Kyiv School of Economics & Kyiv Economics Institute

DISCUSSION PAPER SERIES

Exporting, Productivity and Government Interventions: Is There a Link?

Elena Besedina
Kyiv School of Economics and Kyiv Economics Institute

DP# 28 **June 2010**

Kyiv School of Economics and Kyiv Economics Institute
Yakira St. 13, 3d floor, 04119 Kyiv, Ukraine
Phone: (+380 44) 492-8012, Fax: (+380 44) 492-8011
E-mail: info@kse.org.ua, Internet: www.kse.org.ua

Exporting, Productivity and Government Interventions: Is There a Link?

Elena Besedina*

Kyiv School of Economics, Kyiv Economics Institute, 13 Yakira St., Kyiv 03142, Ukraine

Abstract

Recent theoretical models postulate that only the most productive firms become exporters due to the existence of costs of exporting. Empirical evidence does suggest that exporters are on average more productive than their domestic counterparts. However, contrary to the theory the productivity distribution for exporters and non-exporters overlaps. Motivated by this empirical finding, I extend an existing model of heterogeneous firms by adding endogenous trade policy based on a political economy argument. Using Ukrainian data I identify firms that receive explicit government support in the form of preferential tax policy, subsidies and other exclusive benefits. I find that explicit political support is positively associated with firms size, voter turnout and state ownership but not efficiency.

JEL classification: D24, D72, P26

Keywords: TFP; exporting; subsidy; electoral competition

Submitted to International Economic Review

*I am grateful to Carlo Altomonte and Gianmarco I.P. Ottaviano for their guidance and suggestions. I would like also to thank Roger Lagunoff and Hylke Vandenbussche, and especially Tom Coupe for their valuable comments. I thank you the participants of the European Trade Study Group Meeting, academic seminars at Universita L. Bocconi, University of Nottingham and Kyiv School of Economics.

1 Introduction

A growing number of studies have been looking into how globalization has been affecting economic agents at the micro level. Earlier theoretical work related to so-called "new trade theory" treated all firms within a sector as homogenous. Globalization then would affect all firms in the same way. However, empirical research at the firm level has shown that firms are very different even within narrowly defined 4-digit NACE industries. Differences in performance have been often driven by whether firms serve only the domestic market or also export their products. Challenged by this empirical evidence on diversity among firms,[1] a number of theoretical models featuring heterogeneous firms have been developed. Melitz (2003) introduces heterogeneity among producing agents by assuming that firms differ by their productivity drawn randomly from a given distribution. Prior to the revelation of their productivity, firms have to incur fixed costs of entry. Once the productivity draws are realized, firms make a decision on whether to stay in the market given the estimated present value of the profit stream. Since all firms face the same fixed costs of entry, only firms with productivity above a certain threshold will stay in the market. The Melitz model allows to study the implications of trade policy on firm performance. If there are no trade costs, trade is equivalent to an increase in the size of the closed economy, which does not affect firm-level outcomes. However, if entry into a foreign market is associated with some fixed costs as well, only the most productive firms will serve both the domestic and foreign markets. Trade liberalization will affect aggregate productivity in the economy by forcing the least productive firms out of the market and shifting market shares towards more productive firms (i.e. a reallocation effect). Melitz and Ottaviano (2007) advance the possibility of variation among firms by allowing for changing elasticities of substitution between differentiated goods. In these models, only the most productive firms within an industry become exporters, that is firms are partitioned according to the productivity cutoff levels. Bernard et al. (2003) use a modified version of the Ricardian model of stochastic comparative advantage also to explain the link between exporting, size, and productivity. Similar to the previous models, they assume the existence of the "iceberg" costs of exporting, which allow only more productive firms (those with the least marginal costs) to sell to other countries. In another model, Bernard et al. (2007) follow Melitz (2003) by combining monopolistic competition and unit costs that depend on firm productivity. In addition to heterogeneity among firms, in their model industries are characterized by different factor intensities, while the relative abundance of factors of production varies across countries. Helpman et al. (2004) study the effect of firm heterogeneity on their decision whether to export or set up a subsidiary (engage in foreign direct investment, FDI). Since the latter is associated with higher fixed costs, firms will endogenously sort into domestic, exporting or FDI according to their productivity level.

As summarized by Baldwin (2005), two main features of the 'new' new trade theory are: (1) firms have different marginal costs within the same sector and (2) there exist fixed costs

[1] For an extensive survey of micro-level evidence on the link between foreign market activities, trade policy and firm productivity see Tybout (2003); for developing countries and countries in transition, see Epifani (2003).

of entry to both domestic and foreign markets. The main implications of these models suggest that: (a) exporters should significantly differ from non-exporting firms in terms of productivity due to high cost of exporting; (b) access to a bigger market should lead to an improvement in productivity; and (c) trade liberalization should foster reallocation of market shares towards more productive firms.

The more recent trade models look at the interaction between decisions to go internationally and to innovate. Lileeva and Trefler (2007) model firms' decisions to export and innovate using a heterogeneous response model and test it on a Canadian dataset. They find that new exporters increased their productivity by adopting product-innovative technology. Costantini and Melitz (2008) develop a model where firms make joint decisions to export and innovate once they chose to enter the domestic market. Firms invest in R&D in anticipation of trade liberalization, and such innovation results in a one-time shift in productivity draws. Though these models generate partition of firms into a larger number of groups within an industry (those that sell domestically and innovate, export and innovate, etc.), similarly to the earlier models, they imply the existence of clear thresholds of productivity to determine firms' exporting status.

The mentioned above implication does not seem to be consistent with the recent empirical evidence. Several papers have found that though on average exporters are more productive than non-exporters, there are ranges of productivity at which both exporters and non-exporters exist. For example, Calderon-Madrid and Voicu (2005) using data on Mexican manufacturing firms find that there is minimum threshold above which firms may be exporters or sell domestically only, which is in contrast to prediction of the theoretical models on a sharp cut-off. Moreover, domestic firms seem to outperform exporting firms in some industries such as chemicals, textiles and metals with average productivity among exporters below the average productivity of the domestic firms. Besedina (2008) identifies differences in the overlap between productivity distributions of two groups across sectors in the Ukrainian manufacturing. Similarly to Mexican manufacturing, the differences between the exporting and non-exporting groups are less pronounced in metals and textiles.

Several other papers reveal overlap in the productivity distributions among exporting and non-exporting groups without drawing special attention to this fact[2]. The extent of overlap differs across countries: while in Japan and Spain the productivity distribution of the exporting firms seems to be shifted to the right relative to the domestically selling firms, two distributions almost overlap in Chilean manufacturing (Tekin, 2008) and in Mexican manufacturing (Calderon-Madrid and Voicu, 2005).

Motivated by this finding, I extend a trade model of heterogeneous firms developed by Melitz and Ottaviano (2007) by adding endogenous trade policy induced by a political economy argument. I show that the presence of exogenous subsidies creates a region in the productivity distribution where both exporters and non-exporters are present, as observed in my data.[3]

[2] See, for example, Wakasugi and Tanaka (2009) for Japan and Caldera (2009) for Spain.

[3] Although I use the word 'subsidy', it does not restrict trade policy to this tool only . For example, Faccio (2004) investigates political connections between firms and government officials and finds it as a wide-spread

Next I endogenize trade policy by adding an electoral competition stage. In particular, I use a probabilistic voting model as in Persson and Tabellini (2000) with two competing candidates. Using data on the Ukrainian metallurgical enterprises and Ukrainian legislation, I am able to identify firms that received explicit government support in the form of tax exemptions, writing off accrued arrears, granting tax payment deferment in my dataset. In line with the model predictions, I show that supported plants differ from non supported by several characteristics. I also show that in the presence of government interventions, conventionally estimated TFP may not reflect true economic efficiency, thus leading to an overlap in productivity distributions of exporters and non-exporters, since political support alters the productivity ranking of the firm that would have prevailed in the intervention-free world.

The paper is organized as follows: next section presents theoretical model motivated by empirical findings discussed above. Section 3 describes the data I use to test model predictions. I conclude with final remarks.

2 From empirics to the theory: possible explanation

Recently, several theoretical papers tried to reconcile with empirical evidence on distributions overlap. For example, Eaton et al. (2008) to reconcile with the overlap evidence add firm and market specific fixed cost along with demand shocks while Irarrazabal and Opromolla (2009) try to explain the overlap by introducing different levels of productivity at which firms start and stop exporting activity. The observed evidence of a certain overlap in the productivity distribution of exporters versus non-exporters, as well as the heterogeneous patterns across countries could be explained, in my view, by the presence of government interventions aimed at supporting exporting firms in some industries. This idea would be also consistent with the fact that in developing and transition economies which are more prone to undertake government interventions exporters do not differ much in terms of productivity from their domestic counterparts.

Implicit and explicit support is a well documented fact for Ukrainian economy, in particular. Legeida (2001) provides a classification of implicit and explicit subsidies in the Ukrainian economy. According to her estimates, the most heavily cross-subsidized industries in the Ukrainian economy in late 90s early 00s were mining, ferrous metals, machine building and agriculture. Eremenko and Lisenkova (2002) note that policy tools used to support metallurgical sector range from implicit subsidies (debt write-offs, inter-enterprise soft budget constraints, cross-subsidization by lower prices for intermediate goods) to explicit ad-valorem subsidies, the latter being granted mainly to large exporters. They estimate that these subsidies amounted to around USD 500 millions during 2000-2001. [4]

phenomenon with the varying magnitude across countries. Khwaja and Mian (2005) identify government support to Pakistani firms as the volume of funds available and preferential borrowing rates.

[4] Government interventions skyrocketed even more during the recent crisis. In October 2008 almost every news bloc on Ukrainian TV opened with a report on the meeting of the Prime Minister with the representatives of different industries: metallurgy, chemicals, construction and others. The scenario of the meeting was the same: the representatives asked for the state support to overcome crisis consequences and every time the support was

How does the latter relate to the exporting status of a firm? Serving foreign markets is often associated with significant costs associated with setting up local offices or/and dealer networks. As governments are often concerned with promoting exports (e.g. to boost economic growth)[5], they try to achieve this goal with specific trade policy measures. International trade theory does not have a clear answer whether an active trade policy is desirable from the welfare point of view. Baldwin (1992) contrast the implications of the traditional trade theory assuming competitive markets with the new trade theory under imperfect competition. While the earlier stream of trade theory does not advocate for intensive government intervention, later contributions to trade theory which borrowed tools from the Industrial Organization literature (e.g. Brander and Spencer, 1985) postulated the possibility of strategic trade policy. They argued that if firms of two countries are competing in a third country market, which is imperfectly competitive, governments by means of trade policy (subsidy, tax, tariff) can ensure higher profits for domestic exporting firms at the expense of the other countries' exporting firms.[6]

Linking the possibility of strategic trade policy by the government to the analysis of performance of exporting firms, in the next section I present a model that tries to explain the two previously discussed empirical findings. I introduce export as an exogenous shock to the firm's profits in the original Melitz and Ottaviano (2007) model. Next, I incorporate a trade policy determination stage into the model.

2.1 Open economy with an exogenous subsidy

In this section I present a theoretical model that follows Melitz and Ottaviano (2007). The consumer side of the economy is represented by identical L consumers with quasi-linear preferences over the numeraire good (q_o^c) and differentiated goods (q_i^c).

$$U = q_o^c + \alpha \int_{i\epsilon\Omega} q_i^c di - \frac{1}{2}\gamma \int_{i\epsilon\Omega} (q_i^c)^2 di - \frac{1}{2}\eta \left(\int_{i\epsilon\Omega} q_i^c di \right)^2$$

In this setup consumers' preferences are characterized by different degrees of substitutability between numeraire good and differentiated goods (α and η) as well as by the degree of product differentiation among the latter goods (varieties) denoted by γ.[7]

Consumers maximize utility subject to the following budget constraint:

$$p_o q_0 + \int_{i\in\Omega} p_i q_i d_i \leq E$$

The standard maximization yields the following inverse demand for a variety i assuming that

promised.

[5] As discussed below, export was a driving force behind the recent GDP growth in Ukraine (Figure 1).

[6] Brander (1995) makes an overview of the existing trade literature dealing with strategic trade policy. He shows that optimal trade policy crucially depends on the underlying assumptions about the market structure (oligopoly, duopoly, Bertrand versus Cournot) and type of the competition (third market or reciprocal markets).

[7] Though the functional form is crucial for the Melitz and Ottaviano analysis of the effect of trade liberalization, it is not detrimental for analysis that follows.

$q_o^c > 0$:

$$p_i = \alpha - \gamma q_i^c - \eta Q^c$$

where $Q^c = \int_{i\epsilon\Omega} q_i^c di$ is the aggregate consumption of differentiated goods in consumer's bundle.

Then the market demand for a variety $i \epsilon \Omega^*$(where Ω^* is a subset of differentiated goods s.t. $q_o^c > 0$) depends on its price (p), size of the market (L), degree of differentiation among varieties (γ) and substitutability with a numeraire good (α and η), number of consumed differentiated goods (N) and average price of differentiated goods ($\overline{p}$) defined as $\frac{1}{N}\int_{i\epsilon\Omega^*} p_i di$:

$$q_i \equiv Lq_i^c = \frac{\alpha L}{\eta N + \gamma} - \frac{L}{\gamma} p_i + \frac{\eta N}{\eta N + \gamma}\frac{L}{\gamma}\overline{p}$$

The production side of the economy is divided into two sectors: one that produces numeraire good with constant returns to scale and the other sector dealing with differentiated goods. Both sectors use labor as the only input into production. However, while the numeraire sector is competitive and has free entry, the differentiated product sector is characterized by costly entry (f_E) since entrants have to incur sunk costs. Investment is a stochastic process with draws distributed according to some commonly known distribution $G(c)$. Once the draws are realized each entrant considers whether to stay and produce or exit the market. Since the entry cost is sunk this decision depends on the entrant's draw of costs and expected future profits which are in turn determined by the distribution of productivity in the economy.

The free entry condition for the differentiated products sector is then given by:

$$\int_o^{c_D} \pi(c) dG(c) - f_E = 0 \tag{1}$$

where c_D is a cutoff point for costs, such that firms with costs above it exit the domestic market. This threshold incorporates the influence of the average price and number of varieties (firms) on the firms' profits (π), mark-ups (μ), quantities produced (q) and prices charged (p). The short run equilibrium in this economy is then determined by the free entry condition (1) and the zero cutoff profit condition $c_D = p(c_D)$, where $p(c_D)$ is a price charge by the firm with a cutoff level productivity. Then the number of firms in the market is determined by $N_E = N/G(c_D)$. Firms can export, but, exporting is costly due to the existence of iceberg-type trade cost ($z > 1$). The assumptions on segmented market and constant returns to scale allow for separate profit functions for domestic and foreign markets.

$$\begin{aligned} \pi_D(c) &= [p_D(c) - c]\, q_D(c) && \text{domestic profits} \\ \pi_X(c) &= [p_X(c) - z^* c]\, q_X(c) && \text{export profits} \end{aligned}$$

where $*$ denotes a foreign country.

I concentrate on the short-run perspective implying that all entry has occurred and exit is

not taking place; therefore, the number of firms and productivity distribution (inverse of the costs) are fixed.[8] In this framework subsidy, s, can be considered as an exogenous shock hitting firms' profits with a probability β after they have entered the market.[9] If some of the firms receive a subsidy their profits from export will thus be:

$$\pi_X(c) = (p_X(c) - z^* c)\, q_X(c) + f(s)$$

Melitz and Ottaviano parametrize the cost distribution as a Pareto distribution. Given this assumption, the export profits can be represented as follows[10].

$$\pi_X(c) = \frac{L^*}{4\gamma}\,(z^*)^2\,(c_X\ - c)^2$$

Then the profits of the subsidized firms become:

$$\pi_X(c, s_X) = \frac{L^*}{4\gamma}\,(z^*)^2\,(c_X\ - c)^2 + f(s) \tag{2}$$

I assume that subsidy enters firms' profits but it does not increase profits in 1 to 1 ratio.[11]

An alternative expression in case of a price subsidy will be:

$$\pi_X(c) = (p_X(c) + f(s) - z^* c)\, q_X(c)$$

Which is equivalent to the case of subsidy per unit produced:

$$\begin{aligned}
\pi_X(c) &= (p_X(c) - z^* c)\, q_X(c) + f(s) q_X(c) = \\
&= \frac{L^*}{4\gamma}\,(z^*)^2\,(c_X - c)^2 + f(s)\frac{L^*}{2\gamma} z^*(c_X - c) \\
&= \frac{L^*}{4\gamma}\,(z^*)^2\,(c_X - c)^2 \left[1 + \frac{2f(s)}{z^*(c_X - c)}\right]
\end{aligned}$$

For analytical simplicity I will use expression (2), although the derived results will still be valid for the alternative definitions of subsidy. If we denote with c'_X a cutoff level of costs for

[8] This assumption seems to be relevant for Ukrainian economy where inefficient plants do continue to "hang out" in the market either producing little or not producing at all (often selling inventories and renting out fixed assets).

[9] Without loss of generality I use subsidy in a broad sense as any kind of government intervention affecting firms profits.

[10] For a detailed derivation of the profit functions, see Melitz and Ottaviano (2007).

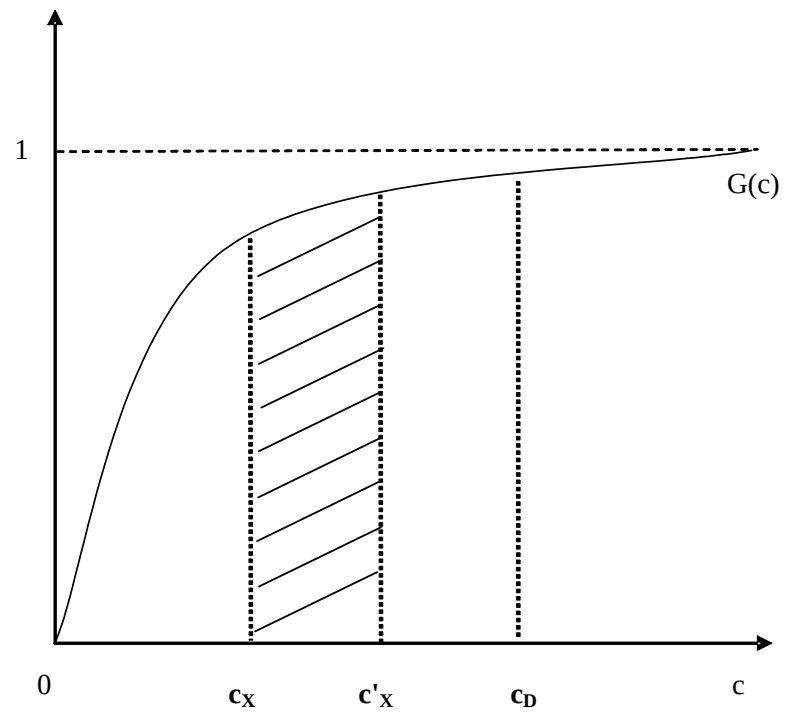
[11] Such functional form allows for different subsidy alternatives. It should be noted that in Ukraine subsidies have been granted in the form of tax reductions (e.g. from overall 30% to 9, then 15 for metallurgical sector), elimination of other levies and fees, writing off of tax arrears. Also, at some point in time free economic zones were created which granted tax privileges to specific enterprises.

the supported group, then[12]:

$$\begin{aligned}\frac{L^*}{4\gamma}(z^*)^2(c_X - c)^2 + f(s) &= \frac{L^*}{4\gamma}(z^*)^2\left(c'_X - c\right)^2 \\ \left(c'_X - c\right)^2 &= (c_X - c)^2 + \frac{f(s)4\gamma}{L^*(z^*)^2} \qquad (3)\end{aligned}$$

The above equality implies that the subsidized group will face lower productivity cutoff to enter the export market. Therefore, in the region between c'_X and c_X (Figure A), some firms that would not export without subsidy will actually export, while the others with the same level of productivity but without subsidy will serve only domestic market generating overlap in the productivity distribution between exporting and non-exporting firms.

Figure A. Productivity distribution and cutoffs for exporting in the presence of subsidy



If there are benefits from exporting the benevolent government would want to support the firms which are located in the region between the original cutoff and new cutoff to stimulate exporting. If this explanation is true, in reality we would observe 'supported' group in the upper middle of the productivity distribution. Once the supported firms are taken out from the sample, the distributions for exporters and non-exporters would shift further away. However, if government's choice is not based on efficiency consideration then the subsidy may go to "wrong"

[12] In the alternative specification:

$$\frac{L^*}{4\gamma}(z^*)^2(c_X - c)^2 + s_X\frac{L^*}{2\gamma}\tau^*(c_X - c) = \frac{L^*}{4\gamma}(z^*)^2\left(c'_X - c\right)^2$$

$$\left(c'_X - c\right)^2 = (c_X - c)^2 + \frac{2s_X}{z^*}(c_X - c)$$

firms, that is the firms, which are already exporting or firms which will not reach the new export cutoff even with the subsidy. Therefore, if the coice of the firms that are supported is not based on productivity, what we will observe in the data is that once the supported group is taken out, the productivity distributions may still overlap if government support was given to 'wrong' firms.

Hence the first hypothesis that I will test in the empirical part is whether exclusion of the supported firms change the degree of overlap.

If government has other than efficiency concerns, the question is what will determine governmental choice who to support in this case? The next section tries to give an answer to this question using polticial economy argument.

2.2 Open economy with a political economy stage:

There are several approaches that could be used to model the political environment. One of them is to assume that politicians engage in electoral competition to win the office. In this set up there is no role for organized groups since politicians decide on the policy platform; voters (groups of voters) influence policy indirectly via some intrinsic characteristics which "attract" politicians. That is, voters behave passively without exerting any special effort (e.g. in the form of pressure, contributions, bribes) to affect the policy platform that competing politicians choose in equilibrium.

The second approach is to introduce organized groups that will actively find ways to influence either probability of winning of their preferred candidate or the policy decision, or both. Grossman and Helpman (1994) develop a model of lobbying in the form of campaign contribution to manipulate trade policy in their preferred direction. In this model the politicians are already in office. Grossman and Helpman (1996) introduce a model where lobbies contributions are aimed either at the electoral support of a given party or to influence the choice of policy. Mitra (1999) models endogenous lobby formation and identifies industry features that are associated with a higher probability of lobbying. In particular, more capital abundant and geographically concentrated industries are more likely to form a lobby and, consequently, receive more protection. More concentrated ownership and less elastic demand for goods produced is also conducive to lobbying. Using Grossman and Helpman (1994) lobbying model Bombardini (2008) shows that industries with more dispersed size distribution are more likely to be organized in lobby and hence will be protected.

I apply probabilistic voting model of electoral competition as in Persson and Tabellini (2000). In this setup subsidy is chosen by politicians competing for office to influence election outcome. The choice can be justified on the grounds that politicians often have motivations for political favors other than campaign contributions, e.g. vote shares, employment, etc. In my model voters are grouped according to employment place. Voters can be ideologically biased toward one of the candidates. I assume that economic policy affects all voters working at a plant in the same way. I show that firms with voters that put greater emphasis on economic policy, less

ideologically biased (with more swing voters), and plants with higher turnout rates among the workers, will be "attractive" for politicians' support, and thus will have higher probability of becoming "politically connected", receive export subsidy or another type of support. Hence my paper is related to a recent work by Muuls, M. and P. Petropoulou (2006) where the distribution of economic activity is modelled to affect trade policy choice when politicians compete for office. The main implication of their model is that industries located in the electoral districts that are pivotal and have many swing voters are more likely to be protected is empirically confirmed for the US economy.

2.2.1 Setup

There are two parties $P = O, R$, which try to win office. Before the elections two parties choose a policy vector (trade policy in this case) which they will implement if they are elected. It is assumed that parties can commit to the policy they announce before the elections.

All voters work at a specific firm and have ideological bias toward one of the parties. The utility of a voter i working at a firm J is described by the following function:

$$w^{iJ} = k^J W^J(s^J) + (\sigma^{iJ} + \delta)V_R \tag{4}$$

Where $V_R = 1$ if party R wins election and $= 0$ otherwise.

k^J is a firm-specific parameter

$W^J(s^J)$ is the effect of trade policy discussed below

σ^{iJ} is a party bias which is individual-specific,

δ is a random popularity shock for all voters.

Both individual party bias and popularity shock are uniformly distributed. The former on the interval: $\left[-\frac{1}{2\phi^J}, \frac{1}{2\phi^J}\right]$ for each firm, and the latter for the entire economy on the interval: $\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$.

Given the properties of the uniform distribution, the density of individual party shocks for each plant is summarized by ϕ^J, and the density for popularity shock is summarized by ψ.

Firms are also distinguished by the extent to which they care more about economic policy relative to the ideology, k^J. I assume that economic policy affects all voters working at the specific firm in a similar way:

$$W^J(s^J) = \pi_D^J + \pi_X^J - \tau + \frac{f(s^J)}{\lambda(L^J)} \tag{5}$$

Where as in the previous case π_D^J is the profits from selling on domestic market, π_X^J profit from exporting, τ is a tax, $f(s^J)$ is the extra profits resulting from the trade policy, as firms can receive export subsidies or other forms of support from the government and $\lambda(L^J)$ is a scaling factor decreasing in the firm size and representing the economies of scale in the governmental support.[13] Given the government budget constraint, $N_E\tau = \sum_J s^J$, the tax rate is determined as

[13] The scaling factor was first introduced by Barten (1964) in a household decision model and had been widely

follows: $\tau = \frac{1}{N_E} \sum_J s^J$, where N_E is the short-run equilibrium number of firms in the economy.

The 2007 snap elections to the Ukrainian Parliament provide some anecdotal evidence on the validity of the assumption that voters can be grouped by the place they work at. One of the parties competing for the seat in the parliament showed indeed an interesting pattern of the votes distribution. Though overall this party did not even reach the required threshold of 3% to enter Parliament. It managed to get more than 50 and 35 per cent of votes in two electoral districts in the same city, respectively. Further look at the more detailed information on votes reveals that even within the two districts the distribution of votes was far away from being homogenous. According to unofficial information such "concentrated" support of this party could be explained by the geographical location of the giant heavy industry plant believed to be connected to one of the party leaders. The fact is that the party received around 90 thousand votes in these two districts and the plant official's employment in the year before the election was around 77 thousand employees. Definitely, without detailed information on the employment of the voters one cannot claim that there is a direct link between the two number; however, this "coincidence" speaks for itself.

The timing is as follows:

1. Two parties simultaneously and noncooperatively decide on the trade policy to ensure winning of the elections.
2. Voters vote.
3. Policy is implemented.
4. Firms produce and export depending on the implemented trade policy.

2.2.2 Solution

In order to determine equilibrium in the model, we need first to determine a "swing" voter - a voter which is indifferent between two parties, i.e. voter with the ideological bias equal to 0:

$$\sigma^J = w^J(s_O^J) - w^J(s_R^J) - \delta$$

All voters of firm J with $\sigma^{iJ} \leq \sigma^J$ would vote for party O.

The cumulative distribution of individual-specific party bias for firm J can be represented as follows:[14]

$$F(\sigma^J) = \phi^J \left(\sigma^J + \frac{1}{2\phi^J} \right)$$

The vote share that the party O gets given the distributional assumptions is thus:

used in the household literature.

[14] Recall that cummulative density function for uniform distribution is given by:

$$F(x) = \frac{x-a}{b-a} \quad \text{for } a \leq x < b$$

$$\lambda_O = \sum_J \frac{L^J}{L} t^J \phi^J \left[\sigma^J + \frac{1}{2\phi^J} \right] \tag{6}$$

where t^J is the probability that voters of firm J will turn out to vote and is firm-specific. Then the probability of party O's winning elections is given by:

$$p_O = \Pr\left[\lambda_O \geq \frac{1}{2}\right] = \frac{1}{2} + \frac{\psi}{\phi}\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[W^J(s_O^J) - W^J(s_R^J)\right]\right]^{15} \tag{7}$$

Where $\phi = \sum \frac{L^J}{L}\phi^J$ is average density across firms. The objective function of the two parties is symmetrical and consists of two parts: probability of winning election p_O and concern for efficiency Ω. The probability of winning elections, in turn represents a weighted social welfare function where the voters utility working at a given firm is weighted by the firm size (L^J), their turnout rate (t^J) and their responsiveness to economic policy (k^J).

$$M_O = \gamma p_O(s_O) + (1-\gamma)\Omega(s_O)$$

Parameter γ measures the degree of selfishness of the politicians. If it is equal to 1, politicians only care about winning elections and put no weight on efficiency. On the other hand, if it is equal to zero politicians have no self-interest. In order to ensure unique policy platform that maximizes social efficiency I assume that $\Omega(s_P)$ is a well-behaved function, i.e. differentiable and continuous such that $\Omega'(s_{\min}) > 0$, $\Omega'(s_{\max}) < 0$ and $\Omega''(s_P) < 0$ for all $s_P \in (s_{\min}, s_{\max})$.

First we consider two extreme cases. When $\gamma = 0$ politicians behave as a benevolent government and offer support to firms based on efficiency.

If $\gamma = 1$, in equilibrium politicians choose policy platform to maximize their objective function, which is simply the probability of winning elections:

$$\max_{s_O^J} p_O = \frac{1}{2} + \frac{\psi}{\phi}\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[W^J(s_O^J) - W^J(s_R^J)\right]\right]$$

Where $W^J(s_O^J)$ is given by (5). Then FOC to the above maximization problem considering two firms I and J is given by:

$$\frac{L^J}{L}\frac{t^J\phi^J}{\lambda(L^J)}k^J\frac{\partial f(s_O^J)}{\partial s_O^J} - \frac{L^J}{L}\sum_J \frac{t^I\phi^I k^I}{N_E} = 0 \tag{8}$$

$$\frac{\partial f(s_O^J)}{\partial s_O^J} = \frac{\lambda(L^J)\sum_J \frac{t^I\phi^I k^I}{N_E}}{t^J\phi^J k^J} \tag{9}$$

[15] Party O wins if it gets at least half of the votes, that is if $\lambda_O \geq \frac{1}{2}$. Using (6), the proability of winning is thus given by:

$$p_O = \Pr\left[\lambda_O \geq \frac{1}{2}\right] = \Pr\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[W^J(s_O^J) - W^J(s_R^J)\right] \geqslant \delta \sum_J \frac{L^J}{L} t^J \phi^J\right]$$

Taking into account properties of the uniform distrubtion this expression becomes (7).

By concavity of utility function and symmetry, both parties offer the same policy platform $s_O^J = s_R^J$ in equilibrium.

To concentrate on the plant characteristics I assume that voters are ideologically similar across plants, namely that $\phi^J = \phi^I$ for $i \neq j$. Hence expression (9) simplifies to:

$$\frac{\partial f(s_O^J)}{\partial s_O^J} = \frac{\lambda(L^J)\sum_I \frac{t^I k^I}{N_E}}{t^J k^J} \tag{10}$$

Given the government budget constraint the revenue part is given by $L\tau$. Since subsidies are costly for the government the government supports only a fraction of firms β with the highest values of $t^J k^J$.

In the above setup I assumed that every voter is a stakeholder only in the firm he works for, which is often the case in transition economies.[16] As an alternative in the Appendix I derive results for the case when workers hold a portfolio of stocks of other firms.

When $0 < \gamma < 1$ both efficiency and firm-specific charaterstics matter in determing policy outcome.

$$\begin{aligned}
\max_{s_O^J} M_O &= \gamma p_O(s_O) + (1-\gamma)\Omega(s_O) = \\
&= \gamma\left(\frac{1}{2} + \frac{\psi}{\phi}\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[W^J(s_O^J) - W^J(s_R^J)\right]\right]\right) + (1-\gamma)\Omega(s_O)
\end{aligned}$$

Using the results of the previous case the FOC can be written as:

$$\gamma\left(\frac{L^J}{L}\frac{t^J\phi^J}{\lambda(L^J)}k^J\frac{\partial f(s_O^J)}{\partial s_O^J} - \frac{L^J}{L}\sum_J \frac{t^I\phi^I k^I}{N_E}\right) + (1-\gamma)\frac{\partial\Omega(s_O)}{\partial s_O^J} = 0$$

Proposition 1 *If γ is the same for both parties then in the equilibrium two parties will choose the same policy platform, which will be determined by the degree of self-interest γ and voters' characteristics.*

Making use of the previous result when $\gamma = 1$ and the assumptions on the form of $\Omega(s_O)$, which ensure a unique vector of the subsidies given to each firm from the efficiency point of view, the proof of the Proposition 1 is straitforward.[17]

2.2.3 Model implications

The model generates several testable implications. Politicians will support plants whose profits are more responsive to governmental intervention. Equation (10) implies that governmental support to a given firm J (higher subsidy s^J) increases in voters turnout (t^J) and/or if its voters

[16] This is especially true for my dataset of open joint stock companies, where many firms have been owned by the workers and management.

[17] Nothing prevents a situation when $s_O^I = 0$ for some I

care more about economic (trade) policy than ideology (higher k^J). Size of the firm (L^J) enters the expression (10) indirectly through the scaling factor. Bigger firms will be favored by the government because of the existence of the economies of scale. This result is different from Persson and Tabellini (2000) where the size of the group does not matter for receiving transfers. In their model, though votes increase in the group's size, the provision of per capita public good also makes the bigger groups of voters expensive to "buy". In my model, the subsidy is given to the firm and though bigger firms receive bigger subsidies, the size of the subsidy is not determined on per worker basis.

More formally:

H1. In case of low self-interest (low γ), politicians will support firms with the higher productivity among non-exporting firms to enable them to enter foreign market.

H2. Since state-owned plants are usually older and less efficient and find it difficult to compete in the market [18], k^J is increasing in the state ownership. As a result, since political support is increasing in k^J, I should expect higher state share in the subsidized/supported plants.

H3. Firms concentrated in locations with more active voters (higher t^J) are more likely to receive support.

H4. The size of the plant is expected to positively influence the probability of receiving political support.[19]

H5. Political support changes the productivity distribution by inducing a structural shift for the politically connected group (Section 2.1).

3 Testing the model: data, specification and results

The dataset I use for the estimation was assembled from the publicly available annual reports of the Ukrainian metallurgical companies. The advantage of this dataset is that it covers a substantial amount of the firm-related information, including ownership, output, stock of capital, credit position, among other indicators allowing to estimate total factor productivity. The dataset in use covers the period 2000-2005. Descriptive statistics can be found in Table 1.

[Insert Table 1 about here]

The share of exporters in metallurgy is around 60 per cent of all firms in the industry. In aggregate, this sector contributed 44.5, 41.4, and 39.7 per cent to the total volume of the country's exports in 2000, 2001, and 2002, respectively (WB 2005). Around 80 percent of the exporters in metallurgy shipped to countries outside of the Former Soviet Union.

A specific legislation passed in 1999 in fact established the initiation of an economic experiment aimed "at the increase in production volumes in the metals and mining sectors via

[18] Previous studies for Ukraine have found state-owned enterprises to be lacking behind in terms of efficiency and competitiveness (see e.g. Andreyeva (2003), Melnichenko (2002) and Zelenyuk V. and V. Zheka (2004).

[19] As the recent car industry bail-out in the US has shown that large-scale employment at the car-making plants was one of the major concerns for the US government when considering the bail-out.

extension of tax privileges". In particular, tax privileges included writing off all the tax arrears that accumulated prior to July 1st 1999.[20] It also allowed delays in tax payment up to 36 months without penalty (zero rate tax credit). The word 'experiment' in the title clearly implied that tax privileges were granted only to some enterprises in the metallurgical sector. The list of participants have been slightly modified in the subsequent years. The experiment was supposed to end in 2002; however, a new set of legislative acts was adopted to continue with experiment.[21] Finally it was abolished in 2005. Thanks to the unique feature of the dataset that allows me to exactly identify the recipients of one of the forms of the governmental support I can directly test the implications regarding governmental intervention discussed above.

I can thus construct a variable *Support* as a binary variable taking values 1 for entire period if firm was listed in both laws and 0 if was not listed in any. Some plants were added along the way and some were excluded, hence the variable *Support* for this groups alternates between 0 and 1.

If Hypothesis H1 is true, then once the supported non-exporting group is taken out from the sample the degree of overlap will go down, i.e. distribution will be lying further apart. Figure 1 shows two graphs, which depict productivity distributions with and without supported firms. The graphs look very much alike suggesting that the coice of the supported firms did no seem to depend on the productivity level. In addition, I compare average productivity of supported and non-supported group among firms that sold only on domestic market in 2000[22]. I find that, there is no significant difference between the two groups (Table 2), suggesting that government choice who to support was indeed driven by other factors.

[Insert Figure 1 and Table 2 about here]

To test Hypothesis H2 I conduct a t-test on equality of means for the variables related to the state ownership in the two groups of firms in 2000. The variable $State - controlled$ takes value of 1 if state owns more than 25% of shares in a given firm and 0 otherwise. The variable *State share* is a continuos variable denoting direct state ownership. The results of the test for two variables are presented in Table 3. As expected, I find that the both the percentage of state-controlled plants and share, owned by the state, is higher for the plants included in the experiment and hence benefiting from governmental support.

[Insert Table 3 about here]

Since the firms in my dataset are open joint stock companies I can identify their location and match it to an electoral district.[23] Ukraine had parliamentary elections in 1998 and presidential elections in 1999. The first law on state support of metallurgical firms was passed on July 14th,

[20] Law of Ukraine on Economic Experiment in Mining and Metals Industry, dated July 14th, 1999.

[21] Law of Ukraine on Further Stimulation of Mining and Metals Industry, dated January 17th, 2002

[22] Since I do not have information on the firms in 1999 I use the earliest available year 2000.

[23] I use legal address to assign firm's voters to electoral district, that is I assume that workers of this firm live nearby. I claim that this is a plausible assumption given the Soviet history when enterprises, especially large ones, built their own housing in the surroundings.

1999 via a secret vote. The presidential elections took place in October hence I use data on voter turnout only for the parliamentary elections of 1998 to test Hypothesis H3. The voter turnout is defined as the share of voters that participated in the elections out of total number of voters entitled to vote in a given electoral district. As suggested by the model, firms located in the electoral districts with higher voter turnout are more likely to be supported and the data seem to confirm this: the difference between supported and non-supported group is statistically significant at 1% significance level (Table 4).

[Insert Table 4 about here]

The fourth prediction of the model implies that the supported firms should be bigger in terms of the number of employees than unsupported firms. Table 5 empirically confirms this prediction: I find statistically significant difference between the average number of employees in two groups of firms.

[Insert Table 5 about here]

According to H5, government interventions are expected to change the productivity distribution within the industry. First I estimate total factor productivity[24] I plot the kernel density for exporting and non-exporting producers to see the extent of the overlap at the beginning of the sample period, namely in 2000 and at the end, in 2005. If initially exporting firms seem to outperform non-exporting firms, overtime the gap between the two groups seem to disappear (Figures 2 and 3). To disentangle the effect of the support I plot the productivity distributions for four groups of firms divided according to their export status and political support. As Figure 4 demonstrates, the productivity schedule for politically supported plants is reallocated to the right, revealing a structural shift. Therefore, in the presence of subsidization or other forms of state support, the TFP measure estimated as residual of the standard Cobb-Douglas function (with value added as dependent variable) might not reflect true efficiency, since 'supported firms' can have access to subsidized intermediate inputs decreasing in this way material costs and inflating valued added.

[Insert Figures 2, 3 and 4 about here]

To validate this finding, I try to build a counterfactual to the existing situation by estimating a hypothetical TFP for supported firms as if it would be without political support. To this extent, I first regress log TFP on a set of other performance indicators which are hypothesized to be independent of the political support using only a subset of exporting firms, which are not listed in the 'experiment resolution'. I can directly use TFP and not an index because I am considering only metallurgical firms, hence I need only to control for time trend in productivity, which I do by using year fixed effects. As before I use quantile regressions estimating the median effect for the following specification.

[24] I estimate TFP using methodology of Levinsohn and Petrin (2003) commonly used in the firm-level studies.

$$\log TFP_{jt} = \alpha_o + \alpha_1 w_{jt} + \alpha_2 k_{jt} + \alpha_3 y_{jt} + \alpha_1 \mu_{jt} + \upsilon_{jt}$$

where TFP_{jt} is firm j total factor productivity in level in year t

w_{jt} is average wage paid by firm j to its employees

k_{jt} is capital per employee

y_{jt} is output per employee

μ_{jt} is profit margin defined as profit (loss) before taxation divided by operating revenue / turnover multiplied by 100

Three of these four performance measures are positively associated with productivity, while capital intensity seems to be going against productivity. This finding could be explained by the fact that most plants are still using obsolete and inefficient machinery and equipment.

[Insert Table 6 about here]

Next, I get the predicted value of TFP conditional on the other indicators of firm performance. Below I report the predicted and earlier estimated mean values of log TFP as well as the difference between the two.

Support	Actual TFP	Predicted TFP	Difference
0	3.238	3.300	0.012
1	3.765	3.469	0.237
All	3.419	3.359	0.094

Even a first look at the predicted and actual values of TFP shows differences between the two groups. To statistically validate this observation I use mean t-test (Table 7). First, I can reject the null hypothesis that differences between actual and predicted TFP are the same for two groups. In case of unsupported plants, I cannot reject the null hypothesis that means of the predicted TFP and the actual TFP are the same; whereas for 'supported' group the two means are not equal according to t-test. This results holds even if I control for size of the firm in the counterfactual specification (Table 8). This gives support to my hypothesis that government interventions alter the productivity ranking and, hence, conventionally estimated TFP is likely to be biased in the presence of governmental interventions.

[Insert Table 7 & Table 8 about here]

Primarily the governmental support was given to large exporting firms, however as Figure 4 demonstrates the productivity distribution of supported non-exporting firms is also shifted to the right relative to the unsupported non-exporting group. This result seems to suggest that in this particular case the existing overlap of the two distributions may also be driven by the governmental support to the non-exporting plants.

4 Concluding Remarks

Financial and economic crisis of 2008 saw major government interventions in many developed and developing countries. Many firms and companies received state support in various forms. For example, automotive industry in the US got a major bailout in history since the Great Depression.[25] Current economic crisis re-emphasized the role of the government in the economy, justifying even 'manual' management of the economy. However, in a globalized world, state support in one country may affect economic agents in other countries as well.

In this paper I propose a theoretical model motivated by the statistical analysis of firm performance in Ukrainian manufacturing. Although exporting seems to be on average associated with better firm level outcomes, differences between exporting and non-exporting firms vary across industries. An analysis of productivity distributions for the two groups shows that there exist significant ranges of productivity where the two groups coexist, differently from the clear-cut predictions of the theoretical models. I suggest a political economic explanation to this finding. I build my work on a recent heterogenous firm model developed by Melitz and Ottaviano (2007) adding an electoral competition stage in order to endogenize trade policy. I test the implications of the model on the data for the Ukrainian metallurgical sector, exploiting the fact that I can identify in the Ukrainian legislation the firms that receive some of kind of government support. In line with theoretical prediction, I find that state-owned and larger firms as well as firms with more active voters are more likely to be favored by the government policy. Government intervention is also hypothesized to change productivity distribution that would prevail in a laissez-faire world. I find that conventionally estimated TFP does not seem to capture actual efficiency in the presence of government intervention.

Despite of the fact that the model is motivated by the findings from a transition economy my work can be extended to the case of developed economies as the presence of politically connected firms is a well-documented fact (Faccio, 2006).

Appendix

Stock Portfolio.

If all voters hold balanced portfolio of all firms:

$$w^{iJ} = k^J \sum_{n=1}^{N_E} \alpha^n W^n(s^n) + (\sigma^{iJ} + \delta) V_R \tag{A1}$$

where α^n is the share of firms n's stock in the portfolio and $\sum_{n=1}^{N_E} \alpha^n = 1$

As before:

[25] General Motors and Chrysler received $17.4 billion in federal aid since December 2008. (NYT, "U.S. Lays Down Terms for Auto Bailout",
http://www.nytimes.com/2009/03/30/business/30auto.html

$$W^J(s^J) = \pi_D^J + \pi_X^J - \tau + f(s^J) \tag{A2}$$

Given this assumption the vote share that the party O gets will be again given by:

$$\lambda_O = \sum_J \frac{L^J}{L} t^J \phi^J \left[\sigma^J + \frac{1}{2\phi^J} \right] \tag{A3}$$

The probability of party O's winning of the elections is given by:

$$p_O = \Pr\left[\lambda_O \geq \frac{1}{2}\right] = \frac{1}{2} + \frac{\psi}{\phi}\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[\sum_{n=1}^{N_E} \alpha^n W^n(s_O^n) - \sum_{n=1}^{N_E} \alpha^n W^n(s_R^n)\right]\right] \tag{A4}$$

In equilibrium $s_O^J = s_B^J$.

Trade policy will be determined in equilibrium by:

$$\max_{s_O^J} p_O = \frac{1}{2} + \frac{\psi}{\phi}\left[\sum_J \frac{L^J}{L} t^J \phi^J k^J \left[\sum_{n=1}^{N_E} \alpha^n W^n(s_O^n) - \sum_{n=1}^{N_E} \alpha^n W^n(s_R^n)\right]\right]$$

Where $W^n(s_O^n)$ is given by (2)

$$\frac{L^J}{L}\frac{\phi^J}{\phi}\frac{\alpha^J t^J k^J}{\lambda(L^J)}\frac{\partial f(s_O^J)}{\partial s_O^J} - \frac{L^J}{L}\sum_J \frac{\phi^I}{\phi}\alpha^I t^I k^I = 0 \tag{A5}$$

$$\frac{\partial f(s_O^J)}{\partial s_O^J} = \frac{\lambda(L^J)\sum_J \frac{\alpha^I t^I \phi^I k^I}{N_E}}{\alpha^J t^J \phi^J k^J} \tag{A6}$$

Which is similar to the expression of the base model (9) and has the same implications for the trade policy. However, in addition to the two parameters of the base model, there is also parameter α, the share of stock of a proper plant in the workers' portfolio. The higher this parameters the more "favored" a plant is.

References

[1] Andreyeva, T. (2003) Company Performance in Ukraine: What Governs Its Success, EERC Moscow Working Paper No. 03-01e.

[2] Baldwin, R. (2005) Heterogeneous Firms and Trade: Testable and Untestable Properties of the Melitz Model, NBER Working Paper No. 11471.

[3] Bernard, A., J. Eaton, J. B. Jensen, and S. Kortum (2003) Plants and Productivity in International Trade, *American Economic Review* **93**: 1268-1290.

[4] Bernard, A. and C.I. Jones (1996) Comparing Apples to Oranges: Productivity Convergence and Measurement across Industries and Countries, *American Economic Review* **86**: 1216-1238.

[5] Bernard, A., S. Redding and P. Schott (2007) Comparative Advantage and Heterogeneous Firms, *Review of Economic Studies* **74**: 31-66.

[6] Besedina E. (2008) Heterogenous firms, heterogenous exporters? Universita L. Bocconi mimeo.

[7] Bombardini M. (2008) Firm Heterogeneity and Lobby Participation, *Journal of International Economics* 75: 329-348.

[8] Brander J.A. (1995) Strategic Trade Policy in G. M. Grossman & K. Rogoff (ed.), *Handbook of International Economics*, edition 1, vol. 3: 1395-1455.

[9] Brander, J.A., Spencer, B.J. (1985) Export Subsidies and International Market Share Rivalry", *Journal of International Economics*, Vol. **18**: 83-100.

[10] Brown, D. J., and J. S. Earle (2000) Competition and Firm Performance: Lessons from Russia, CEPR. Discussion Papers No. 2444.

[11] Caldera, A. (2009) Innovation and Exporting: Evidence from Spanish Manufacturing Firms, ECARES Working paper No. 2009-014

[12] Calderon-Madrid A. and A. Voicu (2005) Assessing heterogeneity of plant responses to trade liberalization in Mexico: productivity, job creation and destruction and survival of manufacturing, El Colegio de Mexico mimeo.

[13] Costantini J. and M.J. Melitz (2008) The Dynamics of Firm-Level Adjustment to Trade Liberalization in E. Helpman, D. Marin, and T. Verdier (eds.) *The Organization of Firms in a Global Economy*, Harvard University Press.

[14] Eaton, J., M. Eslava, M. Kugler, and J. Tybout. (2008) The Margins of Entry into Export Markets: Evidence from Colombia. in E. Helpman, D. Marin, and T. Verdier (eds.) *The Organization of Firms in a Global Economy*, Harvard University Press.

[15] Eremenko I. and Lisenkova E. (2002) Impact of Joining the WTO on Ukrainian Ferrous Metallurgy. Subsidies vs. Antidumping, Is There Really a Trade-off?, EERC Working Paper Series, No 05/02.

[16] Faccio, M. (2006). Politically Connected Firms, *American Economic Review* **96**: 369-386.

[17] Grossman, G. M. and E. Helpman (1994) Protection for Sale, *American Economic Review* **84**: 833–50.

[18] Grossman, G. M. and E. Helpman (1994) Electoral Competition and Special Interest Politics, R*eview of Economic Studies* **63**: 265-86.

[19] Helpman, E. (2006) Trade, FDI, and the Organization of Firms, NBER Working Paper No. 12091.

[20] Helpman E., M. J. Melitz and St. R. Yeaple (2004) Export versus FDI with Heterogeneous Firms, *American Economic Review* **94**: 300-316

[21] Irarrazabal A. and L. D. Opromolla (2009) A Theory of Entry and Exit into Exports Markets

[22] Khwaja, A. I, and A. Mian (2005) Do Lenders Favor Politically Connected Firms? Rent Provision in an Emerging Financial Market, *The Quarterly Journal of Economics* **120**: 1371-1411.

[23] Legeida, N. (2001) Implicit Subsidies in Ukraine: Estimation, Developments and Policy Implications, Institute for Economic Research and Policy Consulting, Working Paper No 10

[24] _____ (2002) The Economic Implications of Government Support for the Steel Industry: The Case of Ukraine, Institute for Economic Research and Policy Consulting, Working Paper No 16.

[25] Levinsohn J. and A. Petrin (2003) Estimating Production Functions Using Inputs to Control for Unobservables, *Review of Economic Studies* **70:** 317-342.

[26] Lileeva A. and D. Trefler (2007) Improved Access to Foreign Markets Raises Plant-level Productivity... for Some Firms", NBER Working Paper No. 13297.

[27] Melitz, M.J. (2003), The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, *Econometrica* **71:** 1695-1725.

[28] Melitz, M.J. and G.I.P. Ottaviano (2007) Market Size, Trade, and Productivity, *Review of Economic Studies* **75**: 295-316.

[29] Mitra D. (1999) Endogenous Lobby Formation and Endogenous Protection: A Long Run Model of Trade Policy Determination, *American Economic Review* **89**: 1116-1134.

[30] Muuls, M. and P. Petropoulou (2006) Oranges and Steel - A Swing-State Theory of Trade Protection in the Electoral College, CEP Working Paper No. 1443.

[31] Persson, T. and G. Tabellini (2000) *Political Economics: Explaining Economic Policy*, MIT Press.

[32] Tekin M. (2008) Plant Productivity and the Effect of Exporting: Evidence from Chile, University of Texas at Austin mimeo.

[33] Tybout J. (2003) Plant- and Firm-level Evidence on the 'New' Trade Theories in E. Kwan Choi and James Harrigan, (eds.) *Handbook of International Trade*, Oxford: Basil-Blackwell.

[34] Wakasugi R and A. Tanaka (2009) Firm Heterogeneity and the Choice of Internationalization Modes: Statistical Evidence from Japanese Firm-level Data, RIETI Discussion paper No. 09-E-024

[35] World Bank (2005) Ukraine Trade Policy Study, Report No. 29684

[36] Zelenyuk V. and V. Zheka (2004), Corporate Governance and Firm's Efficiency: The Case of a Transitional Country, Ukraine, IAP Statistics Network, Technical Report No. 0432.

Table 1. Descriptive statistics

Variable	Mean	SD	Obs
Age	64.4	32.5	638
Employees	4121	8824	638
Output	577433	1488634	628
Net sales	623018	1586149	636
Value added	153943	464175	624
Investment	14511.3	52624.8	456
Machinery and equipment	183178	381529	635
Export, % of sales	25.2	28.8	607

Figure 1. Productivity distributions with and without supported firms

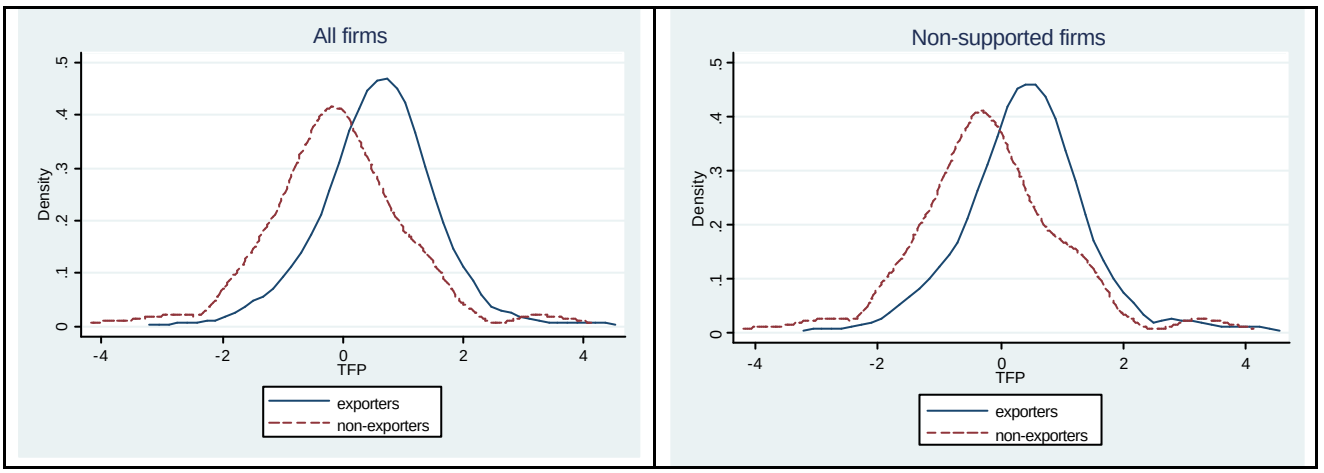


Table 2. Results of t-test on initial productivity for non-exporting firms, by subgroups

	t-stat	p-value
diff = mean(productivity if S=0) - mean(productivity if S=1)		
H_o: diff = 0	-1.6714	0.1044

Table 3. Results of t-test on State Ownership in 2000.

	t-stat	p-value
diff = mean(state-controlled if S=0) – mean(% state- controlled if S=1)		
H_o: diff = 0	-3.0924	0.0027
mean(diff) = mean(state share, % if S=0 – state share, % if S=1)		
H_o: diff = 0	-2.1012	0.0393

Table 4. Results of t-test on voter turnout by subgroups

	t-stat	p-value
diff = mean(turnout if S=0) - mean(turnout if S=1)		
H_o: diff = 0	-3.2207	0.0013

Table 5. Results of t-test on firm size (number of employees) by subgroups

	t-stat	p-value
diff = mean(size if S=0) - mean(size if S=1)		
H_o: diff = 0	-4.2797	0.0001

Figure 2. Kernel density of TFP for exporters and non-exporters in 2000.

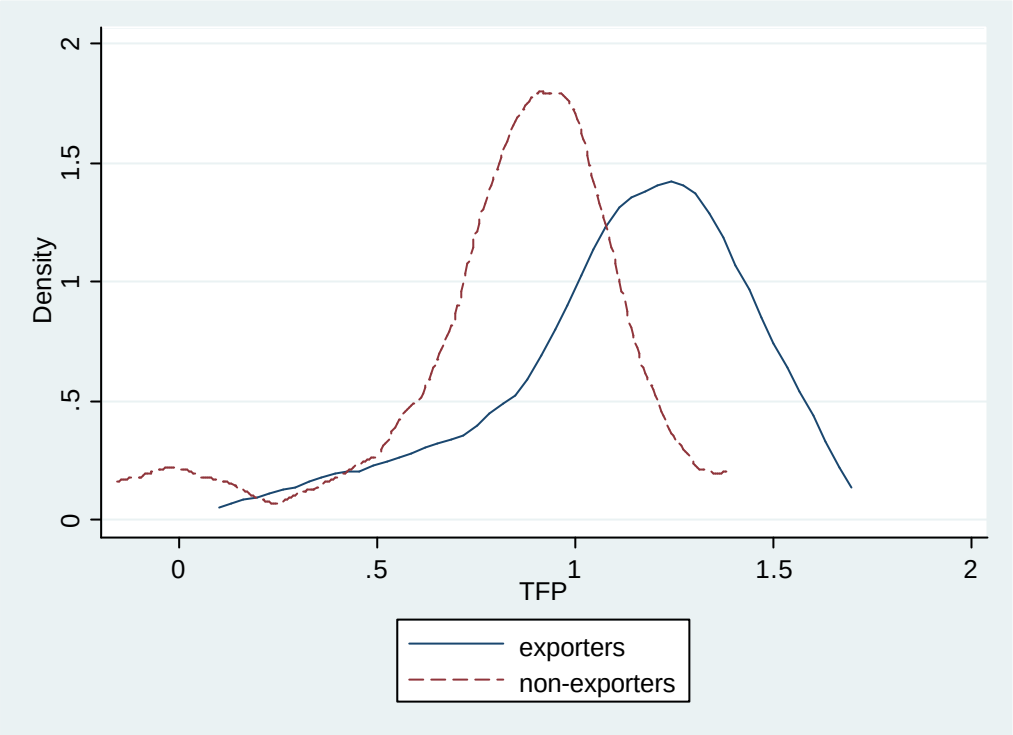


Figure 3. Kernel density of TFP for exporters and non-exporters in 2005.

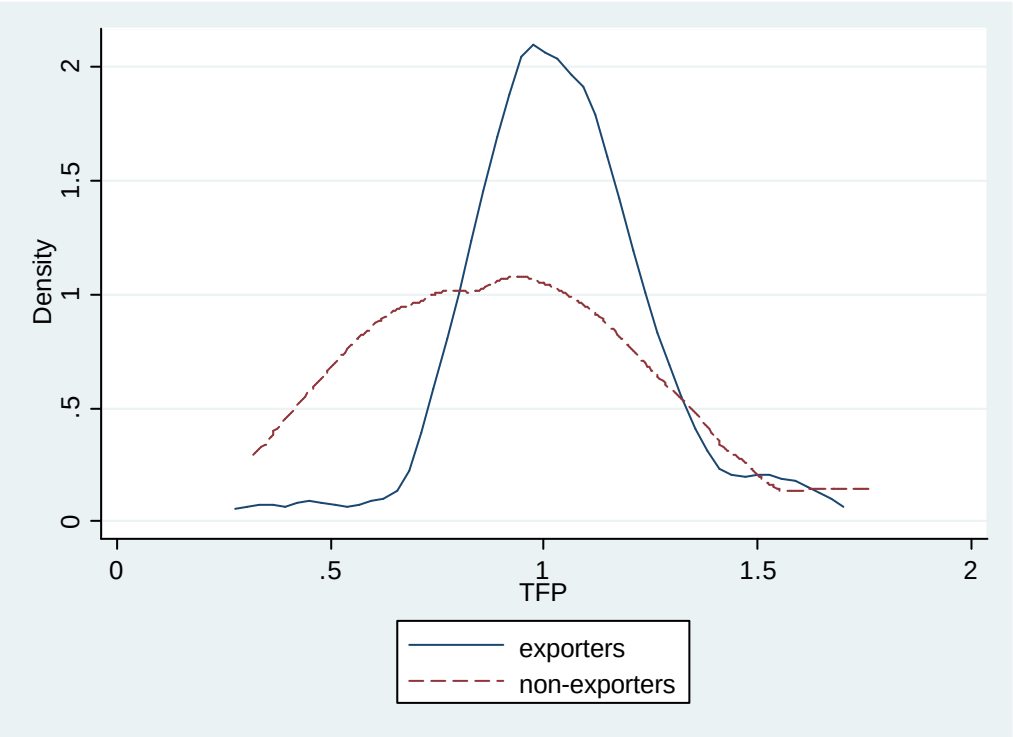


Figure 4. Productivity distribution in Metals for Four Groups of Plants

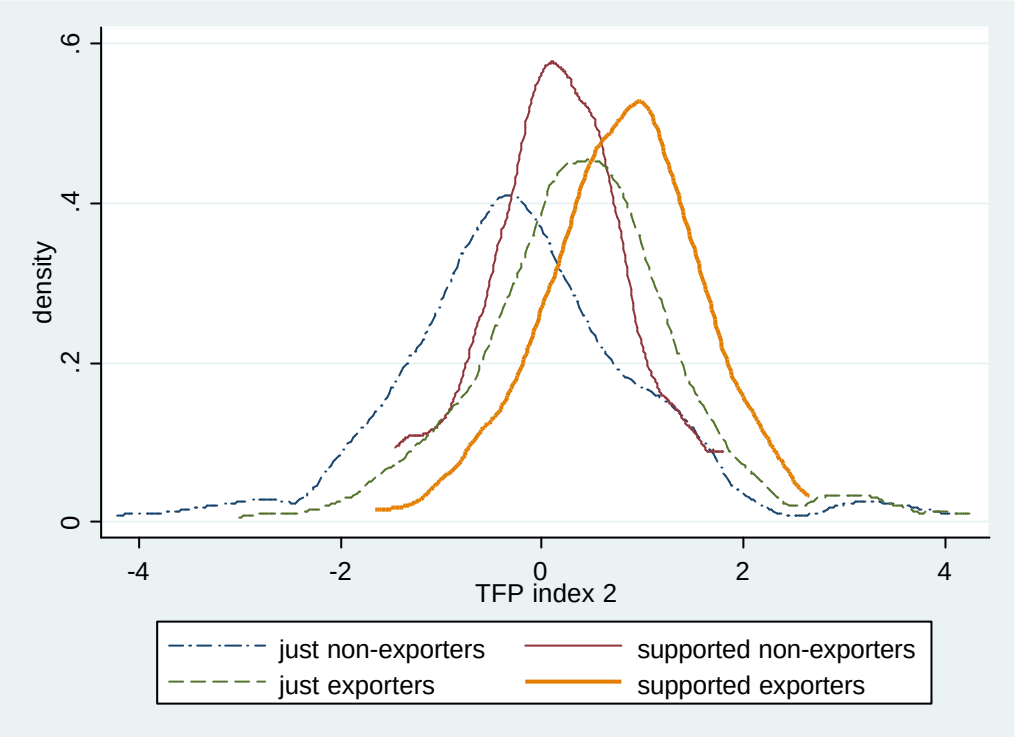


Table 6. Quantile Regression Results for the Unsupported Group of Exporters

	Log TFP	*Log TFP*
Average wage	0.730	0.559
	(0.098)**	(0.127)**
Capital per worker	-0.177	-0.297
	(0.033)**	(0.045)**
Output per worker	0.470	0.445
	(0.042)**	(0.054)**
Profit margin	0.012	0.009
	(0.003)**	(0.004)*
Size		0.140
		(0.028)**
Constant	-6.441	-4.531
	(0.657)**	(0.867)**
Year dummies	Yes	Yes
Observations	164	164
Pseudo R2	0.445	0.468

Table 7. Results of t-test on estimated and predicted TFP by subgroups

		t-stat	p-value
diff = mean(delta S=0) - mean(delta if S=1)			
H_o: diff = 0		-4.4272	0.0000
mean(diff) = mean(actual TFP – predicted TFP)			
H_o: mean(diff) = 0	ALL	3.4567	0.0006
	Unsupported	-0.2514	0.8018
	Supported	5.9208	0.0000

Table 8. Results of t-test on estimated and predicted TFP by subgroups controlling for size

		t-stat	p-value
diff = mean(delta S=0) - mean(delta if S=1)			
H_o: diff = 0		-2.8539	0.0046
mean(diff) = mean(actual TFP – predicted TFP)			
H_o: mean(diff) = 0	ALL	1.3514	0.1773
	Unsupported	-1.3159	0.1900
	Supported	2.7969	0.0060