

Institutional Reforms, Productivity and Profitability: from Rents to Competition?

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This paper explores the divergent effects of institutional reforms on firm's productivity and profits, conditional on firm's ownership. To assess this empirically, we investigate the impact of various components of institutional reforms on the performance of individual firms from Central and Eastern European countries from 1998 to 2006. The impact of reforms on profitability vis-à-vis productivity differs, which we interpret as an indication that profitability is an ambiguous measure of performance: one needs to distinguish between unproductive rents and productivity-based quasi-rents. We find that liberalization measures have more impact on state-owned firms as compared with domestic and foreign owned firms.

Keywords: Institutions, FDI, Privatization, Productivity, Profits, Liberalization.

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1. Introduction

Following renewed interest in institutions (North, 1990; Crawford and Ostrom 1995; Olson 2000, Roland 2000, Williamson 2000 and many others), a wide literature has emerged since the mid 1990 which tests the impact of institutional quality on macroeconomic performance. In summary, this literature suggests a positive causal relationship between institutional reform and economic performance at the macro level (for meta-analyses see: Babecky and Campos 2011; Efendic et al., 2011). Reforms are assumed to reduce transaction costs, investment risk and enhance business opportunities, generating greater returns to private sector investment and innovation (Ades and Di Tella 1999; Dreher, Kotsogiannis and McCorriston, 2007; Boerner and Hainz 2009). Based on this, developing and transition countries are urged to improve their institutions and national governance structures. The expectation is that domestic industries will benefit in the long run, which will translate into increased economic growth. However, there is relatively little micro level investigation of the perceived mechanisms linking reforms with firm behaviour and performance, less still that which examines the impacts on different types of firms. The large micro literature has essentially focussed only on the link between change of ownership status (including transfer to foreign investors) and firm performance during a phase of institutional reforms (see Estrin et al. 2009 for overview). Yet this takes changes in the institutional environment as given: far less has been done on linkages between institutional reforms, ownership structures and performance. We intend to address these shortcomings, by taking a more complete view of the issue, combining effects of firms' ownership and market and institutional reforms in the analysis of firm performance. We highlight the importance of analyzing the differences both between firms and across countries, as well as the need to capture heterogeneity in the institutional environment. Following Krueger (1974), Ades and Di Tella (1999), Dreher, Kotsogiannis and McCorriston (2007) we argue that restricting competition will lead some dominant players, including foreign firms, to capture significant market shares and generate high price-cost margins. Adopting this perspective, our contribution can be described as follows.

Firstly, as noted by Syverson (2011) we still know very little about the impact of institutions on firms' performance as the literature has been mostly silent on this. While our aim is to start filling this gap, we emphasise that in considering institutions, it is important not only to view institutional reforms as an aggregate concept, but also to analyse its multiple components separately, because each reform may have a different effect (Babecky and Campos 2011); we need to understand how particular elements of reform matter for performance. Accordingly, we account for heterogeneity across countries and across time in investigating the extent to which ownership, in conjunction with various institutional reforms explain both firm's productivity and profitability.

Secondly, having a large firm-level cross-country panel dataset, comprising of foreign, domestic and state-owned firms, we are able to control for location decisions of internationally mobile firms. Accordingly, we strengthen the existing literature methodologically by allowing for the sample selection effect. In particular, we argue that foreign ownership should not, as has been the case in much of the literature, merely be treated as an exogenous event. In the context of a study of institutional reform and performance, foreign direct investment (FDI) becomes an endogenous event.

Thirdly, apart from studies on regulated industries that seek to distinguish directly between efficiency-enhancing and rent-increasing effects (Saal and Parker, 2001; De Witte and Saal, 2010), much of the literature (perhaps rather erroneously) sees productivity and profitability as closely related. However, the distinction between productivity and profitability is an important one; Grifel-Tatje and Lovell (1999) highlight the key differences between measures of productivity and profitability. This distinction is also discussed in a number of contexts related to our research question. For example, Girma et al. (2006) argue that productivity refers to the returns achieved by internal stakeholders, namely that increases in productivity boost discretionary resources potentially available to both the internal stakeholders ('the insiders') and the external stakeholders (in particular the shareholders and tax collectors). In contrast, profits represent only those returns that are available to external shareholders after internal stakeholders have taken their return. In particular, the shareholders benefit both directly from profits distributed as dividends and

indirectly from retained profits that may increase the firm's net present value. We build on Girma et al. (2006), but also explain some limitations of their approach below.

Our dataset consists of a sample of 60,078 firms from 12 Central and Eastern European (CEE) countries, controlling for selectivity bias in ownership and analysing more closely the differential impact of various components of reforms. The countries we consider have all engaged in large scale institutional reform, but to different extents, albeit from a similar starting point. Thus, the CEE countries correspond to the 'natural experiment setting' (Eicher and Schreiber, 2010) as far as institutional reforms are concerned.¹

The key intuition we wish to investigate empirically is that without reforms, incumbent firms realise high rents, resulting from obstacles to competition, which also leads to lower firm productivity (Krueger 1974; Ades and Di Tella 1999). We extend this line of research, by linking the institutional literature to that on effects of firm ownership. In particular, we posit that reforms may increase internal efficiency via enhancing the pressure of competition, facilitating access to new resources that come with lower transaction costs, and lowering agency costs, yet at the same time they may have an adverse effect on profitability. To the best of our knowledge this paper is the first to focus on these competing effects of institutional reform, across different types of firms.

In the next section we discuss our prior knowledge. Section 3 deals with sample and methods. Section 4 is on empirical results. We present conclusions in Section 5.

¹ "The fall of the Iron Curtain provides a unique controlled, or natural, experiment in that the initial institutional change is clearly exogenous, which potentially mitigates the endogeneity bias. It also provides a unique opportunity to analyze the impact of subsequent structural policy changes /.../ in a sizeable number of countries, with similar initial conditions, over the same period of time." (Eicher and Schreiber, 2010, p. 169)

2. Institutional reforms, ownership and performance

2.1. Ownership

While we are mostly interested in how the interaction between macro level institutional reforms and micro level ownership structures affect performance (see below), in this section we briefly discuss potential ownership effects on performance that may be independent from institutional variation (at least in the observed range of the latter).

Firstly, one strand of the literature explores whether acquisition by a foreign owned firm leads to productivity growth (Conyon et al., 2002; Harris and Robinson, 2002). The underlying assumption here is that foreign firms have some form of firm specific advantage, be it technical or managerial. When a host country firm is acquired by an inward investor, this knowledge or technology becomes available to the former, and productivity increases. This literature has expanded into analysis of ownership change in emerging and transition economies: the gains associated with resource transfers may be particularly significant in such environments (see Estrin et al., 2009 for a review). Thus, foreign owned firms may perform best in transition economies due to both imported quality of governance and better resource endowments along other dimensions (e.g. management techniques, knowledge of global markets, access to finance, technological know-how).

Secondly, agency problems may be particularly severe in firms which are under state ownership, which leads to difficulty in effective monitoring and in lower performance. In the state-owned firms, neither managers have rights to residual value that would result in strong incentives, nor is there pressure on performance coming from private shareholders. Monitoring chains become long and obscure, stretching from state-owned firm managers to public administrators, politicians and finally, the general public.

Accordingly, we posit that foreign firms outperform domestic private firms, which in turn perform better than state-owned firms, when comparing productivity measures, which can be viewed as an internal return to firms. In contrast, profitability differences may have a different pattern. We posit that once we move to profitability, it becomes difficult to assess how the latter is affected by ownership in isolation from

market conditions and the institutional environments shaping the nature of potential politically generated rents. Thus, while we expect a definite ordering in terms of productivity comparisons between foreign domestic and state owned firms, this ordering breaks down in case of profitability. In particular, we expect the differential effects of reforms on internal and external stakeholders, across different types of firms, which we discuss next.

2.2. Institutional Reforms

Amongst others, North (1990), Williamson (2000), Acemoglu and Johnson (2005), Jellema and Roland (2011), Estrin et al. (2012) emphasise the critical importance of secure property rights based on effective constitutional structure that ensures balances and limits of political power. This matters for development, investment and performance. Yet, as both North (1990) and Williamson (2000) point out, these institutional features change rarely, so identifying their effects is challenging, unless one looks at very long term phenomena. What we are left with in a short run is the “lower level” institutional features; namely the regulatory environment. These regulatory elements are broadly framed by ‘higher order’ constitutional frameworks. Yet there is sufficient heterogeneity and variation in regulation across countries and over time, even in countries with similar ‘deeper level’ constitutional features, to justify questions concerning the short-term links between regulatory environment and performance outcomes. We aim to fill this gap.

From the technical, but not necessarily from the political economy, point of view (see Roland, 2000) regulatory reforms can be implemented relatively quickly. Yet, would we expect them to bring immediate and wide-ranging effects on the behaviour of firms?

Campos and Horváth (2012) in the context of macro growth determinants distinguish between three areas of regulatory reforms: (i) internal liberalisation, (ii) external liberalisation, and (iii) privatisation. The first two aim to establish basic conditions of market competition, both for existing and new businesses and via integration with world markets, consistent with the theory inherited from Tullock (1967), Krueger (1974) and Bhagwati (1982). In turn, privatisation ensures that there is enough diversity between the

economic agents to make this competition meaningful. This is in contrast to an economy dominated by state-owned firms, where it is less obvious where the actual competition could come from. Also, unlike the direct ownership effects we sketched out above, here the privatisation effects are the environmental (ecological) effects, assumed to influence firms regardless of their own ownership status.

We argue however that these three clusters of reforms need to be supplemented by two key areas: (iv) regulation of entry and (v) finance. Emphasis on the former can be traced back to the seminal paper by Djankov et al. (2002). Their key intuition relates to the fact that the effective competition comes primarily from the new ventures, enhancing performance, thus emphasising the significance of low formal entry barriers. In turn, access to finance affects how fast the new ventures (and any other ventures with high-value adding projects) can turn their plans into practice. Accordingly, an underdeveloped financial sector hampers economic growth and performance, also on micro level; as Coricelli et al. (forthcoming) posit, market reforms improve the monitoring of indebted firms by financiers, thus reducing excessive lending, and encouraging productivity growth (see also Demirguc-Kunt and Maksimovic, 1998). In turn, the quality of the financial sector links directly to the quality of regulation (Barth et al., 2008).

While there is a broad literature relating some of these reforms to economic growth (see Falcetti et al., 2002; Falcetti et al., 2006, Campos and Horváth, 2012; and meta-analyses by Babecký and Campos, 2011; Efendic et al., 2011), less is known about their impact at the micro level. We expect the liberalization and regulatory reform measures outlined above to have a positive effect on productivity; in contrast, the impact of reforms on firm profitability may be more ambiguous. For some firms, liberalization may stimulate efficiency gains and scale effects related to access to wider markets, creating temporary, dynamic quasi-rents that feed through to profitability gains. At the same time however, competition increases and while firms generate productivity growth, they may experience a decline in monopoly rents. Ales and Di Tella (1999) point to how the ability of incumbent firms to collude with corrupt officials, can result in high pre-reform rents. Liberalization may eliminate this advantage and therefore reduce the profitability of

incumbents, while benefiting new entrants. Accordingly, the relationship between institutional reform and firm *financial* performance is more complex.

Thus, consistent with Girma et al. (2006) discussed above, the impact on internal and external returns may differ. Further, Driffield and Du (2007) examine the relationship between performance change and ownership change in the context of privatisation in China. They demonstrate that foreign acquisition has a significant impact on productivity, but a smaller effect on profitability. Reforms may therefore increase internal efficiency via enhancing the pressure of competition, facilitating access to new resources that come with lower transaction and agency costs, yet at the same time they may have an adverse effect on profitability.

Furthermore, it is clear that where institutions fail to protect minority or outside shareholders, productivity and profitability are likely to diverge (Driffield and Du, 2007). Moreover, these effects will differ for alternative ownership structures. As argued above, the governance structures are likely to be weakest in state-owned firms, and strongest in foreign-owned firms. Further, government intervention may be rather uneven in the presence of weak institutions, which may lead some firms to succeed not via efficiency or good strategy, but by special, politically-generated gains. Higher profitability may result from political rents and state capture by specific categories of owners (Hellman 1998; Hellman et al. 2002, 2003; Slinko et al. 2005; Havrylyshyn, 2006; Mickiewicz, 2009). We expect therefore that the impact of institutional reform on profitability is more varied compared with its impact on productivity, depending on the nature of the reform and the type of firm concerned.

2.3. Differential effects of reforms on foreign firms

The evidence on the impact of institutions on FDI is ambiguous (Bevan and Estrin, 2004). Whereas most studies find an inverse relationship, some have even shown a positive impact of weak institutions on FDI, as for example, Egger and Winner (2005). One possible reason for these contradictory results may be that as much of the analysis focuses on investment flows at the country level, it sheds little light on the

motivation of firms to engage in FDI in a given location. Notable exceptions that are not confined to the aggregate level are Javorcik and Wei (2009) and Driffield et al. (2010) who, while pointing out that institutions impact on the firm's decision to undertake FDI, argue that the relationship is far from simple. And the more subtle reason for the ambiguity in reported results may be that foreign companies could actually take advantage of weak institutions, which can be reasoned as follows: in many middle and low income countries with dysfunctional institutions, large foreign investors are sheltered from the negative impact of the business environment by operating in enclaves protected by relational capital with the host country government. Examples of such a situation relate to resource-rich economies, where large rents are shared with foreign investors, based on government privilege instead of the rule of law.²

A different line of argument is that foreign companies' productivity may also be driven to some extent by the international scale of their operations, therefore remaining less sensitive to local conditions compared to private domestic firms. Combining all of the arguments, we argue that institutional reforms will have smaller positive impact on foreign companies' productivity compared with domestic and state-owned firms. In contrast, the reforms may have a negative differential effect on profitability with respect to foreign-owned companies to the extent that the pre-reform profitability was driven by privilege.

2.4. Differential effects of reforms on state owned firms

With the dismantling of the communist apparatus of surveillance and centralised administration, the government was unable to exert any effective ownership control on thousands of state-owned firms, which led to insider control of firm operations. Accordingly, a strand of theory that has been applied to CEE countries models state-owned firms as controlled by insiders, such as labour in particular (Aghion and Blanchard 1994, 1998; Mickiewicz 1996; Filatotchev et al. 1999). Due to lack of property rights, those who control the firms cannot separate distributional decisions from optimisation decisions, which affects

² For example, Azerbaijan scores very low on institutional quality measures, but creates relatively good business conditions for foreign investors within the oil sector.

performance. In particular, it will only be by coincidence that the labour-controlled firms set the employment level at the value that maximises productivity. Typically it will either be too large (in case where a private owner would rather shed employment in need to restructure) or too small (when insiders may restrict employment growth to maximise internal rents per employee). In both cases, employment will be chosen at a sub-optimal level. This perspective implies that the framework adopted by Girma et al. (2006) (see section 2.2 above) may be too simple, as it assumes – in a Coasian spirit - that allocational decisions within firms (affecting internal performance) may be easily separated from distributional decisions (affecting external performance).

Moreover, it is in the state sector, where opportunities for ‘political capitalism’ are most likely to emerge. Shleifer and Vishny (1994) discuss bargaining between politicians and state-owned firms in order to realise mutual special interests at the cost of economic efficiency. They argue that this type of bargaining is more likely to succeed in the case of state-owned firms than between politicians and private owners, as it is less costly to compensate the managers of state-owned firms for the adoption of politically motivated objectives for their operations. Indeed, they do not need to be compensated for the opportunity cost of lower returns. This is a different channel, resulting in lower (internal) firm productivity. Yet, parallel to insiders’ control effects, the (implicit) contracts between the politicians and state-owned firms may typically imply effects related to the size of employment and remuneration of labour, as jointly captured by the ratio of the total wage bill to value added (Shleifer and Vishny, 1994; for empirical evidence, see also: Frydman et al., 1999; La Porta and López-de-Silanes, 1999). The point we emphasise however is that opportunities for such outcomes diminish with institutional reform.

The political economy perspective represented by Shleifer and Vishny (1994) is akin but not identical to the theory of soft budget constraints (Kornai et al., 2003). Here, the government is not assumed as driven by its private benefits. A benevolent government may still not be able to eliminate inefficiency, if the informational asymmetries vis-à-vis the state-owned firms are particularly severe. The soft budget constraint describes a situation, where the government would like to enforce better performance, but the

managers of state-owned firms behave opportunistically and the outcomes of their actions are only observed with delay. Once the performance data is revealed, the government may choose to subsidise the firms, as bankruptcy of a state-owned firm comes with negative utility to politicians (which may reflect their private welfare function but may also represent social welfare, or a combination of these two). Thus, the government faces a problem of post-contractual opportunism, which is akin to moral hazard. This creates the soft budget situation generating disincentives to perform. Yet, institutional reforms may alleviate the problem, both by diminishing informational asymmetries between the government and the firms, and by creating credible commitment to non-subsidisation (by imposing credible rules that restrict opportunities for arbitrary public assistance).

These two perspectives (political corruption and soft budget) may be complementary and not mutually exclusive and should be placed in the context of institutional change. With competition-enhancing market reforms and withdrawal of government support, the state-owned firms face stronger incentives to enhance their productivity to protect themselves against external shocks and the risk of bankruptcy. That makes the predicted effect of reforms on internal productivity positive and unambiguous.

In contrast, the effects on profitability may be subject to conflicting influences. Some of enhanced internal productivity will be transformed into higher profitability. On the other hand, it is the loss of government support, especially in terms of protecting incumbents from competition, preferential credit, and direct subsidies, which is likely to negatively affect profitability. We expect this second cluster of effects to dominate.

In between these two ownership categories (foreign versus state-owned), we find firms controlled by domestic private owners. In contrast to foreign owners, private domestic owners from transition countries are less likely to be exposed to global markets and to efficiency-enhancing opportunities and pressures. Therefore, economic reform (liberalization) is likely to have a stronger positive impact on their internal performance compared with the case of foreign firms, but still weaker than in the case of state-owned firms – private domestic companies are less likely to be involved in political exchange with the government

(Shleifer and Vishny, 1994) and soft budgeting (Kornai et al., 2003) of private domestic firms has been far less prevalent than in the case of the state sector. It follows therefore that there is also less scope for efficiency improvement in the case of private domestic firms.

2.5. Hypotheses

To summarize, we present our prior knowledge about the impact of reforms and ownership on both internal performance (productivity) and external performance (profits) as hypotheses in Table 1 below. We expect that there is a hierarchy in terms of productivity, with the mean productivity effect for foreign ownership to be highest, and for state ownership to be lowest. We also expect the reforms to impact productivity in a positive way, yet these effects to be strongest for state companies and weakest for foreign companies. In contrast, with respect to profitability, we expect that the reforms to have the strongest positive effect on domestic companies, weaker positive (or even negative) on foreign firms, and negative on state owned firms.

{Insert Table 1 about here}

3. Data and methods

3.1. The sample scope: general comments

The range of firms we include is much wider than the large publicly quoted companies; focus on the latter while important would generate a biased sample. Stock markets may not correspond to the nationwide institutional frameworks within which most of firms, including large ones, operate (Shleifer and Vishny, 1997). Equally, while large firms dominate most sectors, they are not representative of a typical way that the institutional framework impacts on firms' behaviour and performance. Further, consistent with what we discussed above, in many transition economies, large firms may easily form some relational network capital with politicians and administrators that insulate them from negative effects of weak institutional quality

within the country, but - as another aspect of the same phenomena - may also lead to state capture and creation and maintenance of firm-specific rents (Hellman et al., 2003). This motivates our focus on a large spectrum of firms in our empirical design.

Furthermore, we not only broaden the range of firms we consider, but we also benefit from our choice of cross-country variation. We focus on the post-Soviet ‘transition’ region of CEE that offers dramatic institutional variation, and also provides an interesting natural experiment setting. In particular, the initial institutional setup was very similar in this group of countries at the time when the reforms started (1989-1991), and that makes it a robust set of economies to compare. The institutional differences in CEE after two decades of reforms has resulted from alternative policy choices; thus, there is a relatively smaller risk that the variation in institutions captures some omitted country-level conditions related to institutions. Indeed, in the initial point, those economies were more homogeneous compared with other parts of the world.

3.2. Data and performance measures: details

We utilise a large database of European firms drawn from *Amadeus* which is a comprehensive and rich firm-level dataset provided by Bureau van Dijk, a leading electronic publisher of annual account information on private and public firms. Compiling the information on firms operating in 12 CEE host countries produces a large data-set spanning the period 1998-2006. Our sample of host countries consists of Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Russia, Slovakia and Ukraine.³ Table 2 shows the frequency distribution of firms across the sample countries and

³ We did not include countries where we would had less than 5 firms (e.g. Macedonia, Moldova etc.). The smallest country in our sample has at least 100 firms at some point in the panel period. Further, given that our focus is on performance, we noticed some of the observations on our outcome/performance measures, profitability in particular, were not in plausible range. Responding to this, we cleaned the data with respect to severe outliers, i.e. observations where (1) the ratio of EBIT to total assets lies outside the outer fence defined by the inter-quartile range multiplied by three, corresponding to a range of -0.5 and 0.7 (2) likewise for log of total factor productivity (the outer fence: either below -0.7 or above 5). We also verified that using an alternative simpler method of removing one percentile from each end of the distribution of our dependent variables made our results stronger on average, compared with using inter-quartile range as in the results we report.

ownership types. We included all firms for which we had at least one year worth of information on the variables of interest.

{Insert Table 2 about here}

There is a wide range of home countries in our sample. The list is dominated by foreign investors from the US and also the old EU countries including France, Germany, Italy, Netherlands, UK, Denmark and Sweden. In addition, there are also foreign investors from other OECD (e.g., Australia, Canada, Japan), newly emerging (e.g., Brazil, China, India and Russia) as well as those from the Middle-East countries (e.g., Israel, Lebanon, Syria, Turkey). More detailed data on distribution of home countries is available on request.

3.3. Dependent variables

We aim to explore differences between total factor productivity (TFP) and profitability as indicators of performance and argue that they measure related but distinctive phenomena. These two measures are our dependent variables. To quantify the profitability of a firm (external performance), we use the ratio of earnings before interest and taxes to total assets, which proxies for the return on assets. This is a standard indicator which shows the return on investment undertaken. Internal performance is proxied by an estimate of total factor productivity (TFP) derived as the residual of the production function using the Levinsohn and Petrin (2003) semi-parametric approach. It has now become a standard technique to address the problem of endogeneity in the applied microeconomic literature that uses firm-level data to estimate TFP (further detail in section 3.6).

3.4. *Independent variables: reform indicators*

We use the set of institutional measures developed by the European Bank for Reconstruction and Development (EBRD, 1995-2009) which has been commonly used by researchers. EBRD clusters three liberalization measures together, labelling them ‘first stage reforms’. These include (i) internal price liberalization, (ii) liberalization of foreign trade and exchange rate and (iii) freedom of entry, where the latter is also associated with small scale privatisation that is with privatisation of small enterprises, typically in services. However, we side with Campos and Horváth (2012) who argue that the EBRD grouping is not ideal. It is important to disentangle the three components of liberalisation as these can be implemented separately and with different effects on performance. In fact, these three reforms did not follow the same path: when we examined it for our data, it came with a relatively low Cronbach Alpha of 0.63.

In contrast, five additional elements are considered by EBRD as ‘second stage’ reforms that need more time for implementation. Unlike liberalisation they require institution building rather than removal of barriers. This encompasses privatisation of large enterprises (which may also imply introducing related legal frameworks)⁴, and three aspects of financial reforms (banks, non-banking finance, and corporate governance) plus competition policy.

Our awareness of imperfect measurement of reforms led us to draw from alternative institutional measures offered by the Heritage Foundation / Wall Street Journal indicators of Economic Freedom, to investigate robustness of our results.⁵ While EBRD measures are declared as taking the regulatory standards observed in developed market economies as the benchmark, the Economic Freedom indicators simply range

⁴ We doubt if a (‘large scale’) privatisation process should be considered as a ‘second stage’ reform: it was often implemented fast, especially when ‘mass privatisation’ methods were used (that is methods based on vouchers-based privatisations, privatisations to insiders or a combination of both). Moreover, existing evidence documents some immediate direct effects of privatisation on firm performance (see overview of evidence by: Megginson and Netter, 2001; Djankov and Murrell, 2002; Estrin et al., 2009). It is also likely that the environmental, i.e. indirect effects are rapid: where its competitors change ownership status, a company faces a tougher challenge (from privatised companies). And this effect is independent to the one that follows from a change in its own ownership status. We argue therefore that the scale of privatisation in a country could be considered alongside liberalisation elements as one of the reforms that may impact on an individual firm performance rapidly.

⁵ See Aidis et al. (2012) for more extensive discussion of the ‘Economic Freedom’ indicators.

from more to less regulation.⁶ Despite this significant difference in underlying political philosophy, in the relevant range, the two measures are relatively well correlated.

Mapping EBRD indicators onto Economic Freedom to produce a reasonable match is in some cases easy yet in other cases next to impossible.⁷ First, the EBRD external liberalisation measure is akin to ‘trade freedom’ but also to ‘investment freedom’ as the latter covers foreign exchange and foreign investment restrictions or their absence. Second, while EBRD has a separate price liberalisation measure, the Heritage dataset includes it in ‘monetary freedom’ indicator, combining it with the level of inflation. A justification of this approach is that open price inflation becomes a problematic indicator, where prices are controlled, yet high open inflation with no price control, and low inflation with significant price controls are two distinctively different cases, while they may produce a similar ranking on ‘monetary freedom’. Thus, we simply do not have an alternative measure for price liberalisation. Third, the situation is better with respect to entry regulation. Here, the EBRD measure of freedom of entry and small scale liberalisation can be matched with Business Freedom, which is simply an indicator that aggregates the World Bank ‘Doing Business’ enterprise survey components related to direct entry barriers, licencing barriers and exit barriers. Fourth, for EBRD’s ‘large scale privatisation’ indicator, there is no matching measure in the Economic Freedom dataset. There is a measure of the overall size of government spending, but it is not the same thing. Finally, with respect to the financial regulation measures, the EBRD offers three indicators: (i) banking reforms, (ii) non-banking finance and stock exchange, (iii) governance and restructuring, where the latter features quality of corporate governance frameworks. For our data, all these three EBRD indicators can be credibly combined into one scale (Cronbach Alpha: 0.90). In turn, Heritage/Wall Street Journal produces one Financial Freedom indicator, which is a relatively good match to the scale we produced based on the EBRD financial measures.

⁶ With some important exceptions. For example, with respect to “financial freedom” some (low) threshold of sound financial regulation is assumed as a benchmark, not lack of any regulation.

⁷ For lack of space we do not offer a detailed description of each of those two sets of indicators. These are available at <<<http://www.ebrd.com/pages/research/economics/data/macro.shtml>>> and <<<http://www.heritage.org/index/book/methodology>>>.

We also produced our own liberalisation scale, which combines relevant EBRD indicators and Economic Freedom indicators and seems empirically coherent for our data. It combines EBRD Price Liberalisation, External Liberalisation and Freedom of Entry with Trade Freedom and Monetary Freedom from Heritage; the resulting scale is based on standardized items, as both set of indicators use different measurement units (Cronbach Alpha: 0.82). As indicated above, Heritage's Monetary Freedom indicator mixes inflation and price control, so is problematic when used separately, but contributes to this new scale well, correlating with other dimensions.

3.5. Control variables

We include a host of additional factors which may affect firm performance. First, in order to control for firm size and to account for nonlinearities in the relationship between size and productivity, we group enterprises into small, medium and large categories according to their assets. It is important to control for size, as the likelihood of extracting some political rents relates not only to ownership status but also to a bargaining position as determined by the size of the firm. In addition, we may have some economies and diseconomies of scale affecting productivity. Use of size categories instead of a continuous variable comes at cost of precision of estimates, but alleviates the simultaneity bias between short-term variation in performance and size.

Second, we control for market share. We introduce a logarithm of market share estimated against all other firms in a given sector. This captures the effect that can be purely attributed to market position.

Third, we control for the technology intensity of a firm. We introduce a dummy that identifies high-technology firms, applying the OECD/Eurostat definition.

As our main hypotheses relate to macro level measures of reforms, we also need to control for alternative macro level influences. We introduce the level of GDP per capita (purchasing power parity, constant US dollars) to control for the overall level of development. In turn, by using annual GDP growth rates we control for general business opportunities, which may not necessary be related to the advance in

reforms. Similarly, we distinguish between more and less open economies by controlling for the ratios of both imports and exports to GDP. Those measures of openness may be correlated with reforms, but may also be driven by other factors such as size of the economy, with smaller countries likely to be more open. We also included full sets of industry, country and time dummies to control for industry-specific, country-specific and time-specific factors that may affect firm performance.

3.6 Estimation Strategy

We estimate productivity (TFP) derived as the residual of the production function using the Levinsohn and Petrin (2003) semi-parametric approach which is an econometric technique to address endogeneity in inputs. This particular endogeneity problem occurs when at least a part of the TFP (e.g. productivity shock) is unobserved by the econometrician but observed by the firm at a time early enough so as to change the factor input decision. If that is the case, then profit maximization implies that the realization of the error term is expected to influence the decision on factor inputs. That makes ordinary least squares estimation biased and inconsistent. Levinsohn and Petrin (2003) show that by using material inputs as a proxy to control for unobservable productivity shocks can alleviate the endogeneity of inputs in a production function setting⁸.

Theoretically, any firm in our sample can attract foreign investment and thus have a foreign ownership share. However, in practical terms the probability of acquisition by a foreign firm is a non-random event. We control for this potential selection bias by initially estimating the probability of firm attracting foreign ownership, and subsequently employ an estimator based on Wooldridge (1995) to allow for the selection issue. This is essentially an extension of the Heckman (1979) model that has been widely used in this area (Dustmann and Rochina-Barrachina, 2007). The essential premise is that if one seeks to link FDI to performance then one has to first control for selectivity bias in the sample of firms that have

⁸ This technique is widely used in the literature on firm performance. The full description of this estimation and algorithm is omitted due to space constraints. Readers interested in more detail are referred to the original work by Levinsohn and Petrin (2003).

some foreign ownership. The method proposed by Wooldridge (1995) has the added advantage in that it not only corrects for selection bias (as in Heckman, 1979), but also control for the unobserved heterogeneity as in a standard fixed effects model. Further, it allows for unbalanced panels; the residual correlation property of this kind of model is not affected by a potential survivor bias.

This is a two stage estimation procedure to control for the non-random nature of foreign ownership. The first step essentially includes year-by-year probits where the dependent variable is binary (i.e. 1 if the firm has some degree of foreign ownership and 0 otherwise) and a number of main determinants which are common in the literature on multinationality (e.g. productivity, firm-size, intangible assets, industry affiliation).⁹ In the second stage of the estimation we then include the information obtained from the first step (inverse Mills ratios) to control for selection bias as well as a full set of country and year fixed effects to alleviate a possibility that our institutional effects are driven by some unobserved heterogeneity or by common time-specific shocks.

In addition we added random country-year effects to our second stage. In case of each of our specifications we tested a hypothesis if the residual inter-cluster (country-year) variation plays a significant role. The tests suggested that the random effects were needed. Either adding random effects or at least clustering standard errors is important to avoid artificially suppressing standard errors for our institutional (that is country level) variables, which would be easy to achieve given a large sample size.

Finally, we mean centred all our institutional measures. As we use interactions of institutions and ownership, this allows us to interpret the coefficients of ownership dummies as captured at mean values of institutional range.¹⁰

⁹ What is crucial for this procedure is to include a variable which affects the amount of foreign investment but not firm performance directly (exclusion criteria). In this paper we use free cash that a firm has at its disposal, this being strongly correlated with the likelihood of attracting investment, but uncorrelated with performance (Jensen 1986; Barkema and Vermeulen 1998).

¹⁰ Strictly speaking, we centred the institutional indicators on the feasible values of the indices closest to their means.

4. Results

All our results are presented in two sets, where in each case the first one relates to estimates of internal performance (TFP) and the second one to estimates of external performance (return on assets). With ownership measures, the omitted benchmark category is always ‘private domestic’ dominant owners.

Table 3 (models (1)-(6)) documents first the tests based on the individual liberalization dimensions as discussed above, where indicators are taken both from the EBRD and the Heritage databases. The last column (7) reports the results using a liberalisation scale we constructed combining standardized items from both sources (external liberalization, price liberalization, freedom of entry from EBRD, trade freedom and monetary freedom from Heritage).

In Table 4 we present estimations of productivity that use the scale we constructed combining three EBRD financial measures (spec. 8), financial freedom (spec. 9), and next EBRD (‘large scale’) privatisation measure (model 10), and finally ‘competition policy’ (11), which is the final EBRD measure not used earlier. Next, we additionally show results when measuring the overall impact of reforms by using the average of all eight EBRD sub-indices (model (12) in Table 4) and the average of all individual dimensions used by Heritage, that is, the Economic Freedom indicator (model 13).

In all models we include dominant ownership dummies, reform indicators, and interactive terms between the institutional indicators and ownership. Table 5 and 6 mirror all these specifications for estimates on profitability.

{Insert Table 3-6 about here}

As judged by coefficients of ownership dummies in all models presented in tables 3-4, the basic order of productivity is consistent with the literature on privatisation effects in transition economies (Estrin et al., 2009; Djankov and Murrell, 2002) and with our hypotheses H1a and H1b. At mean values of institutional indicators, across all the specifications, foreign-owned firms demonstrate superior performance

as compared with domestic private firm, which in turn dominate state-owned firms. The differences in this ordering are significant.

Table 3 presents estimates of the effects of the components of liberalisation measures on productivity. The positive effects of both price liberalisation (spec. (4)) and of external liberalisation (spec. (1)) stand apart as the most significant ones. In addition, our new composite market liberalization scale has strong positive impact on performance (i.e. model (7) in table 3). In turn, table 4 shows estimates for the impact of regulatory reforms other than liberalisation (i.e. ‘second stage’ reforms). In contrast to the estimates for first stage liberalisation measures, it is more difficult to detect a short-term positive effect, apart from an important exception of financial reform when measured by the scale we constructed based on EBRD indicators (specification (8) in table 4). Yet when financial freedom indicator is used, the result becomes (weakly) negative. Likewise, competition policy comes with weak negative effect on performance, and so does large scale privatisation: it does not increase performance. Note that we are measuring an environmental effect, in addition to positive individual firm ownership effect, which remains highly significant for both categories of private ownership. Finally, we detect some catch-all short-run positive effect of EBRD composite measure of reforms on productivity (i.e. model (12)). But this result is much weaker than that obtained when we use more disaggregated measures of liberalisation. Thus, Hypothesis H2 is supported when based on liberalisation measures, however the results are more ambiguous with respect to regulatory (“second stage”) indicators.

We found the reforms to have differential impact on alternative ownership categories, as expected. In particular, the positive impact of aggregate reforms on state-owned firm productivity is always significantly stronger than that on the private firms, supporting H4a. This result is remarkably strong: it holds across all interaction of state ownership with reform indicators for all the specifications (1)-(14). In contrast and equally consistently, the impact of reforms on productivity of foreign owned companies is always significantly weaker, as illustrated by the corresponding interactions in all the specifications, consistent with H3a.

It is interesting however to compare the effects of the two liberalisation variables, trade liberalisation and price liberalisation. Figure 1 illustrates the adjusted mean effects based on specification 4 (for price liberalisation). The three points on the vertical axis of Figure 1 represent the values of the EBRD index of price liberalisation approximately one standard deviation from the sample mean each way (i.e. correspond to the values of the EBRD index at: 3.67, 4.00, 4.33). According to EBRD definition, a change between 3.67 and 4.33 correspond to the removal of any state procurement at non-market prices and to removal of any price control outside housing, transport and natural monopolies. The figure suggests, that moving two standard deviations along the reform index and achieving full price liberalisation (i.e. value of the index at 4.33 compared with 3.67) increases average state firms productivity by 27%, while productivity of domestic private companies increases by 24% and that of foreign companies by 13%. As a result, the productivity gaps between all the ownership categories, but in particular between the state companies and others, narrow significantly under full liberalisation. All differences in response to price liberalisation between each pair of the ownership categories are significant.

In turn, Figure 2 shows the differences in productivity associated with trade liberalisation. The mean value of the trade liberalisation indicator is lower and standard deviation higher, and correspondingly, we plot the EBRD indicator at values of 3.00, 3.33, 3.67, 4.00 and 4.33 (vertical axis of Figure 2). The upper limit corresponds to standards consistent with WTO membership; the lower limit to some quantitative import and export restrictions beyond agriculture, some significant export tariffs, major non-uniformity of tariffs for exports and imports, and/or direct involvement in exports and imports by ministries and other state-managed trade organisations. There are interesting differences between both figures. The impact on state companies is still stronger than on domestic and foreign companies, but the difference is not that large as for price liberalisation. And once we test the differences in productivity response to trade liberalisation between domestic private and foreign companies, the corresponding contrast is no longer significant, indicating that unlike H4a, support for H3a is sensitive to the choice of reform measures. Moving along the

EBRD index of trade liberalisation from 3.67 to 4.33, achieving full trade liberalisation, implies that state companies gain 18.0%, domestic private 13.7% and foreign companies 13.2% in terms of productivity.

{Figures 1-2 around here}

With respect to profitability (tables 5 and 6), we find consistently that, at the mean level of reforms, state companies and foreign companies are significantly less profitable than domestic private ones, with state companies being the least profitable. Yet, once we take account the interactions between reforms and ownership, a more interesting picture emerges. While the reforms consistently reduce profitability in the state sector the results being robust across all reform indicators, giving robust support to hypothesis H4b, individual reforms impact in different ways on the performance of multinational firms (H3b). The basic measures of both price liberalisation and trade liberalisation reduce rents achieved by foreign companies more than those by domestic private companies. However competition policy impacts less on MNEs than on domestic firms. The first result suggests that prior to reforms, MNEs enjoy certain advantages in terms of import restrictions and access to international goods and factor markets. The second result implies that some key monopolistic firms are more likely to remain in domestic hands. These differences are mirrored by the impacts of removal of entry barriers (as captured both by EBRD and by Business Freedom / World Bank 'Doing Business' indicators), where the effect on foreign firms is lower, as foreign firms are less sensitive to emerging domestic competition. In parallel with this, the negative impact of financial reform on profitability is greater for domestic firms than foreign firms; the former seem to benefit to a greater degree from distortions in domestic credit markets.

Again, we illustrate the scale of some of these effects utilising Figures 3-4. Profitability of state companies is at 9.5% (0.095) at the lower end of the range of price liberalisation we consider (EBRD index at 3.67), but that is cut by more than a half to 3.4% once full price liberalisation is achieved (Figure 3). Thus, while price liberalization has the strongest positive effect on productivity of state-owned firms, it has

also the strong relative negative effect on their profitability. This clearly suggests that (pre-reform) restrictions on price setting (especially related to factor markets) and the related issue of government procurement utilising non-market pricing imply rents that are realised primarily by the state sector.

In turn, at the low level of price liberalisation foreign companies maintain a small advantage over domestic firms (11.2% versus 10.8%). This however is reversed once full price liberalisation is established (7.3% versus 10.6%): profitability enjoyed by foreign companies is eroded by almost exactly one third when full price liberalisation is implemented. Thus, while foreign companies maintain the productivity advantage regardless of reforms, liberalisation erodes the profitability advantage they enjoy significantly.

In sharp contrast with the other two categories, profitability of domestic firms remains around 10.7% and a direct test of the effect of price liberalisation on domestic firms' profitability suggests no effect.

A different picture emerges once we concentrate on the impact of trade liberalisation on profitability (Figure 4). We verified that trade liberalisation has no significant impact on foreign firm's profitability (based on testing of differential slope of trade liberalisation). In contrast, domestic companies gain significantly from internationalisation of the economy, while state companies are clearly losing some rents that were maintained by barriers to trade. The scale of these effects is again far from being trivial, as can be easily assessed from Figure 4.

Finally, it is interesting to note some effects with respect to our control variables. Small firms are consistently more productive and more profitable than larger ones. This is consistent with many of our findings above, in that larger firms have stronger insiders, whose positions are protected by the lack of institutional quality, consistent with Girma et al. (2006). Unsurprisingly however, larger market share results in higher profitability, but also in higher productivity, consistent with both market power and efficiency, with high technology firms both more profitable and more productive, but only the former effect is consistently significant.

Turning to macro effects, the level of development as represented by GDP per capita, which proxies for the quality of institutional environment and infrastructure other than that covered by reforms' indicators,

comes across as highly significant for both productivity and profitability. In contrast, the impact of GDP growth is mostly insignificant, or marginally significant with unexpected negative sign. More clear-cut results relate to the measures of openness. Higher overall level of exports results in higher productivity indicating significant effects of broader markets and possibly spillover effects from exporters to other firms in the economy. In contrast, effects of imports on profitability are negative but not always significant. Both exports and imports affect profitability but do not affect productivity in any significant way. This is entirely in line with the theory we mentioned earlier on, including Krueger (1974), Ades and Di Tella (1999), Dreher, Kotsogiannis, McCorrison (2007). Yet, following the same literature, we focus more on institutional and policy environment, including external liberalisation, taking it as more exogenous. In contrast, the openness indicators reflect both some external conditions and the impact of policy decisions.

4.1 Additional checks

We run a series of robustness checks, testing alternative specifications. The battery of tests includes for example using the EBRD grouping of liberalisation, and combining the individual dimensions of the reforms in different specifications.¹¹ Our findings are robust to these specifications.

We also investigated how using Campos and Horváth (2012) indicators (internal reform, external reform, privatisation) affects the results. These are only available for 1997 to 2001, thus reducing significantly the inter-temporal variation in the indices. The results however remain robust, in that we find a positive impact of both internal reforms and external reforms on productivity, and weak negative environmental effect of privatisation. This is in line with the results discussed above.

We also employed different measures of ownership, including ownership percentages rather than the measures of dominant ownership again with no substantial change in results.¹² Next, with a small number of countries, we took the price liberalisation specification and run additional estimations omitting each country

¹¹ Even if the scale does not hold together for our data as indicated by low Cronbach Alpha.

¹² We focus on ownership dummies in our results and discussion, as we did not develop any priors about the effects of changes of ownership shares; our discussion relates to the characteristics of the dominant owners.

observations in turn, both for productivity and for profitability measures. The results reported above are robust to these tests, although highlighting that the impact on foreign firms is strongest for Croatia, Estonia, Romania and Russia, as well as the earlier part of the sample (1996-1998) when the levels of foreign investment are significantly below the average for the full sample period. A similar exercise however reveals no differences across countries or time with respect to state firms. This is not surprising; as illustrated above, the results of price liberalisation on state sector are strongest, and therefore least affected by changes in the composition of the sample.

Additional tests included splitting the sample first by country and along time dimensions. However, with a relatively unbalanced data set, this reduces the extent to which we are able to control for unobserved heterogeneity, as well as increasing the risk of outliers, or certain countries dominating. For the former Soviet Union (fSU) countries, results become less significant, while for other (Central European countries) they remain robust. However, this exercise does not suggest that the results are weaker for one group of countries, but that the impact of reforms is non-linear: we estimate mean effects, and the mean values of reforms for the fSU countries are significantly lower. Thus, there may be some threshold levels of reforms, below which there is little impact. In addition, we split the sample for the period before the EU accession (1997-2003) of several countries in our sample, and after (2004-2006). The results in the first period remain strong, but in the more recent period are a little weaker. This may suggest that institutional variation decreases after the EU accession, making identification of effects more difficult. Yet it may also be affected by a short time span in the more recent period.

Finally, for the whole sample, we compare ordinary least squares results with the more sophisticated estimators discussed above. Our results remain qualitatively similar, with the same inferences with respect to ordering of types of firms and the importance of the interactions between firm type and reforms.

5. Conclusions

This paper investigates the links between institutional reforms and performance, using measures including liberalization of prices, of foreign trade and of entry into business, but also corporate governance and financial frameworks, privatisation in the environment and anti-trust regulatory structures. We compare the effects of improvements in these indices on firm performance and profitability. This is in contrast to the management literature, where the focus is on the financial performance. In particular, Cuervo-Cazurra and Dau (2009) find that market reforms contribute to external performance of publicly quoted companies in Latin America, and that the greatest effects are found for state-owned firms. Our results on a wide sample of firms from the transition economies of CEE confirm this finding, but also extend this analysis by looking at the relationships between institutions and performance, not merely in terms of profitability, but also productivity. We interpret this in the following way.

Liberalisation generates productivity growth, but it does not affect all ownership sectors equally. The productivity advantage of foreign firms decreases slightly, and the state owned companies experience the most significant increase. This is perhaps not surprising, as liberalisation would be expected to benefit only firms that are in a position to take advantage of new opportunities, which may not be the existing market leaders, foreign firms in particular.

At the same time, the productivity increase does not translate into profits growth overall. The clear cut effects relate to the profitability decreases for state owned firms as lack of reforms is associated with excessive rents for the state sector firms. For the foreign firms, the situation is more complex, as only some institutional reforms are associated with erosion of rents, as we discussed above.

The results suggest that productivity of inward investment is a feature of the ownership advantages that are transferred from the parent, and thus are essentially less dependent on the institutional environment. At the same time, many inward investors are also dominant players in their industry, and so while they may claim that they want better institutions, it may also erode their first mover advantage. In particular, that relates to the fundamental dimension of price liberalisation. That is not to say that weak institutions don't

deter FDI (an effect for which we controlled in the first stage of our estimation), but those foreign firms that we observe investing enjoy an advantage over other ownership sectors where prices are not liberalised and/or goods are purchased by the government using non-market prices.

With respect to productivity, the strongest impacts of institutional reform are on the state-owned firms, suggesting that this is where internal returns grow fastest. We interpret this as evidence that reforms strongly improve internal performance of state-owned firms rather than their financial performance, suggesting that institutional reforms are also associated both with greater competition faced by the state sector and with the elimination of either political rents or soft budgets.

In contrast, we show that liberalisation decreases the positive productivity differential (if taken in percentage) enjoyed by foreign owned firms, as illustrated by Figure 1. One would expect these firms to be at the technology frontier, and operating with reference to international capital and goods markets. We investigated this in terms of both foreign ownership per se, and foreign ownership percentage. Higher levels of foreign ownership are associated with lower benefits of reform, which again suggests that firms at the frontier, with access to international knowledge benefit the least, because of their initial position.

More general implications of our research are that contrasting the internal and external measures of performance is important in order to distinguish between efficiency-enhancing and rent-reducing impact of institutional reforms. Following this perspective, we confirm that institutional reforms may produce effects that come with opposite sign for productivity and profitability: while the former may be enhanced, that does not apply to the latter.

Moreover, we are able to shed more light on the differential impact of various types of reforms. In particular, we find that simple liberalization is sufficient to produce strong productivity effects, and those effects are strongest where the initial structures of ownership control are the weakest. Thus, to some extent, competition may substitute for ownership reform. This should not come as a surprise: under a genuinely competitive system, inefficient ownership forms will either evolve or become eliminated. These results are also consistent with the strong link between external liberalisation and growth documented by the meta

analysis of Babecký and Campos (2011). However, here we do not account for political economy effects. It may also be the case that without ownership reforms, firms and sectors that benefited from weak institutional environment most, may have incentives and resources to reverse the reform process. We declare this as a limitation of our research; an issue that needs to be explored further.

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Table 1

Hypotheses on Ownership and Institutional Factors Affecting Performance

Factors	Impact on Internal Performance (Productivity)	Impact on External Performance (Profitability)
Ownership	H1a: FO > DO H1b: DO > SO	Ambiguous
Institutional reforms	H2: Positive	Ambiguous
Institutional reforms: differential impact on ownership sectors	H3a: weakest positive for FO H4a: strongest positive for SO	H3b: FO - negative or weaker positive compared with DO H4b: SO - negative

Notes: SO – state-ownership, DO – domestic private ownership, FO – foreign ownership.

Table 2

Distribution of Ownership (1998-2006)

Mean (standard deviation); number of firms with dominant owner in a given category

Host countries	(1) % FO holding	(2) % SO holding	(3) % DO holding
Bulgaria	61.87 (36.39); 299	20.69 (29.78); 113	92.78 (20.09); 1,582
Croatia	74.26 (35.32); 201	39.94 (33.95); 12	95.04 (18.15); 1,046
Czech Rep.	88.73 (21.88); 591	100 (0.00); 1	95.16 (18.43); 3,646
Estonia	83.12 (26.95); 461	--	93.55 (20.02); 1,574
Hungary	79.62 (30.40); 32	--	89.89 (26.14); 106
Lithuania	75.67 (29.39); 116	--	96.79 (14.37); 1,369
Latvia	80.99 (29.03); 169	--	93.54 (20.27); 729
Poland	86.61 (24.84); 1,589	69.81 (39.01); 270	90.65 (25.05); 5,898
Romania	81.50 (27.84); 3,840	55.57 (36.78); 31	93.03 (21.45); 13,476
Russia	74.45 (33.13); 1,204	64.88 (37.8y8); 289	98.18(10.93); 21,354
Slovakia	82.40 (25.33); 95	--	48.63 (32.87); 55
Ukraine	58.00 (32.38); 483	77.09 (34.52); 672	90.71 (23.31); 3,645

Notes: SO – state-ownership, DO – domestic private ownership, FO – foreign ownership.

The means represent the dominant shareholder in each ownership category.

Table 4. Determinants of productivity	(8)	(9)	(10)	(11)	(12)	(13)
Medium size firms	-0.285*** (0.002)	-0.286*** (0.002)	-0.287*** (0.002)	-0.286*** (0.002)	-0.285*** (0.002)	-0.286*** (0.002)
Large size firms	-0.476*** (0.005)	-0.482*** (0.005)	-0.487*** (0.005)	-0.481*** (0.005)	-0.479*** (0.005)	-0.482*** (0.005)
Market share	0.239*** (0.001)	0.239*** (0.001)	0.239*** (0.001)	0.239*** (0.001)	0.239*** (0.001)	0.239*** (0.001)
1.ownership	-0.148*** (0.004)	-0.147*** (0.004)	-0.136*** (0.005)	-0.177*** (0.005)	-0.131*** (0.005)	-0.143*** (0.004)
2.ownership	0.072*** (0.002)	0.074*** (0.002)	0.071*** (0.002)	0.086*** (0.002)	0.066*** (0.002)	0.073*** (0.002)
High technology dummy	0.382*** (0.008)	0.382*** (0.008)	0.383*** (0.008)	0.383*** (0.008)	0.382*** (0.008)	0.383*** (0.008)
GDP per capita	0.024 (0.015)	0.034* (0.015)	0.025+ (0.015)	0.062** (0.020)	0.025 (0.015)	0.032* (0.015)
GDP growth	-0.001 (0.004)	-0.006 (0.004)	-0.001 (0.004)	-0.006 (0.004)	-0.004 (0.004)	-0.004 (0.004)
Imports / GDP	-0.002 (0.003)	-0.001 (0.003)	0.004 (0.004)	-0.002 (0.003)	-0.004 (0.003)	-0.001 (0.003)
Exports / GDP	-0.003 (0.003)	-0.004 (0.003)	-0.007* (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.004 (0.003)
EBRD Finance Index	0.397** (0.132)					
State ownership x EBRD fin index	0.080*** (0.008)					
For. ownership x EBRD fin index	-0.068*** (0.003)					
Financial Freedom		-0.003* (0.001)				
State ownership x Fin Free		0.002*** (0.000)				
For. ownership x Fin Free		-0.002*** (0.000)				
EBRD Large Priv.			-0.143* (0.060)			
State ownership x Priv.			0.095*** (0.015)			
Foreign ownership x Priv.			-0.046*** (0.005)			
EBRD Compet. Pol.				-0.158* (0.070)		
State ownership x Compet.				0.131*** (0.014)		
Foreign ownership x Compet.				-0.074*** (0.005)		
EBRD Mean Score					0.483* (0.200)	
State ownership x EBRD Mean					0.119*** (0.012)	
Foreign ownership x EBRD Mean					-0.100*** (0.006)	
Econ. Free. Mean Sc.						0.001 (0.003)
State owner. x Econ. Free Mean						0.010*** (0.001)
For. owner. x Econ. Free Mean						-0.004*** (0.000)
Constant	5.123*** (0.238)	5.227*** (0.238)	5.198*** (0.236)	4.933*** (0.266)	5.237*** (0.232)	5.223*** (0.235)
sigma_u	0.086*** (0.007)	0.087*** (0.007)	0.086*** (0.007)	0.086*** (0.007)	0.084*** (0.007)	0.085*** (0.008)
sigma_e	0.360*** (0.000)	0.360*** (0.000)	0.360*** (0.000)	0.360*** (0.000)	0.360*** (0.000)	0.360*** (0.000)

Notes to Tables 3-4

Standard errors in parentheses. Full set of industry, country and time dummies included. Wooldridge two stage estimator. Multilevel ML estimation with country-years effects in the second stage. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10
Number of observations: 286, 075. Number of country-year random effects: 110.

Table 6. Determinants of profitability	(21)	(22)	(23)	(24)	(25)	(26)
Medium size firms	-0.074*** (0.001)	-0.074*** (0.001)	-0.074*** (0.001)	-0.074*** (0.001)	-0.074*** (0.001)	-0.074*** (0.001)
Large size firms	-0.129*** (0.002)	-0.128*** (0.002)	-0.128*** (0.002)	-0.129*** (0.002)	-0.128*** (0.002)	-0.128*** (0.002)
Market share	0.025*** (0.000)	0.025*** (0.000)	0.025*** (0.000)	0.025*** (0.000)	0.025*** (0.000)	0.025*** (0.000)
1.ownership	-0.055*** (0.002)	-0.054*** (0.002)	-0.053*** (0.002)	-0.041*** (0.002)	-0.063*** (0.002)	-0.054*** (0.002)
2.ownership	-0.028*** (0.001)	-0.028*** (0.001)	-0.028*** (0.001)	-0.031*** (0.001)	-0.027*** (0.001)	-0.028*** (0.001)
High technology dummy	0.050*** (0.003)	0.050*** (0.003)	0.050*** (0.003)	0.050*** (0.003)	0.050*** (0.003)	0.050*** (0.003)
GDP per capita	0.005* (0.002)	0.005* (0.002)	0.004 (0.002)	0.004 (0.003)	0.005* (0.002)	0.005* (0.002)
GDP growth	0.001 (0.001)	0.000 (0.001)	0.001+ (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Imports / GDP	-0.001 (0.000)	-0.001 (0.000)	0.000 (0.001)	-0.001 (0.000)	-0.001 (0.001)	-0.001 (0.001)
Exports / GDP	0.002*** (0.001)	0.002*** (0.000)	0.001** (0.001)	0.002*** (0.000)	0.002*** (0.001)	0.002*** (0.001)
EBRD Finance Index	0.008 (0.017)					
State ownership x EBRD fin index	-0.034*** (0.003)					
For. ownership x EBRD fin index	0.008*** (0.001)					
Financial Freedom		-0.000 (0.000)				
State ownership x Fin Free		-0.001*** (0.000)				
For. ownership x Fin Free		0.000** (0.000)				
EBRD Large Priv.			-0.029** (0.009)			
State ownership x Priv.			-0.021*** (0.006)			
Foreign ownership x Priv.			0.005* (0.002)			
EBRD Compet. Pol.				0.003 (0.011)		
State ownership x Compet.				-0.058*** (0.006)		
Foreign ownership x Compet.				0.014*** (0.002)		
EBRD Mean Score					-0.006 (0.027)	
State ownership x EBRD Mean					-0.054*** (0.005)	
Foreign ownership x EBRD Mean					0.006** (0.002)	
Econ. Free. Mean Sc.						0.000 (0.001)
State owner. x Econ. Free Mean						-0.003*** (0.000)
For. owner. x Econ. Free Mean						0.001*** (0.000)
Constant	0.197*** (0.038)	0.198*** (0.038)	0.190*** (0.035)	0.204*** (0.042)	0.200*** (0.037)	0.199*** (0.037)
sigma_u	0.013*** (0.001)	0.013*** (0.001)	0.012*** (0.001)	0.013*** (0.001)	0.013*** (0.001)	0.013*** (0.001)
sigma_e	0.165*** (0.000)	0.165*** (0.000)	0.165*** (0.000)	0.165*** (0.000)	0.165*** (0.000)	0.165*** (0.000)

Notes to Tables 5-6

Standard errors in parentheses. Full set of industry, country and time dummies included. Wooldridge two stage estimator. Multilevel ML estimation with country-years effects in the second stage. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10
Number of observations: 346,642. Number of country-year random effects: 119.

Figure 1. Effects of price liberalization on productivity

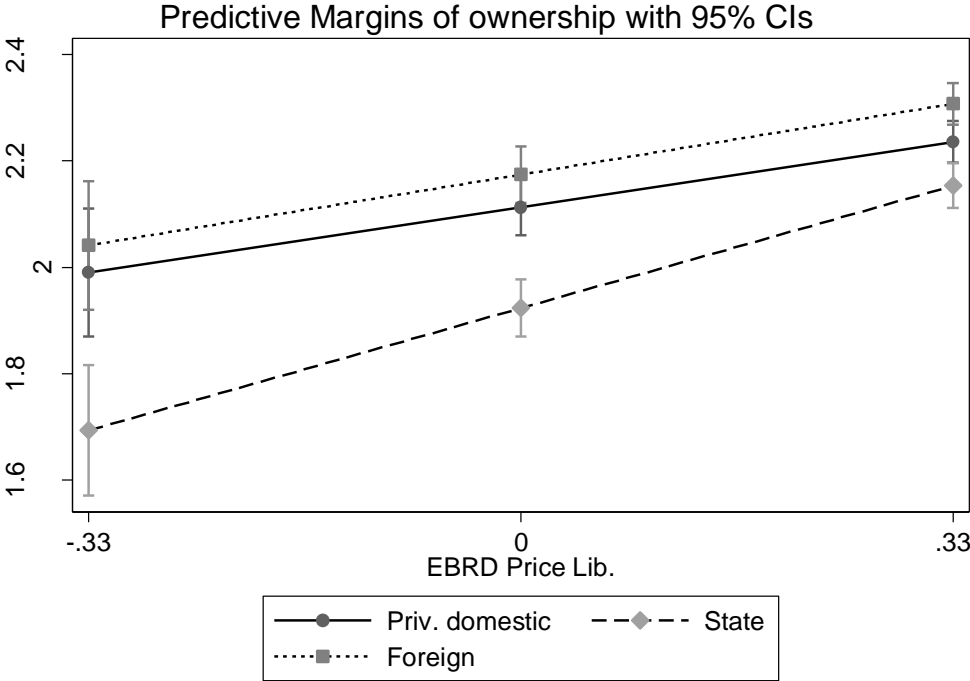


Figure 2. Effects of trade liberalisation on productivity

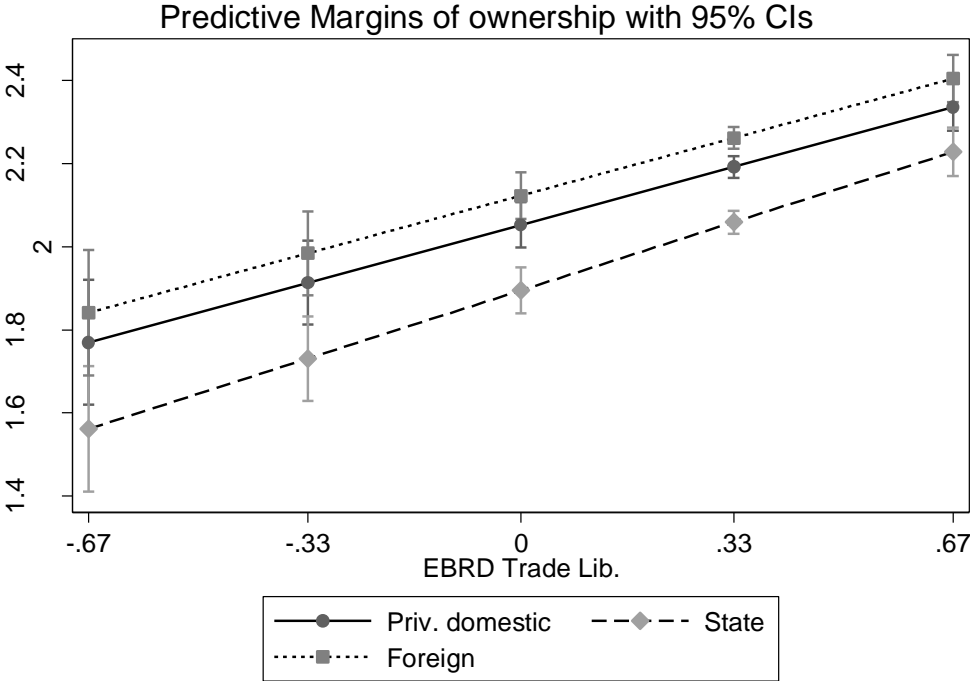


Figure 3. Effects of price liberalisation on profitability

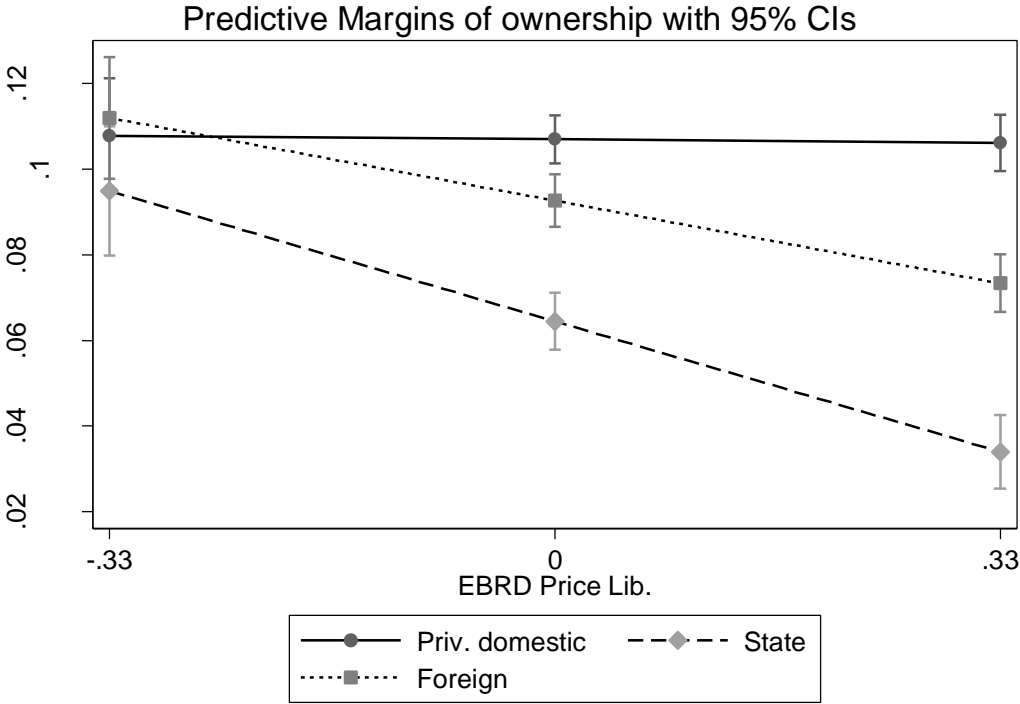


Figure 4. Effects of trade liberalisation on profitability

