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# Do privatized and newly created firms have higher levels of productivity? Evidence from Slovenia

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## Introduction

Slovenia's transition to a free market economy has been a relatively painless process. The economy experienced a comparatively short three-year initial recession during which total output fell only 14 percent, the mildest recession among all transition economies except Poland (World Bank, 2002, p. 5). At the onset of transition, Slovenia had the most open economy in Eastern Europe and also the highest per capita GDP.[1] As a part of Yugoslavia from 1945 to 1991, it operated under a system of market socialism and workers' self-management – a quasi-market type economy with flexible prices – instead of central planning, and thus was spared from some of the severe distortions that characterized other socialist economies. And to this day, Slovenia remains the most prosperous, the most export oriented, and conceivably the most western minded economy of the former socialist countries.[2]

The Slovenian government, however, has been surprisingly slow to implement economic reforms. The assets still in the hands of the public sector are vast, with only 50-55% of GDP in private control (World Bank, 1999, p. 102),[3] which is ironic for a country where many of the economic decisions had been decentralized under socialism. Tight restrictions were imposed on foreign participation during privatization (World Bank, 1999, p.83), and the amount of foreign direct investment has not been high.[4] Policy reforms have also lagged behind other Central European transition countries according to various

[1] In 1989 (while still a part of Yugoslavia) Slovenia's exports as a share of GDP were 22.2%, making it "the most open economy in the central and eastern European area." (OECD, 1997, p. 19).
[2] Source: "A tiny nation's giant recovery," *The Banker*,Jan. 1998, 35. With a per capita GDP of $9,810 in 2002, Slovenian per capita GDP is comparable to that of Portugal or Spain, whose respective figures are $10,840 and $11,660. The closest transition country, the Czech Republic, has a per capita GDP of $5,560. Source: World Bank, 2003, pp. 252-253.
[3] This is in stark contrast with countries such as the Czech Republic, Hungary and Slovakia, where the private sector share of GDP in 1997 stood at over 75% (World Bank, 1999, p. 102).
[4] Cumulative FDI as a share of GDP in 1996 stood at 10.8% in Slovenia, compared to 34.3% in Hungary and 12% in the Czech Republic (OECD, 1997, p. 108).

liberalization indices.[5] To its credit, however, the Slovenian government has at least done a good job at implementing sound macroeconomic policies – maintaining fiscal responsibility, curtailing money growth and inflation, etc. (Prasnikar, Svejnar, and Domadenik, 2000). At the same time, many critical questions still remain unresolved. Given the very low ratio of commercial bank credit to GDP, is firm growth and productivity being hampered by a lack of capital?[6] To what extent have factor markets been developed, as measured by firm entry and exit rates? Has the exit of unproductive firms spurred the entry of new ones, and how does the productivity of these firms compare? Are privatized firms more productive than state-owned ones?

This paper analyzes the performance of Slovenian firms over a ten year period. Using panel data from a large sample of Slovenian firms, I find that both privatization and foreign ownership significantly improve total factor productivity, controlling for industry and location specific effects. I also find that, surprisingly, newly created (*de novo*) firms do not have generally have higher total factor productivity, but size effects clearly exist, with larger firms possessing above-average productivity levels. Moreover, high firm turnover rates suggest that an important dimension of the transition process has taken hold in Slovenia – that is, this paper finds clear evidence of factor markets at work.

## 2.) Literature Review

### 2.1) Theory

Recent literature has emphasized the importance of reform policies that encourage entry in stimulating growth and productivity in transition economies (World Bank, 2002;

[5] According to the liberalization index presented by the World Bank (2002), Slovenia slipped from 2nd place on the liberalization index to 6th place, and made the least progress among Eastern European countries apart from those in the former Yugoslavia (p. 14).
[6] See Appendix 1 for a cross country comparison of these rates.

Carlin *et al*, 2001). The case for stimulating the entry and expansion of new firms is strong. In a broad sense, entering firms should raise total factor productivity because they presumably enter the market with a more efficient mix of capital and labor. The hard budget constraints they face, it is argued, create incentives for production and innovation rather than for dysfunctional behavior such as asset stripping or tunneling resources for personal gain (World Bank, 2002, p. 27). Typically smaller in size than incumbents (Richter and Schaffer, 1996), they are ideally poised to create a burgeoning sector of small-scale firms which had been neglected under socialism. Given the structural imbalance in Slovenia prior to its independence, with its heavy focus on manufacturing and heavy industry,[7] entering firms offer the promise of shifting the economic focus to more sustainable and productive sectors. Even in western economies, which have not suffered from such acute structural imbalance in the past, the net contribution to overall labor productivity growth from net entry (entry and exit of firms) typically accounts for between 20 and 40 percent of total productivity growth (Scarpetta *et al*, 2002).

To stimulate the growth of small firms, countries need to liberalize their economies through policies of discipline and encouragement, both of which require the development of functional factor markets. Discipline refers to policies which allow for exit to occur by imposing hard budget constraints and introducing a credible threat of bankruptcy. Discipline thus allows for valuable scarce resources – physical and human capital – to be freed up from unproductive firms and industries. Encouragement refers to policies which allow these resources to be absorbed by more productive firms. The critical link in this process are factor

[7] For example, comparing the sectoral distribution of employment across countries shows that Slovenia, like other Eastern European countries, placed excessive emphasis on industry: the fraction of the labor force employed in manufacturing and mining in 1981 was 42.6% in Slovenia, compared to 43.5% in Hungary, 43.2%

markets, which supply nascent firms with the land, labor and capital they need in order to grow. Obstacles such as high firing costs are detrimental to the functioning of factor markets because they distort the price signals critical for sound economic decisions and optimal allocations. Another influential component of spurring growth, apart from the development of factor markets, is legislation which strengthens property rights and contract enforcement in order to give firms incentives to invest and innovate.

**2.2) Previous empirical research**

While substantial empirical research has been conducted on the productivity of privatized firms compared to their state-owned counterparts in transition economies, research on entering firms has been relatively sparse. Bearing this in mind, I turn to the privatization studies first, and then discuss past research done on productivity.

**2.2.1) Research on privatization**

Research on transition economies in Central and Eastern Europe (CEE) has generally confirmed the posited productivity effects associated with privatization (Djankov and Murrell, 2002).[8] Studies have collaborated this result for various countries, including the Czech Republic (Zemplinerova *et al*, 1995; Claessens and Djankov, 1998), Hungary (Campbell, 2002), Estonia (Jones and Mygind, 2001), Romania (Earle and Telgedy, 2001), Slovenia (Smith *et al*, 1997; Konings and Xavier, 2003), and various cross country comparisons (Claessens *et al.*, 1997; Frydman *et al*, 1998; Carlin *et al*, 2001). For example, in their survey of seven CEE countries, Claessens *et al* (1997) find that total factor productivity growth following privatization increases by about 5 percent per year. Earle and Telgedy (2001) find

in Poland, and 30.7% in Western Europe ("Yearbook of Labor Statistics," ILO Geneva 1981, in Mencinger, 1989).

that privatized firms in Romania had an average growth rate that was 16% higher than state-owned ones, and Jones and Mygind (2001) find this figure to be on the order of 18% in their study of Estonian firms.

As many researchers have pointed out, however, these statistics should be interpreted with caution because of the bias inherent in the selection of firms that are privatized.[9] A high degree of endogeneity – reverse causality – is likely to exist in analyzing firm performance and privatization. Firms that are privatized are not selected at random; instead, their current/prior performance is likely to be a factor in deciding the whether they are to be privatized and, if so, to whom (internal or external investors, for example). In Slovenia, the decision of whether to privatize a firm was strongly influenced by its employees and management (who could purchase its shares at a 50% discount), and it seems that firms with poor prospects would be unlikely to privatize and thus relinquish their right to government financial support (World Bank, 1999).

**2.2.2.) Research on *de novo* firms**

As mentioned above, econometric research on *de novo* firms in transition economies has been relatively sparse, and the results have been mixed as well. In their survey of firms in 25 transition countries, Carlin et al (2001) find that average firm productivity growth was negative in *de novo* firms while it was positive in SOE's and privatized firms. However, they find clear size effects, with positive productivity growth recorded for *de novo* firms in the largest size class.[10] In their study of Russian manufacturing firms, Richter and Schaffer

[8] However, Djankov and Murrell (2000), in their extensive survey of the literature on the topic, also find that the "privatization effect is statistically insignificant in the Commonwealth of Independent States… these results are robust" (p. 4).
[9] See, for example, the discussion of selection bias by Earle and Estrin (1996) or Bevan *et al* (1999).
[10] They mention that this may be the result of endogeneity: "Larger firms may be larger at the time of survey because they grew faster" (p. 11).

(1996) find stronger evidence of positive performance among *de novo* firms. They find that while real output declined by 19 percent among privatized firms in the 1993/94 period, it grew by 4 percent *de novo* firms, a result that was robust regardless of size. This result is confirmed by Berkowitz and DeJong (2001), who find a strong positive relationship between regional entrepreneurial activity and regional economic growth in Russia.[11]

A major problem with most studies on *de novo* firms is that they lack comprehensive and reliable data. For example, in their analysis of *de novo* Russian manufacturing firms, Richter and Schaffer (1996) analyze the performance of 439 firms, of which only "forty-odd" are *de novo.* Because their data comes from a cross-sectional survey, it may suffer from survivorship bias, with results that will tend to overstate the performance of *de novo* firms. The present study thus builds on this body of research by tracking the performance of a comprehensive set of firms over a 10-year time period, essentially capturing the entire transition experience to date.

**2.2.3) Methodology**

Research on firm productivity in transition economies tends to use the following general model: firm performance (Y) is viewed as a function of a variable reflecting some aspect of reforms which may be reflected in the firm (change in ownership, entry, etc. – $X_1$) and a vector of variables which control for other firm characteristics and the amount of inputs used ($X_2$):

$$Y = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \varepsilon$$

A variety of different approaches are used to measure firm performance. These include output levels as captured by revenues (Richter and Schaffer, 1996; Carlin *et al,* 2001),

[11] They use the regional registry of small private enterprises per thousand inhabitants as a proxy for the presence of *de novo* firms, a rather imperfect measure.

value-added (Brown and Earle, 2000), and more financial indicators such as profitability (Belka *et al*, 1995). Some studies apply growth rates of these variables instead of absolute figures (Frydman *et al*, 1999), and many use per worker levels (thus measuring labor productivity instead of total factor productivity). Qualitative measures of these indicators are sometimes used, especially for earlier studies and for those studying the Former Soviet Union (where obtaining accurate data poses more of a challenge). Given the nature of the economies of interest, no measure can be considered ideal, and each has its drawbacks: TFP estimates, for example, inevitably have to deal with inaccurate capital stock estimates, and measures such as profit may fail to capture long-term, sustainable trends in productivity growth.[12]

Explanatory variables in these models generally fall into two categories: those that capture some aspect of reforms (e.g. ownership type) and are of primary interest, and those that control for other enterprise characteristics (e.g. industry) and the amount of inputs used. For the first category, indicators such the percentage of state ownership, dummies for privatization or entry, or levels of market competition/liberalization are used.[13] For the second, levels of inputs – labor, capital, intermediate inputs; dummies for industry, year, region are generally used.

Studies differ markedly in the functional form used to analyze efficiency, reflecting the variety of different dependent and independent variables used and the differing data availability. Studies that estimate production functions tend to employ either a Cobb-Douglas

[12] As Earle and Estrin (1996) contend, "profitability may be a particularly poor measure of behavioral change, certainly so in the short run, because many types of restructuring may impose higher short-run costs and only increase profits in the longer run (even leaving aside the accounting problems which are multiplied in a situation where the accounting system is itself undergoing a transition and few firms are subject to rigorous outside audit)."

[13] A substantial body of research on privatization uses an extensive number of variables to measure various types of private ownership, i.e. dispersed, insider-controlled, institutionally managed, etc. These are not, however, the focus of the research in the present study.

or a translog production function, or both (Djankov and Murrell, 2002; Hrovatin and Ursic, 2002).

**3) Ideal model and data**

At the most basic level, measuring productivity means understanding how effectively firms combine factors of production – most notably, labor and capital – to produce a given level of output. An ideal measure of productivity would consider a broad spectrum of factors – the efficiency of the firm's internal organization, the level of effort put forth by the firm's employees, the technology used in the production process – given the amount of labor and capital used by the firm and the market constraints it faces (Sargent and Rodriguez, 2003). Variations in productivity levels across firms could then form the basis for analyzing the effects of economic policies that alter a firm's incentives or its institutional/competitive environment, taking into consideration differences in the objective difficulties faced by firms because of differing initial conditions (varying levels of asset specificity) and industry or location specific effects.

Total factor productivity (TFP) is a good measure of such overall productivity because it takes into consideration multiple factors of production and is also the best indicator of long-run growth (Sargent and Rodriguez, 2003). Since TFP is a function of inputs (labor, capital, materials) and output, calculating it accurately requires data on the quantity *and* quality of both. For output, this would ideally entail obtaining data on the real resource costs of production, where the price of output equals its marginal cost. Ideally, the value of the capital stock would be based on the market value of the capital stock (as opposed to the historical

cost valuation, which is based on a rather arbitrary accounting).[14] The quality of the labor force would be another important consideration, one which would consider the education, tenure, quality of job match of the employees, as well as more subtle aspects such as the degree of firm-specific human capital.

Having calculated each firm's TFP, we would then attempt to attribute variations in TFP levels to the following factors:

- the prevailing managerial and worker incentives – determined by ownership type (public or private; insider vs. outsider controlled) and the hardness of budget constraints,
- outside environment/institutional setting – the existence of functional labor and capital markets which facilitate restructuring and investment (determined by the development of factor markets), which may very well vary by sector and location,
- industry-specific factors – varying levels of asset-specificity that would influence the ease of restructuring (a proxy for differing initial conditions), the nature of the production process and the level of available technology.

Several more points are on order. The ideal dataset would comprise of a panel of firms so as to avoid survivorship bias – we would expect a small firm to be less likely to survive a negative shock than a large firm, and thus cross-sectional data would tend to exaggerate performance of new firms compared to the generally larger state-owned and privatized ones (Richter and Schaffer, 1996). The ideal data source is difficult to pinpoint: on the one hand, survey data may suffer from selection bias because any firm which is willing to be interviewed and reveal its financial records is likely to be of above-average integrity (Belka et

[14] Moreover, a problem with using capital stock data in the context of transition is that "managers of a still state owned firm may have an interest in reducing the reported value of capital in order to lower the price at which

al, 1995), but government statistical data may be equally suspect because firms have an incentive to conceal their true financial performance for tax-avoidance purposes. Government data may be especially problematic for studies of the generally small *de novo* firms, because many business units that should be considered *de novo* firms may be in the informal sector and thus not registered at all.

## 4.) Actual data and model

### 4.1) Actual data

The actual data used in this study cover a comprehensive panel of Slovenian firms from 1991-2001. The data include all registered legal businesses during the 1991-2001 observation period and, as can be seen in Appendix 1, cover between 73 to 84 percent of the total employment in Slovenia (coverage is not complete because public institutions and NGO's are excluded from the dataset). For each firm and year it was in operation, the following variables can be calculated:

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they would purchase the firm" (Claessens and Djankov, 1997, p.11).

| Variable | Basis for calculation | Values taken by variable | Data source |
|---|---|---|---|
| Output | revenues plus net change in inventories, where applicable | Positive integers | Agency of the Republic of Slovenia for Public Statistics and Services Accounting Register |
| number of workers employed[a] | Number of hours worked based on yearly number | Positive integers | |
| Capital[a] | value of tangible fixed assets based on historical cost accounting | Positive values | |
| Materials | cost of goods sold, where applicable | Positive integers | |
| Industry | Slovenian activity codes | Dummies for agriculture, manufacturing, utilities, construction, trade, hotels and restaurants, FIRE, and other services. | |
| Location | Urban or Rural location | Dummy if rural | |
| Ownership type | State or Private (includes foreign and domestic ownership) | Dummy if majority private-owned | Statistical Office of Slovenia Business Register |
| Foreign ownership | Capital origin | Dummy if majority foreign-owned | |
| Mixed ownership | Capital origin | Dummy if partially foreign owned | |
| Entry | Firm data (7-digit firm identifiers) | Dummy if firm exits between 1992 and 2001 | Own calculations |
| Exit | Firm data (7-digit firm identifiers) | Dummy if firm enters between 1992 and 2001 | |
| Herfindahl index[b] | Slovenian activity codes and data on output | 0 (perfect competition) to 1(monopoly) | |
| Overall firm turnover rate[c] | Slovenian activity codes and data on entry, exit | 0 (no entry or exit) to 2 (all firms enter and exit) | |

Note: Because not all firms were in operation for entire year, output and materials were adjusted for the number of months firm was in operation (data thus represent simulated yearly data). Data on output, materials and capital were deflated based on the respective deflators from the Statistical Office of Slovenia price index reports (1991-2001). The identifying variables used to merge data from different sources were a universal 7-digit firm identifier and the relevant year.

[a] A large number of companies with no employees or capital existed in the early 1990's as more liberal legislation made it easy to establish a new company (Hrovatin and Uršič,, 2002). These companies were fictitious; they never *de facto* performed business operations, but rather were established for tax-avoidance purposes. As such, they were excluded from the data.

[b] The Herfindahl index measures the degree of competition based on the output shares of firms. It is defined as

$$\text{Herfindahl} = \sum_{j=1}^{n} S_j^2$$

where $S_j$ is the share of firm j in sectoral output in the sample of n firms in the sector. Two-digit sectors are used to define the respective market (they are based on the Slovenian classification, but are roughly analogous to two-digit SIC classifications).

[c] Following Scarpetta *et al* (2002), the overall firm turnover rate is defined as the sum of the entry and exit rate, where the entry rate is the number of new firms divided by the total number of incumbent and entrant firms in a given year, and the exit rate is the number of firms exiting the market in a given year divided by the incumbents in the previous year.

The data suffer from several problems. The capital stock is measured by historical cost instead of its market value, a significant problem given Slovenia's socialist legacy. The data on labor are also crude, measuring only the number of workers employed without regard to their quality. The accuracy of government data is suspect because of the incentive problems discussed earlier. Moreover, like most other studies on entry that are based on statistical records, no distinction can be made "between new-startups and small firms that emerge from restitution, spinoffs from state-owned enterprises, or other forms of privatization" (Brada, 1996, p. 75). Finally, the valuations of output and material inputs originate from markets where monopoly and monopsony power is likely to exist – as an emerging/transition market economy that still needs to further liberalize its markets, significant (although decreasing) monopolistic markups are likely to exist throughout the economy. As a result, interpreting estimates of TFP can be problematic because they may reflect markups due to imperfect competition instead of actual productivity levels (Basu and Fernald, 1995). We may thus mistakenly attribute to productivity increases what is in fact caused by increases in market power.

Fortunately, at least the latter problem can be partially corrected. If we include measures of sector-level competition in the model, we can control for increases in revenues that result from imperfect competition and thus attempt to capture the real resource costs of production. Two indices are used for this purpose. The first – the Herfindahl index – is widely used (see Earle and Estrin, 1996, for example) and captures the degree of firm market power by measuring output shares in respective 2-digit industries. However, this measure

does not address an important problem – that is, that similar levels of sectoral concentration may be associated with differing levels of competition because of the problem of defining the appropriate geographic market (for example, a grocery store's market is much more restricted than that of a manufacturing plant). For this reason, a second measure of competition – the overall firm turnover rate – is used. This measures the fraction of firms which exit and enter a certain sector in a given year, and as such proxies the degree to which markups from imperfect competition induce market entry.[15] Since the Yugoslav economy was, by Western standards, characterized by low levels of competition,[16] a lack of entry indicates high barriers to entry (e.g. high sunk costs or continued government subsidies to incumbents). In the absence of entry, firms can thus be posited to possess market power. Moreover, firm exit can also be seen to be strongly tied to competition because a hostile, competitive environment is more likely to produce bankrupt firms. The firm turnover rate is thus an excellent proxy for capturing sector-level competition, one that will ensuring that markups from imperfect competition do not bias TFP estimates.[17]

**4.2) Actual model**

The actual model used in this study follows Brown and Earle (2000) in using the log of value-added as the dependent variable. In order to calculate total factor productivity, the

[15] According to the theory of contestable markets, the threat of entry – and not necessarily actual entry – should be the relevant consideration in determining market power , implying that actual firm turnover rates may insufficiently measure a firm's market power. That is, "oligopolistic structure and behavior are… determined by the pressures of *potential* competition" (Baumol, 1982, p.2). As a result, "a history of absence of entry in an industry and a high concentration index may be signs of virtue, not of vice" (p. 14). However, this is true only under the assumption of negligible entry costs, an implausible proposition in the case of a transition country such as Slovenia.

[16] A 1990 OECD economic report on Yugoslavia notes that "the institutional set-up has encouraged vertical integration and oligopolistic behavior in the context of regional autarky" (p. 41). "Barriers to entry applied not only to private business but also to socialized companies if this threatened the regional or local monopoly of large conglomerates" (p. 42).

[17] Despite its benefits, even the overall firm turnover rate does not consider competition from imports, which can be an important factor in determining competition levels (Earle and Estrin, 1996) and also a drawback given the openness of Slovenia's economy.

following functional form is used (expected signs of the independent variables are in parentheses):

$$Y_{i,t} = \beta_0 + \beta_1 \cdot \underset{(+)}{\text{labor}_{i,t}} + \beta_2 \cdot \underset{(+)}{\text{capital}_{i,t}} + \beta_3 \cdot \underset{(+/-)}{\text{industry}_{i,t}} + \beta_4 \cdot \underset{(-)}{\text{location}_{i,t}} + \beta_5 \cdot \underset{(+)}{\text{private ownership}_{i,t}} +$$
$$\beta_6 \cdot \underset{(+)}{\text{foreign ownership}_{i,t}} + \beta_7 \cdot \underset{(+)}{\text{mixed ownership}_{i,t}} + \beta_8 \cdot \underset{(+)}{\text{entry}_{i,t}} + \beta_9 \cdot \underset{(-)}{\text{exit}_{i,t}} + \beta_{10} \cdot \underset{(+/-)}{\text{competition}_{i,t}} + \beta_{10} \cdot \underset{(+)}{\text{year}} + \varepsilon$$

where the firm is the unit of observation and $Y_{i,t}$ is the log of value-added (output minus material inputs) for firm *i* at time *t*, capital and labor measure the log of capital and labor, respectively, and the other variables are as described in §4.1. Competition is measured using either the Herfindahl index or the overall firm turnover rate.

Before presenting the results, it is important to clarify the expected signs of the independent variables. The sign of the coefficients on capital and labor are expected to be positive, since higher levels of inputs should lead to higher levels of output. The expected signs for the industry variables are uncertain – the industry dummies are included mainly to control for industry-specific effects such as the degree to which asset-specificity may impede restructuring (Krueger, 2004, p. 277). The sign on the location dummy is expected to be negative – rural firms are expected to have lower levels of productivity. They presumably have less competitive factor markets, and thus the prices that should serve as signaling devices are likely to be more distorted, leading to less of an impetus to restructure and to lower productivity (Krueger, 2004, p. 278).[18] Private, foreign and mixed ownership, as well as the dummy for *de novo* firms, are all expected to have positive signs because of the above-described positive productivity effects. The sign on the exit dummy, equal to one if a firm

[18] Another reason for this expected sign is that most of the urban firms are in the capital city of Ljubljana, leading to what Ellman (1994), citing Mario Nuti, describes as the capital city effect: "The government, worried about the political consequences of unemployment in the capitol, are more liberal with subsidies for enterprises in the capital than for those far from it" ( p.11).

will exit the market by 2001, is expected to be negative because bankrupt firms are presumably more inefficient and uncompetitive.

The expected sign for the competition variables is less certain. Increased competition would most likely lead to not only to increased productivity, but also to a concurrent decrease in a firm's ability to markup the price of its product.[19] If the gains from increased productivity exceed the lost revenue from more competitive pricing, then we would expect the relationship between competition and TFP to be positive. If this were the case, we would expect the sign for the Herfindahl index to be negative, since increased sectoral concentration should be associated with lower levels of productivity, and the sign for overall firm turnover should be positive, since increased entry/exit should raise productivity. Finally, the expected sign on the year variable is positive, since we would expect the restructuring associated with transition to yield productivity gains with time.

**5) Regression results**

Table 2 presents the results of the regressions using the log of value added as the dependent variable. Regression 1 includes the Herfindahl index to account for potential markup arising from imperfect competition and Regression 2 uses the overall firm turnover rate for this purpose. The specifications in Regression 3 are identical to those in Regression 2, but only firms with more than 30 employees are included in the regression.[20]

[19] Increased competition may also be accompanied by decreased productivity in the short-run, as incumbents are forced to restructure to adjust for overcapacity or to increase their product assortment.

[20] F-tests show that for the first two specifications (which include variables on institutional/reform characteristics) are superior to the basic specification that only uses the variables for capital, labor, industry and location. The F-statistics for regressions 1 and 2 are 926 and 1134, respectively, compared to a 2.51 critical value (1% level of significance) for both tests . Thus, the null hypothesis that the regression coefficients of the dummies on ownership, entry/exit, and competition are jointly zero is soundly rejected and the extended models recognized as superior.

Table 2: Explaining variations in Total Factor Productivity in Slovenia, 1991-2001
Dependent variable is Log(Value Added)

| | Regression 1 | Regression 2 | Regression 3 (including only firms with more than 30 employees) |
|---|---|---|---|
| Constant | -11.040 | -54.148 | -87.656 |
| | (-6.8) | (-28.4) | (-19.5) |
| Log(Labor) | 0.793 | 0.788 | 0.779 |
| | (355.2) | (354.8) | (133.4) |
| Log(Capital) | 0.212 | 0.217 | 0.189 |
| | (165.0) | (168.7) | (62.4) |
| Location | -0.109 | -0.133 | -0.150 |
| | (-22.9) | (-27.8) | (-15.1) |
| Private | 0.070 | 0.079 | 0.071 |
| | (9.0) | (10.2) | (6.4) |
| Foreign | 0.436 | 0.423 | 0.281 |
| | (32.9) | (32.0) | (9.6) |
| Partial | 0.306 | 0.294 | 0.270 |
| | (29.3) | (28.3) | (13.1) |
| Entry | -0.057 | -0.046 | 0.120 |
| | (-10.9) | (-8.9) | (12.0) |
| Exit | -0.362 | -0.374 | -0.253 |
| | (-58.9) | (-61.2) | (-21.0) |
| Herfindahl index | -0.337 | – | – |
| | (-9.5) | | |
| Overall firm turnover | – | 0.826 | 0.240 |
| | | (43.4) | (6.3) |
| Year | 0.009 | 0.030 | 0.047 |
| | (10.4) | (31.5) | (20.8) |
| Adjusted R-squared | 0.7443 | 0.7466 | 0.734 |
| F-Statistic | 52673.47 | 53311 | 4747 |
| SSR | 157407 | 156000 | 6775 |
| Sample Size | 199,034 | 199,034 | 18,937 |

Note: Test statistics are in parentheses. All coefficients are statistically significant at the 1% level. All regressions include 12 industry dummies, which are excluded from the table.

Looking at Regression 1, the most surprising feature is the negative coefficient on *de novo* (entering) firms: converting the coefficients from log points to percentages, these firms have a 5.5% lower productivity level compared to Slovenian firms in general.[21] Also interesting is the strikingly high coefficient on foreign ownership: majority foreign-owned firms have a 54.7% higher productivity level than firms in general, while this figure amounts

[21] Percentage figures are calculated as $e^{-0.057} - 1 = -5.5\%$, for example.

to only 7.3% among majority privatized firms.[22] Partially foreign-owned firms also have markedly higher productivity – 35.8% above the average level. Location has a relatively strong effect, one that is even stronger than that of privatization, with rural firms having productivity that is 10.3% below the level of urban ones. Not surprisingly, exiting firms have significantly lower levels of productivity, 30.4% below the level of other firms.[23] The negative sign on the effect of the Herfindahl index indicates that competition does indeed have a positive effect on productivity because the increases in TFP outweigh the decrease in revenue associated with lower pricing.[24] The year variable indicates a slow increase in TFP over time.

Replacing the Herfindahl index with the overall firm turnover rate (Regression 2) does not significantly affect the results of the regression. Adjusted R-squared increases slightly, indicating that the fit of the regression is slightly better. The only major difference is the change in the year coefficient, whose magnitude increases by more than 3 times, indicating that TFP increases from year to year may be greater than Regression 1 suggests. The coefficient on overall firm turnover is positive, as expected, corroborating the results of the Herfindahl index variable in the regression and indicating that higher levels of competition are associated with higher productivity.

In order to test the hypothesis that size effects may exist, Regression 3 analyzes data on firms with more than 30 employees. In contrast to the previous to models, this one finds

[22] Note that foreign ownership and state-ownership are not mutually exclusive – the state has a share in roughly 10 percent of firms with foreign ownership. The coefficients therefore measure differences between foreign owned firms and Slovenian firms in general and not merely productivity differences between domestic-private or domestic-public vs. foreign firms.

[23] This statistic is likely to be biased upward (overstating the productivity of exiting firms), as some firms may have exited soon after 2001, but our data do not permit us to distinguish these from non-exiting firms.

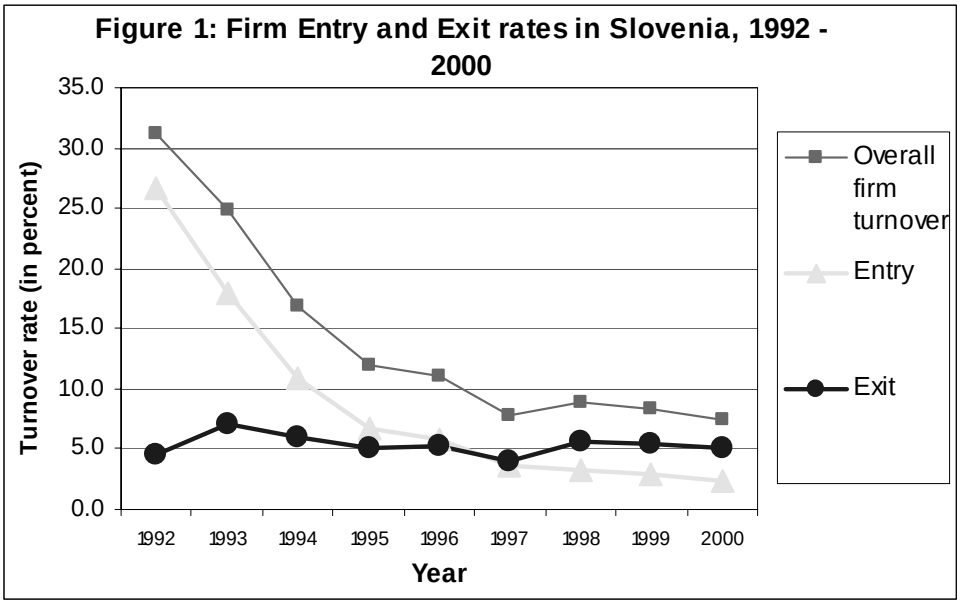
[24] Interpreting the magnitude of the coefficient is difficult for the reasons discussed above. Roughly speaking, however, a firm in a perfectly competitive sector is 28% more productive than a firm in a monopolized one (this under the rather unlikely assumption that markup is independent of the level of competition).

that entering firms have *above* average levels of productivity, with TFP that is 12.7% higher on average, even higher than that attributed to private (incumbent) firms. This result may be due to the endogeneity of size (Carlin *et al*, 2002), but its implications could also be more profound. It may indicate that *de novo* firms lack the opportunity to attain efficient scales of production, either due to institutional constraints or because of a lack of working capital.

An interesting result of the regressions is that in Regression 1 and 2, the coefficients on labor and capital – which measure output elasticities – add up to one (1.005 to be precise), indicating constant returns to scale. In Regression 3, however, the elasticities of output with respect to labor and capital add up to 0.968, indicating decreasing returns to scale. As a whole, the economy is thus experiencing the constant returns to scale associated with long-run equilibrium. However, while larger firms are experiencing decreasing returns to scale, smaller ones could reap productivity gains from capital deepening.

**6.) Entry and exit rates**

As mentioned above, the data permit us to calculate rates of firm entry and exit by sector. The actual rates themselves warrant further discussion because they illustrate the degree to which factor markets are operational in Slovenia. And as Krueger (2003) contends, factor markets are a particularly important aspect of transition because the price mechanism they provide serve as signaling devices to gauge opportunity costs, and as such promise to correct the distortions that socialism inflicted on the economy. That is, factor markets enable an economy to "reallocate resources from low productivity sectors and firms to firms and sectors that are more productive," (Krueger, 2003, p. 5) an important function given the necessity of structural reorganization in transition economies.




As is evident from Figure 1, overall firm entry rates in Slovenia were very high at the onset of transition. This is a very important result, as it indicates high levels of restructuring early on in transition, when it was most necessary. Since 1997, entry and exit rates have tapered off, but are still roughly comparable to those of OECD countries in the same time period – as can be seen in Appendix 3, the overall firm turnover rate in this period averaged 8.1 percent in Slovenia and 12.8 percent in western countries.

## 7.) Conclusion

This paper finds evidence of positive trends in the productivity of Slovenian firms. The results suggest that private firms, and especially firms with foreign ownership, have significantly higher total factor productivity levels *vis-à-vis* their entirely state-owned counterparts. Entering firms have had below average productivity when taken as a whole, but there is evidence that they may have been hindered by a lack of capital with which to expand their operations, as larger *de novo* firms have proven their superior productivity. Employing a

hitherto unused proxy for competition, the overall firm turnover rate, I also find tentative results that competition has a positive effect on firm productivity.

The results have several policy implications. First, they provide a solid case for liberalizing capital flows in order to increase the presence of foreign capital in Slovenia, which would provide both the beneficial ownership effects of foreign firms (a result corroborated by this study) and increase the accessibility of capital to nascent *de novo* firms.[25] Second, privatization should be carried further, as the state's presence in economic activity remains unusually high, even for a transition economy. Third, firm entry and exit should be further encouraged, as the initially high rates of firm entry and exit have tapered off significantly. Moreover, the adoption of legislation conducive to entry and exit should be expedited, as Slovenia is lagging behind other transition countries in many respects (see Appendix 4).

More work needs to be done on aggregate productivity gains reaped from firm entry and exit in order to gauge the degree to which these contribute to economic growth. While this study has shown that the contribution of individual privatized firms is positive, the aggregate effect of these firms on GDP growth should be the subject of further research. Moreover, the hypothesis that *de novo* firms in Slovenia have been hindered by a lack of capital should be further explored.

[25] The political prospects for this to occur are promising, as Slovenia's pending accession to the European Union in May 2004 will likely be followed by significant capital market liberalization.

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**Appendix 1: Commercial bank lending as a percentage of GDP**

| Country | 1994 | 1996 |
|---|---|---|
| Slovenia | 23.2 | 14.5 |
| Comparison transition countries: | | |
| ▪ Czech Republic | 95 | 75 |
| ▪ Hungary | 63 | 27 |
| ▪ Poland | 33 | 20 |
| ▪ Russia | 13 | 13 |
| Developed economies: 120-130 percent | | |

Source: Prasnikar, Svejnar and Domadenik (2000)

**Appendix 2: Comparison of sample employment with official employment**

| Year | Number of firms in sample | Total employment in sample firms | Official employment in formal sector | Percentage of actual employment in sample |
|---|---|---|---|---|
| 1991 | 13,836 | 599,050 | 713,115 | 84.0% |
| 1992 | 21,046 | 525,600 | 658,922 | 79.8% |
| 1993 | 28,975 | 484,350 | 629,016 | 77.0% |
| 1994 | 32,723 | 475,880 | 605,496 | 78.6% |
| 1995 | 34,997 | 485,841 | 594,394 | 81.7% |
| 1996 | 36,939 | 467,851 | 581,106 | 80.5% |
| 1997 | 37,800 | 457,919 | 593,086 | 77.2% |
| 1998 | 38,454 | 455,278 | 591,653 | 77.0% |
| 1999 | 38,427 | 455,594 | 606,982 | 75.1% |
| 2000 | 38,056 | 454,897 | 615,493 | 73.9% |
| 2001 | 37,210 | 457,455 | 626,444 | 73.0% |

Source: Statistical Yearbook of the Republic of Slovenia, various years; own tabulations.

**Appendix 3: Cross country comparison of firm turnover rates, 1997-2000**

| | Entry rate (%) | Exit rate (%) | Overall Firm Turnover |
|---|---|---|---|
| Slovenia | 3 | 5.1 | 8.1 |
| | | | |
| Comparison Countries: | | | |
| Belgium | 4.8 | 5.9 | 10.7 |
| Denmark | 6.4 | 6.3 | 12.7 |
| Finland | 5.9 | 6.5 | 12.5 |
| Italy | 6.4 | 6.4 | 12.8 |
| Netherlands | 6.6 | 6.2 | 12.8 |
| Portugal | 7.2 | 6.2 | 13.3 |
| Spain | 7.4 | 6.8 | 14.2 |
| Sweden | 5.3 | 5 | 10.3 |
| United Kingdom | 6.9 | 9.1 | 16 |
| Comparison country average | 6.3 | 6.5 | 12.8 |

Source: OECD, own calculations.

**Appendix 4: Indications of legislation conducive to fluid factor markets**

| **Indicator** | **Slovenia** | **Former socialist countries** | **OECD** |
|---|---|---|---|
| Starting a business indicator (number of procedures required to start a business) | | | |
| Number of procedures | 10 | 10 | 7 |
| Duration (days) | 61 | 47 | 30 |
| Cost (% of GNI per capita) | 15.5 | 21.7 | 10.2 |
| Minimum Capital (% of GNI per capita) | 89.1 | 114.0 | 61.2 |
| Closing a Business indicator | | | |
| Actual time (in years) | 3.7 | 3.2 | 1.8 |
| Actual cost (% of estate) | 18 | 15 | 7 |
| Goals of Insolvency Index | 41 | 51 | 77 |
| Hiring and Firing workers indicator | | | |
| Flexibility of Hiring Index | 53 | 51 | 49 |
| Conditions of Employment index | 84 | 82 | 58 |
| Flexibility of Firing Index | 41 | 39 | 28 |
| Employment laws index | 59 | 57 | 45 |

Source: World Bank, 2003.