779-810.

Andvig, J.C. (2006). Corruption and Fast Change. *World Development*, *34*(2), 328-40.

Arellano, M. & Bond, S.R. (1998). Dynamic Panel Data Estimation Using DPD98 for GAUSS. Lisbon: ISEG, Universidade Tecnica de Lisboa.

Arrow, K. (1962). The Economic Implications of Learning by Doing. *Review of Economic Studies, 29*(2), 155-173.

Asheim, B. T., Gertler, M. S, Fagerberg, J., Mowery, D. C. & Nelson, R. R. (2005). The Geography of Innovation: Regional Innovation Systems. In *The Oxford Handbook of Innovation (pp. 291-317)*. Oxford and New York: Oxford University Press.

Aslund, A. (2009). *How Ukraine Became a Market Economy and Democracy.* Washington, D.C.: Peterson Institute for International Economics.

Audretsch, D. & Feldman, M.(1996). Knowledge Spillovers and the Geography of Innovation and Production. *American Economic Review, 86*(4), 630-640.

Baldwin, J. R., Beckstead,D., Brown, W. M. & Rigby, D. L. (2008). Agglomeration and the Geography of Localization Economies in Canada. *Regional Studies, 42*(1), 117-132.

Barrell, R. & Holland, D. (2000). Foreign Direct Investment and Enterprise Restructuring in Central Europe. *Economics of Transition, 8*(2), 477–504.

Barrington, L. W. & Herron, E. S.(2004). "One Ukraine or Many? Regionalism in Ukraine and Its Political Consequences. *Nationalities Papers, 32*(1), 53-86.

Benacek, V., Gronicki,M., Holland, D. & Sass, M. (2000). The Determinants and Impact of Foreign Direct Investment in Central and Eastern Europe: A Comparison of Survey and Econometric Evidence. *Transnational Corporations,* 9 (2), 163-212.

Bénassy-Quéré, A., Coupet, M. & Mayer, T. (2007). Institutional Determinants of Foreign Direct Investment. *World Development*, 30 (5), 764-782.

Bevan, A., Estrin, S. & Meyer, K. (2004). Foreign Investment Location and Institutional Development in Transition Economies. *International Business Review, 13*(1), 43–64.

Birch, S. (2000). Interpreting the Regional Effect in Ukrainian Politics. *Europe-Asia Studies, 52*(6), 1017-1041.

Bjorvatn, K. & Soreide, T. (2005). Corruption and Privatization. *European Journal of Political Economy, 21*(4), 903-14.

Blundell, R. & Bond, S.(1999). *GMM Estimation with Persistent Panel Data: An Application to Production Functions*. IFS Working Paper Series No W99/4.

Bohle D. (2000). Internationalization: An Issue Neglected in the Path-Dependency Approach to Post-Communist Transformation. In M. Dobry (ed.), *Democratic and Capitalist Transitions in Eastern Europe: Lessons for the Social Sciences (pp. 71-90).* Dordrecht/Boston/London: Kluwer Publishers.

Bottazzi, L. & Peri, G. (2003). Innovation and Spillovers in Regions: Evidence from European Patent Data. *European Economic Review, 47*(4), 687-710.

Cardenas, M. & Barrera, F. (1997). On the Effectiveness of Capital Controls: The Experience of Colombia During the 1990s. *Journal of Development Economics, 54*(1), 27-57.

Carrington, A. (2003). A Divided Europe? Regional Convergence and Neighbourhood Spillover Effects. *Kyklos, 56*(3), 381-394.

Caves, D. W., Christensen, L. R. & Diewert, W. E. (1982). Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers. The Economic Journal, 92(365), 73-82.

Cheloukhine, S. & King, J. (2007). Corruption Networks as a Sphere of Investment Activities in Modern Russia. *Communist and Post-Communist Studies, 40*(1), 107-122.

Christensen, R. K., Rakhimkulov, E. R. &. Wise, C. R. (2005). The Ukrainian Orange Revolution Brought More Than a New President: What Kind of Democracy Will the Institutional Changes Bring? *Communist and Post-Communist Studies, 38*(2), 207-230.

Cooke, P., Roper, S. & Wylie, P. (2003). 'The Golden Thread of Innovation' and Northern Ireland's Evolving Regional Innovation System. *Regional Studies, 37*(4), 365-379.

Cooke, P. N. & Morgan, K. (1998). *The Associational Economy: Firms, Regions, and Innovation.* Oxford and New York: Oxford University Press.

Crespo, N., Fontoura, M. P. & Proença, I. (2009). FDI Spillovers at Regional Level: Evidence from Portugal. *Papers in Regional Science, 88*(3), 591-607.

Cuervo-Cazurra, A. (2008). Better the Devil You Don't Know: Types of Corruption and FDI in Transition Economies. *Journal of International Management, 14* (1), 12-27.

Cule, M. & Fulton, M.(2005). Some Implications of the Unofficial Economy-Bureaucratic Corruption Relationship in Transition Countries. *Economics Letters, 89*(2), 207-11.

D'Anieri, P. (2005). The Last Hurrah: The 2004 Ukrainian Presidential Elections and the Limits of Machine Politics. *Communist and Post-Communist Studies, 38,* 231-249.

Damijan, J. P., Knell, M., Majsen, B. & Rojec, M. (2003). The Role of FDI, R&D Accumulation and Trade in Transferring Technology to Transition Countries: Evidence from Firm Panel Data for Eight Transition Countries. *Economic Systems, 27*(2), 189-204.

Dikova D. & van Witteloostuijn, A. (2007). Foreign Direct Investment Mode Choice: Entry and Establishment Modes in Transition Economies. *Journal of International Business Studies, 38*(6), 1013–1033.

Dries, L. & Swinnen, J. F. M.(2004). Foreign Direct Investment, Vertical Integration, and Local Suppliers: Evidence from the Polish Dairy Sector. *World Development, 32*(9), 1525–1544.

Ellison, G., Glaeser, E. L. & Kerr, W. R. (2007). *What Causes Industry Agglomeration? Evidence from Coagglomeration Patterns*. Harvard Business School, Working Paper 07-064.

Färe, R., Grosskopf, S., Norris, M. & Zhang, Z. (1994). Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries. *The American Economic Review, 84*(1), 66-83.

Gertler, M. S. (2003). Tacit Knowledge and the Economic Geography of Context, or the Undefinable Tacitness of Being (There). *Journal of Economic Geography, 3(*1), 75-99.

Globerman, S. & Shapiro, D. (2002). Global Foreign Direct Investment Flows: The Role of Governance Infrastructure. *World Development, 30* (11), 1899–919.

Greene, W. 2000. *Econometric Analysis*. 4th ed. Upper Saddle River, NJ: Prentice–Hall.

Hagemejer, J. & Tyrowicz, J.(2012). Is the Effect Really So Large? Firm-level Evidence on the Role of FDI in a Transition Economy. *Economics of Transition, 20*(2), 195–233.

Halpern, L & Muraközy, B. (2007). Does Distance Matter in Spillover? *Economics of Transition, 15*(4), 781-805.

Hanousek, J., Kočenda, E.& Maurel, M. (2011). Direct and Indirect Effects of FDI in Emerging European Markets: A Survey and Meta-Analysis. *Economic Systems, 35*(3), 301–322.

Harris, R., Moffat, J. & Kravtsova, V. (2011). In Search of W. *Spatial Economic Analysis, 6*(3), 249-270.

Hatzichronoglou, T. (1997). Revision of the High-technology Sector and Product Classification. *STI Working Papers 1997*/2, Paris: OECD.

Havranek,T. & Irsova, Z. (2011). Estimating Vertical Spillovers from FDI: Why Results Vary and What the True Effect Is. *Journal of International Economics, 85*(2), 234–244.

Havrylyshyn, O. & van Rooden, R. (2003). Institutions Matter in Transition, But So Do Policies. *Comparative Economic Studies, 45*(1), 2–24.

Havrylyshyn, O. (2006). *Divergent Paths in Post-Communist Transformation: Capitalism for All or Capitalism for the Few.* Houndmills: Palgrave Macmillan.

Henderson, D. J. & Russell, R. R. (2005). Human Capital and Convergence: A Production-Frontier Approach. *International Economic Review, 46*(4), 1167-1205.

Henisz, W. J. (2000). The Institutional Environment for Multinational Investment. *Journal of Law, Economics and Organization, 16*(2), 334–364.

Hong, Q. & Smart, M. (2010). In Praise of Tax Havens: International Tax Planning and Foreign Direct Investment. *European Economic Review, 54*(1), 82-95.

Howells, J. R. L. (2002). Tacit Knowledge, Innovation and Economic Geography. *Urban Studies, 39*(5-6), 871-884.

Ishaq, M. (1999). Foreign Direct Investment in Ukraine since Transition. *Communist and Post-Communist Studies, 32*(1), 91–109.

Javorcik, B. (2004a). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages. *American Economic Review, 94*(3), 605-627.

Javorcik, B. (2004b). The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights: Evidence from Transition Economies. *European Economic Review, 48*(1), 39-62.

Javorcik, B. & Spatareanu, M.(2008). To Share or Not to Share: Does Local Participation Matter for Spillovers from Foreign Direct Investment? *Journal of Development Economics, 85*(1), 194–217.

Jensen, N. M. (2003). Democratic Governance and Multinational Corporations: Political Regimes and Inflows of Foreign Direct Investment. *International Organization, 57*(3), 587-616.

Jindra, B., Giroud, A. & Scott-Kennel, J. (2009). Subsidiary Roles, Vertical Linkages and Economic Development: Lessons from Transition Economies. *Journal of World Business, 44*(2), 167-79.

Katchanovski, I. (2006). Regional Political Divisions in Ukraine in 1991-2006. *Nationalities Papers, 34*(5), 507-532.

Keller W. (2002). Geographical Localization and International Technology Diffusion. *American Economic Review, 92*(1), 120-142.

King, L.P. & Váradi, B. (2002). Beyond Manichean Economics: Foreign Direct Investment and Growth in the Transition from Socialism. *Communist and Post-Communist Studies, 35*(1), 1–21.

Kokko, A. & Kravtsova, V. (2008). Innovative Capability in MNC Subsidiaries: Evidence from Four European Transition Economies. *Journal of Post-Communist Economies, 20*(1), 57-75.

Konings, J. (2001). The Effects of Direct Foreign Investment on Domestic Firms: Evidence from Firm Level Panel Data in Emerging Economies. *Economics of Transition, 9*(3), 619-633.

Kolasa, M (2008). How does FDI Inflow Affect Productivity of Domestic Firms? The Role of Horizontal and Vertical Spillovers, Absorptive Capacity and Competition. *Journal of International Trade & Economic Development, 17*(1),155-173.

Kononov, O. (2010). Ukraine's Inward FDI and Its Policy Context. *Columbia FDI Profiles.* New York: Vale Columbia Center.

Kubicek, P. (1997). Post-Soviet Ukraine: In Search of a Constituency for Reform. *Journal of Communist Studies and Transition Politics, 13*(3), 103-126.

Kubicek, P. (2000). Regional Polarisation in Ukraine: Public Opinion, Voting and Legislative Behaviour. *Europe-Asia Studies, 52*(2), 273-294.

Liber, G. (1998). Imagining Ukraine: Regional Differences and the Emergence of an Integrated State Identity, 1926-1994. *Nations and Nationalism, 4*(2), 187-206.

Maurseth, P. B. & Verspagen, B. (1999). Europe: One or Several Systems of Innovations? An Analysis Based on Patent Citations. In J. Fagerberg, P. Guerrieri & B. Verspagen (eds.), *The Economic Challenge for Europe: Adapting to Innovation Based Growth (pp.149-174)*. Cheltenham, U.K. and Northampton, Mass: Elgar.

Meyer, K. E. (2001a). Institutions, Transaction Costs and Entry Mode Choice. *Journal of International Business Studies, 31*(2), 257–267.

Meyer, K. E. (2001b). International Business Research in Transition Economies. In A. Rugman & T. Brewer (eds.), *Oxford Handbook of International Business.* Oxford: Oxford University Press.

Meyer, K.E. & Sinani, E. (2009). When and Where Does Foreign Direct Investment Generate Positive Spillovers? A Meta-Analysis. *Journal of International Business Studies, 40*(7), 1075–1094.

Mudambi, R. & Navarra, R.(2002). Institutions and International Business: A Theoretical Overview. *International Business Review, 11*(6), 635–646.

Nelson, R. R. & Wright, G.(1992). The Rise and Fall of American Technological Leadership: The Postwar Era in Historical Perspective. *Journal of Economic Literature, 30*(4), 1931-1964.

Nicolini, M. & Resmini, L. (2010). FDI Spillovers in New EU Member States. *Economics of Transition, 18*(3), 487–511.

North, D. (1990). *Institutions, Institutional Change and Economic Performance.* Cambridge, Mass.: Cambridge University Press.

Oughton, C., Landabaso, M. & Morgan, K. (2002). The Regional Innovation Paradox: Innovation Policy and Industrial Policy. *Journal of Technology Transfer, 27*(1), 97-110.

Pavlínek, P. (2004). Regional Development Implications of Foreign Direct Investment in Central Europe. *European Urban and Regional Studies, 11*(1), 47–70.

Pournarakis, M. & Varsakelis, N. C. (2004). Institutions, Internationalization and FDI: The Case of Economies in Transition. *Transnational Corporations, 13*(2), 77-94.

Rodrígeuz-Clare, A. (1996). Multinationals, Linkages, and Economic Development. *American Economic Review, 86*(4), 852 - 873.

Romer, P. M. (1986). Increasing Returns and Long-run Growth. *Journal of Political Economy, 94*(5), 1002-1037.

Sabirianova, K., Svejnar, J. & Terrell, K.(2005). Distance to the Efficiency Frontier and Foreign Direct Investment Spillovers. *Journal of the European Economic Association,* 3(2–3), 576–586.

Sinani, E. & Meyer, K. E. (2004). Spillovers of Technology Transfer from FDI: The Case of Estonia. *Journal of Comparative Economics, 32*(3), 445-466.

Sinn, H.-W. & Weichenrieder, A. J. (1997). Foreign Direct Investment, Political Resentment and the Privatization Process in Eastern Europe. *Economic Policy, 12*(24), 177-210.

Sjöholm, F. (1999). Productivity Growth in Indonesia: The Role of Regional Characteristics and Direct Foreign Investment. *Economic Development and Cultural Change, 47*(3), 559-588.

Stiglitz, J. (1999). Whither Reform? Ten Years of the Transition. In B. Pleskovic & J. Stiglitz (Eds.), *World Bank Annual Conference on Development Economics 1999 (pp.27-56).* Washington, D.C.: World Bank.

Svejnar, J. (2002). Transition Economies' Performance and Challenges. *Journal of Economic Perspectives, 16*(2), 3-28.

Thorton, P. H. & Flynne, K. H.(2003). Entrepreneurship, networks and geographies. In Z.J. Acs & D.B. Audretsch (eds.), *Handbook of Entrepreneurship Research (pp. 401-433).* Boston/Dordrecht: Kluwer Academic Publishers.

Torlak, E. (2004). *Foreign Direct Investment, Technology Transfer, and Productivity Growth in Transition Countries: Empirical Evidence from Panel Data.* Gottingen: Centre for Globalisation and Europeanision of the Economy, Georg-August-Universitat.

Wheeler, D. & Mody, A. (1992). International Investment Location Decisions. The Case of U.S. Firms. *Journal of International Economics, 33*(1–2), 57–76.

Wolczuk, K. (2002). Catching up with 'Europe'? Constitutional Debates on the Territorial-Administrative Model in Independent Ukraine. *Regional & Federal Studies, 12*(2), 65-88.

Wolczuk, K. (2006). Domestic Politics and European Integration in Ukraine. *The International Spectator,* 4/2006, 7-24.

World Development Report (2005). *A Better Investment Climate for Everyone.* Washington, D. C.: World Bank.

Yudaeva, K., Kozlov, K., Melentieva, N. & Ponomareva, N. (2003). Does Foreign Ownership Matter? The Russian Experience. *Economics of Transition, 11*(3), 383–409.

APPENDIX 1. The main components of the Malmquist productivity index

STEP 1. The four distance functions: $D_o^s(x_i, y_i), D_o^s(x_s, y_s), D_o^t(x_i, y_i), D_o^t(x_s, y_s)$ are estimated using the Data Envelopment Analysis (DEA).

DEA estimation of the output oriented distance function with constant returns to scale (CRS) is modelled as a following linear program (LP):

$$\left[\overline{D}_o^v(x_u^j, y_u^j)\right]^{-1} \equiv \max\theta \tag{1}$$

$$\text{s.t.} \sum_{k=1}^{n} z^k y_{m,r}^k \geq \theta y_{m,u}^j, \ \text{m} = 1 \ldots \text{M} \tag{2}$$

$$\sum_{k=1}^{n} z^k x_{i,r}^k \leq x_{i,u}^j, \ \text{i} = 1 \ldots \text{N} \tag{3}$$

$$\theta \geq 0, \ \text{k} = 1 \ldots \text{n} \tag{4}$$

Note: v is a set of technology in period s or t (v= s, t) and u is the period in which firm j is observed (u= s, t). N is a number of inputs, M is a number of outputs, and k is a number of firms defining a technology set n.

STEP 2. Malmquist Index is estimated using formula:

$$M_o(x_s, x_t, y_s, y_t) \equiv (M_o^s(x_s, x_t, y_s, y_t) \times M_o^t(x_s, x_t, y_s, y_t))^{0,5} =$$
$$= \left(\frac{D_o^s(x_t, y_t)}{D_o^s(x_s, y_s)} \times \frac{D_o^t(x_t, y_t)}{D_o^t(x_s, y_s)}\right)^{0,5} \tag{5}$$

STEP 3. Malmquist Index is decomposed into efficiency and technical change:

$$M_o(x_s, x_t, y_s, y_t) = \frac{D_o^t(x_t, y_t)}{D_o^s(x_s, y_s)} \times \left(\frac{D_o^s(x_s, y_s)}{D_o^t(x_s, y_s)} \times \frac{D_o^s(x_t, y_t)}{D_o^t(x_t, y_t)}\right)^{0,5}$$
$$= EC \times \left(TC_s \times TC_t\right)^{0,5} = EC \times TC \tag{6}$$