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ABSTRACT

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We use enterprise data to analyse and contrast the determinants of enterprise performance in China and Russia. We find that in China, enterprise growth and efficiency is associated with rapid increases in factor inputs, but not correlated with ownership or institutional factors. However, in Russia, enterprise growth is not associated with increases in factor quantity (except for labor) or quality. The main determinants of company performance are instead demand and institutional factors at a regional level. We explore possible interpretations of these results, including the impact of institutional and managerial quality.

JEL Classification: D23, L22, O12, P31

Keywords: enterprise performance, privatization in Russia and China

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1. Introduction

There has been a marked contrast in national economic performance between Russia and China since each embarked on the path of transition from socialist planning. China's GDP per capita has increased by 8% per annum between 1978 and 2000, while Russian GDP had fallen to 64% of its 1990 level by 2000, with output declining in seven years of the ten, though there has been fast growth in the past four years (see EBRD (2004)). When comparing the explanations offered by different analysts, we note that they have cited preconditions, notably the low level of industrialization in China (see Sachs and Woo, 2000); policy frameworks – gradualism in China as against "big bang" policies in Russia (see Jefferson and Rawski, 1994); and policy sequencing i.e. delayed rather than immediate privatization in China but not Russia (see Stiglitz, 1999, Nellis, 2000). In this paper, we use two broadly comparable surveys of enterprise data to analyse the determinants of company performance in China and Russia, in a manner that throws light on these broader issues.

There are a number of factors likely to contribute to growth in relatively less developed economies transforming from central planning to markets. The first is the transfer of factor inputs from lower to higher productivity uses. In the case of less industrialised economies, such as China, much of that transfer might take the form of labor shifts from agriculture to industry and industrial capital accumulation. In Russia, with "over-industrialization" and a pre-transition domestic relative price structure inconsistent with world prices (see Ellman, 1989), factor reallocation could take the form of capital and labor flows to sectors of international comparative advantage (see World Bank, 1996, Svejnar, 2002). At the same time, the price and foreign trade liberalisation elements of a transition program are likely to lead to enhanced competition, which, as Nickell (1996) has argued, might act to increase total factor productivity (TFP). Ownership changes could also enhance enterprise performance (see Vickers and Yarrow, 1988; Megginson and Netter, 2001), though, as Djankov and Murrell (2002) report, the results for the transition economies are not so clear cut because the ownership forms which emerged post-privatization were too dispersed, and because the legal

and institutional environment was not always sufficiently well developed to guarantee that private ownership enhanced performance (see also Estrin, 2002). This latter finding suggests that institutional factors – political, legal, regional and industrial – may also play a significant role in determining company performance, especially in countries as regionally diverse as Russia or China (see Granick, 1990, Tsui, 1996, Qian, 2003).

In this paper, we explore the impact of these determinants of enterprise growth in random panels of firms in Russia and China. The study is based on a largely common survey instrument with the questionnaire designed to yield information about competition, technology, ownership and managerial activity, as well as concerning institutions and factor inputs. The strength of the study is that it permits us to contrast the determinants of enterprise growth in these very different economies. Our findings are for the most part consistent with those in the separate large literatures on enterprise performance in Russia[1] and China,[2] but we obtain additional insight from the estimation of similar equations, and the resulting comparisons of growth determinants. We find that, in China, enterprise performance is associated with rapid increases in factor inputs but is not significantly affected by ownership or institutional factors. In contrast, sales growth in Russia is not driven by improvements in factor quantity (except for labor) or quality and privatization to outsiders is not found to improve performance relative to insider owned firms. Though our equations are based on similar data sets and provide an equivalent level of fit in Russia and China, the main determinants of sales growth is found to be increases of factor inputs in China but demand and region-specific factors in Russia.

[1] See for example Blasi, Kroumova and Kruse (1997), Earle, Estrin and Leschenko (1996), Estrin and Wright (1999).

[2] See for example Jefferson and Rawski (1994), Li (1999), Jefferson, Rawski and Zheng (1996), Woo (1994), and Jefferson, Rawski and Zheng. (2000).

[3] This discussion is necessarily brief and summarises two large literatures (see e.g. Byrd, 1991 World Bank, 1996, Boycko, Shleifer and Vishny, 1995, EBRD, 1999, Groves, Hong, McMillan and Naughton, 1994, 1995, Granick, 1990, Jefferson and Rawski, 1994, Lau, Qian and Roland, 2000).

The remainder of the paper is structured as follows. In the next section we outline our hypotheses, taking into account both economic theory and the particular institutional environment of Russia and China. The resulting estimation framework is presented in third section, along with the datasets. The basic findings are presented in the fourth section and some simple attempts to deepen our interpretation of the findings is contained are in the fifth, before moving on to conclusions.

2. The Determinants of Enterprise Growth in Russia and China

In this section, we outline the conceptual framework and outline the hypotheses implied by the Chinese and Russian historical and institutional environments. Our approach is based on estimation of augmented production functions using data from Russian and Chinese firms. We assume that the technology of each firm, *i*, can be represented by,

$$Y_i = A_i L_i^{\alpha} K_i^{\beta} \qquad (1)$$

where Y measures output, L is labor, K is capital, and A is the "technology" parameter. Output (value added) data is scarce and typically of poor quality in transition economies, so, with other analysts in the field, (see e.g. Frydman, Gay, Hessel and Rapaczynski, 1999), we have used sales (S), where

$$S_i \equiv P\, Y_i = P A_i L_i^{\alpha} K_i^{\beta} \qquad (2)$$

and P is the product price of the good being produced. The price is determined by net demand in the relevant market and the competitive structure of that market, i.e.

$$\mathbf{P = P(Q, C)} \qquad (3)$$

where Q is net demand in the industry and C is a measure of competition.

Because the transition process is essentially one of change, our analysis is focused towards growth of sales; levels of output or input in transition economies are often determined by historical or institutional factors of limited relevance in the new market environment. Hence, denoting time differences by a dot,

$$\dot{S}_i = \dot{P}(\ )\dot{A}_i \dot{L}_i^{\alpha} \dot{K}_i^{\beta} \qquad (4)$$

This framework categorises the determinants of sales growth into three groups: changes in product price (itself a function of net demand and market structure changes); changes in factor inputs (L and K) including changes in factor quality; changes in A- total factor productivity - which, in the transition context, may be particularly affected by ownership structures (see Frydman, Gray, Hessel and Rapaczynski, 1999, Djankov and Murrell, 2002).

To sharpen the hypotheses, we must briefly compare the two economies at the point of transition (1978 and 1991 respectively) and beyond, to establish points of similarity and difference.[3] China and Russia both embarked on their transition paths from more or less unreformed systems of central planning,[4] though Chinese planning was never so complete as Russian, and operated through regional structures rather than industrial ministries (see Qian, Roland and Xu, 1999). The Chinese economy therefore suffered, within the almost entirely state owned industrial sector, from similar problems of incentives, soft budget constraints and inadequate information, with well-known negative implications for company efficiency, innovation, and growth (see e.g. Ellman, 1989). Indeed, in Russia at the time when transition

[4] In contrast, for example, to Hungary or Yugoslavia (see Fischer and Gelb, 1991).

began, there was an almost total absence of the institutional and legal infrastructure necessary for the operation of competitive markets (see Commander, Fan, Schaffer, 1996, Blanchard and Kremer, 1997).

However, there were also very marked differences in initial conditions. China was a much less developed economy in 1978 than Russia in 1991; for example in GNP per capita (US$ 285 as against US$ 3783); share of industrial employment, (13.3% as against 39%) and share of agricultural employment (75% as against 13.5%).[5] In particular, the stock of human capital was markedly lower in China, with a literacy rate in 1980 of 66% as against 98% in Russia, 1998; secondary school enrolment rates of 63% as against 91% and tertiary education enrolments of 1.7%, (1980) as against 50%. This meant that the two countries faced fundamentally different resource reallocation challenges. In China, it was necessary to raise national income by transferring labor from low productivity activities (primarily agriculture) to higher productivity ones (largely in industry) (see Qian, 2000, Granick, 1990). In Russia, the structure of output needed to be rebalanced from a concentration on the pattern preferred by central planners (heavy industry, defence) towards domestic consumer demand (light industry, services) and activities of international comparative advantage at world prices (see Granville and Oppenheimer, 2001).

The two countries also followed very different transition paths. In China, reforms were gradual, experimental, and partial, with the authorities taking a flexible approach to policy making (see Qian, Roland and Xu, 1999). In Russia, the reforms were intended to be rapid and comprehensive (see Hanson, 2002), though there were major differences between the objectives and actual implementation of reforms. The sequence of transition in the two countries was therefore also very different. In China, markets were liberalised first, and they have gradually become more competitive and efficient in resource allocation (see Jefferson

[5] Sources: World Bank, IMF and State Statistical Bureau. GNP per capita in Russia refers to 1988 and the share of industrial and agricultural employment refers to 1980.

and Rawski, 1994) while the process of privatization has been much slower and more limited (see Jefferson, Rawski and Zheng, 2000, Cao, Qian and Weingast, 1999). Hence, strong market-based incentives were provided to state owned firms and semi-private ones such as the town-village enterprises (TVEs). In contrast, Russia attempted virtually simultaneous introduction of markets and private ownership, with much of the intended enhancement to company performance presumed to derive from the latter (see Boycko, Shleifer and Vishny, 1995). The implementation of Russian reforms, however, proved harder than expected (see Hanson, 2002), leaving enterprises to operate initially in only a quasi-market environment (see Commander, Dolinskaya and Mumssen, 2002), during what proved to be a prolonged recession (see EBRD, 1999).

Therefore in China, one can hypothesise that growth in the industrial sector has resulted from strong demand (domestic and international) and derives from factor transfers (labor and capital) and TFP growth driven by competition (see Wang and Yao, 2001). Once might also expect some contribution from enhanced factor quality, though a limited one given the level of development and the transition path (but see Huang and Duncan, 1997). Given that a relatively competitive market system had been established by the time of our study in 1999, specific institutional factors related to industry or regions might be expected to be of less significance (see Parker, 1997). Chinese reforms have not fully addressed the ownership issue (see Qian, 2003); hence privatisation might not yet show any decisive influence on performance.

One would predict similar factors as being relevant for enterprise growth in Russia, though the balance of importance might be different. One would expect the change in sales to be correlated with changes in factor inputs; this is a corollary of cost minimisation. Given Russia's more advanced level of technological and educational development, one might also predict a strong influence of factor quality on sales growth. If Russia's reform programme

had been effective, one would also expect to see an impact from ownership changes and competition.

3. Specification and Data

3.1. Specification of the Estimating Equations

Equation (4) is a reduced form relationship that is commonly estimated log-linearly and in rate of change form (Δ) to remove firm-specific effects so, with error term ε_i;

$$\Delta \ln S_i = \Delta \ln A_i + \alpha \Delta \ln L_i + \beta \Delta \ln K_i + \varphi \Delta \ln Q_i + \sigma \Delta \ln C_i + \varepsilon_i \qquad (5)$$

In this section, we outline the dataset, and the ways that the variables in equation (5) have been specified for empirical estimation. It is often difficult to obtain direct measures of *A*, *Q* and *C* as continuous variables, especially in transition economics, so (5) can be modified in such a way that while the factor inputs are included in logarithmic form, the other variables are proxied by indirect measures and fixed effects.

The variable *A* is associated with total factor productivity and may be influence by a number of factors. In the literature on privatization, TFP is found to vary with ownership, being higher in private than state owned firms (see Megginson and Netter, 2001). The transition literature additionally argues that TFP is a function of the type of private ownership, with outsider ownership expected to generate higher productivity than insider or state (Blanchard and Aghion, 1996). Because the institutional frameworks are different in this respect in the two countries, we use different ownership dummies in our estimating equations. In China, reforms have allowed the emergence of a *de novo* private sector, including through the development of TVEs (town-village enterprises). Hence the important distinction for performance may be between firms in which the state has the controlling interest and those in which non-state entities have the controlling stake, as in the standard literature (e.g. Megginson and Netter, 2001). Insider ownership as has emerged in much of Central and

Eastern Europe is not a significant issue. In Russia, however, though privatisation was widespread (almost all firms in our sample are private) the dominant owners are often not outsiders (see Earle, Estrin and Leschenko, 1996). Hence it is useful in the Russian context to distinguish between firms in which insiders have a controlling stake and firms that are controlled by outsiders (see Djankov and Murrell, 2002). Further, in Russia, the government retained 25 percent or more shares in some privatised firms, thereby giving them a significant say in the decision making process (see Bennett, Estrin and Maw, 2005). This factor too should be taken into account in considering for the quality of corporate governance in Russian enterprises. Hence the control for ownership in our estimating equations is defined differently in the Russian and Chinese contexts.

We have also attempted to control in our equations for the quality of factor inputs[6], but the only successful variable concerns capital quality, which we proxy with the proportion of productive capital in the enterprise that is less than 5 years old. Turning to competition, the data set provides only qualitative indicators of changes in competitive pressures, derived from management responses in the survey and subdivided into domestic and international competition. However these proved not to be significant in any equation, so we report regressions in which they are excluded. This implies that we have only been able to control for competition factors indirectly through industry dummy variables, which also control for (net) demand. Regional dummy variables are included to control for region-specific factors that might influence enterprise performance. To the extent that the markets in China and Russia are not fully integrated, the regional dummies may pick up local demand effects, as well as inter-regional differences in institutional factors like the legal environment and governance. We attempt to distinguish between the impact of local net demand and institutional factors later in our analysis.

[6] We also had data to control for the quality of the labor force by using the ratio of managerial to blue-collar workers. This is a rather poor indicator of labor quality and it was never even nearly significant in the estimations. We therefore report regressions in which it was not included. Its exclusion does not alter in any way the pattern of results.

In keeping with the earlier discussion, α, and β and the coefficient on factor quality are expected to be positive, reflecting the relationships between growth in sales and in factor inputs and technological advance. As we have seen, the predicted impact of ownership on sales growth is more complicated. In principle, government control in China and Russia can be expected to have an adverse impact on sales growth relative to outsider ownership (see Vickers and Yarrow, 1988, Nellis, 2000), either through the state ownership dummy (China) or the variable indicating that the government is a significant shareholder (Russia). But, in the light of the relevant literature, it is not clear whether privatization to insiders would generate similar improvements in performance relative to state ownership. The literature suggests that, at the very least, outsider ownership will be more efficient than insider or state, but that insider ownership may not yield significantly superior performance to state ownership. Empirical evidence however suggests that insider private owners do enhance enterprise performance relative to that of state owned firms (see Estrin and Wright, 1999).

3.2 The Chinese and Russian Data Sets

The Chinese survey was conducted to explore the depth of structural reform among Chinese manufacturing firms and therefore focuses on less well-known industrial centres. The data on Chinese firms were collected through a random survey with retrospective questions conducted in 2000. The focus was on manufacturing firms in the Sha'anxi, Hunan and Shanxi provinces of China, and the survey yielded data on 274 firms over five years (see Tlusty-Sheen, 2001). A significant proportion of equity of most of the firms in the sample in 1999 was in the hands of various administrative organs of the state, thereby suggesting that we have a mix of fully state-owned firms, corporatised state-owned enterprises, and a few TVEs. Ownership did not change in any of the sampled firms during the sample period. The firms belong to five mining and manufacturing industries,[7] and the sample includes about 20% of the firms in the

[7] The industries are mining, light industries, engineering products, chemicals and utilities.

population. The responses to the survey questionnaire provide information about, among other things, ownership of the firms, volume of sales, stock and quality of factor inputs, the extent of competition faced by the firms in the product market, and the extent of restructuring.

The Russian survey was designed to provide a snapshot of the consequences of reforms in the manufacturing sector in the major industrial centres of Russia. The dataset contains information on 437 firms surveyed in 2000, operating in 13 provinces[8] and six industries.[9] The survey contains retrospective questions to provide data for three years, 1997-1999 (see Estrin, 2003 for further information). As with the Chinese data, the stratified random survey of Russian manufacturing firms provides information about the volume of sales, stock of inputs the nature of competition faced by firms in the product market, and the extent of restructuring.[10] The data for these firms, almost all of which had been privatised before 1997, also provide information about the proportion of equity owned by the insiders and the government in 1999. Again, there were no ownership changes in the sample over the period.[11]

[8] The regions are Moscow, Moscow oblast, St. Petersburg, St. Petersburg oblast, Nizny Novgorod, Samari, Ekaterinburg, Perm, Novosibirik, Kiasnayovsk, Volgograd, Chelyabirsk, and Omsk.

[9] The industrial categories are somewhat more disaggregated than in China; chemicals, machinery, wood and paper, construction material, light industry, and food processing. 18 "special" firms, which did not wholly belong to any of these six industries, were placed in an 'other' category.

[10] The survey was based on random sampling from a population list from Goskomstat Enterprise Registry, for the six Russian Industries Classification's (OKONH) two-digit sector. The sampling was done in 2000, with retrospective questions for earlier data. The size of the sampled firms was restricted to between 100 and 5000 employees, so as to rule out both small and medium enterprises and the huge Russian resource companies, which, though important economically, are atypical. The sample was stratified to distribute firms more or less evenly across three size classes: 100-500 employees, 501-1000 employees, and 1001-5000 employees. The stratification process led to certain biases in the sample relative to the Goskomstat data for industrial enterprises, e.g., over-representation of chemicals relative to machine building. Estrin (2003) also reports some bias in favor of more profitable firms. None of these biases seem likely to explain the estimation results.

[11] The data sets both contain some missing values. In particular, a number of firms did not provide full breakdown of equity stakes, and/or information about capital stock. Since ownership and capital stock are important determinants of a firm's performance, observations with incomplete information about these variables had to be dropped. There was no obvious pattern by sector, region, size and sales growth and formal tests do not suggest bias arising from omitted variables. We use 138 firm level observations for China and 279 for Russia.

The main differences between the Russian and Chinese datasets are fourfold. First, the measures of some qualitative variables differ between the two samples. Second, unlike the Russian data, the Chinese data do not include firms in the energy sector. Third, as we have seen, differences in reform paths indicate that different controls should be used for ownership structure. Finally, the samples compare privatised Russian firms in some of the main industrial regions of the country with largely state owned firms in some of the less central and more internally oriented provinces of China. However, the measures of the quantitative variables (e.g., sales, labor and capital) are comparable across the samples. Further, the samples are representative within the respective economies, and hence while we cannot compare the performance of similar firms in China and Russia, the data allows us to contrast the performance of an average manufacturing Russian firm with the performance of an average Chinese manufacturing firm in those regions during roughly the same time period. While the choice of non-coastal and non-southern Chinese firms *a priori* biases the comparison in favour of the Russian firms, as we explain later, this bias strengthens our conclusions rather than weakens them.

The descriptive statistics in Table 1 highlight the patterns of evolution of the Russian and the Chinese firms over the period and are consistent with the macro-economic data (see, e.g., EBRD, 2001). First, as one would expect, collectively the state had the controlling stake in most Chinese firms in our sample, while in Russia, the majority of firms were controlled by insiders (see Qian, 2000, Earle and Estrin, 1997). Second, even though the real sales of an average Chinese firm in our sample grew between 1995 and 1999, while the real sales of an average Russian firm in our sample declined, sales per laborer in Russian firms remained higher that that in Chinese firms, even after the recession in 1998 and the adverse impact of the sharp depreciation of the rouble on the US dollar value of the sales of the former. Further, there was real sales growth in a large minority of Russian firms. Third, the size of the labor force for both Russian and Chinese firms declined over time, indicating some degree of

restructuring in both countries that involved laying off surplus laborers. Fourth, while the real capital stock (valued at historic cost) of an average Chinese firm grew substantially over the 1995-99 period, an average Russian firm experienced severe real decapitalisation during 1997-99, rather more markedly than the decline in demand. This decapitalisation can be found in the population data as well, and is probably the consequence of Russian firms selling assets and writing off unproductive capital in the aftermath of the 1998 crisis. Interestingly, however, despite the significant capitalisation of the Chinese firms, the average of the proportion of new (i.e., less than five years old) capital stock in Chinese firms remained less than 20%, suggesting that investment was concentrated in the large firms.

4. Regression Results

The basic regression results are presented in Tables (2) and (3). In both tables, we report the coefficient estimates of a model based on equation (5) using the Chinese and Russian data respectively. The use of first differences also helps to take account of firm-specific fixed effects. For each country, we first report the basic model (Spec 1), and then add controls for initial conditions (Spec 2) and industry- and firm-specific factors (Spec 3 and Spec 4, respectively) that might potentially influence the growth of sales. We control for initial conditions to capture potential firm specific heterogeneity in adjustment to new market circumstances. Moreover, while the model would suggest that first differencing would eliminate fixed effects, there are reasons to believe that there may also be time variant industry and regional effects in the transition economies. These could include for example sectoral differences in technical progress, differences in the regional development of infrastructure or in the sectoral and regional pattern of foreign direct investment. The correct specification is therefore an empirical question, which we address by comparing specifications 3 and 4 against 1.

As mentioned earlier, the specifications for China and Russia are slightly different, on account of the difference in the nature of ownership and impact of ownership on firm performance in the two countries. The specification estimated with the Chinese data includes one ownership variable: a dummy variable indicating whether or not the state collectively had controlling shares in a firm. The specification estimated using the Russian data, on the other hand, has two variables capturing the impact of insider ownership and residual government control: a dummy variable indicating whether or not insiders – managers and laborers – hold a majority stake in a firm during 1997-99, and another dummy variable indicating whether the government controls 25% or more of its equity during the same period, a stake which we could have given the government significant influence over strategic and operational decisions of the firm.

The regression results for China are presented in Table 2. The equations are based on samples of 138 firms over five years, which in first difference specification yields 552 firm year observations. The coefficient estimates for the basic model, which attempts to explain inter-firm variation in sales growth using ownership, technology and growth of factor inputs, are reported under Spec 1. In Spec 2, we introduce into the model the value of (log) sales in 1995, to control for the initial conditions that might have affected sales growth during the relevant time period. In Spec 3, we add controls for the industries to which the firms belong, and controls for the regions of operation are introduced in Spec 4. All four specifications yield a reasonable level of fit and indicate that, in China, growth of sales is positively correlated with changes in factor inputs (i.e., $\alpha, \beta > 0$). The quality of the capital stock is weakly significant, at the 9% level, for specification 2 and around the 12-14% level for all other specifications. Neither initial conditions nor industry and region-specific factors contribute significantly towards an explanation of inter-firm variation in sales growth. Further, state ownership does not affect the sales growth of Chinese firms. Note that the signs of the significant variables are robust to the choice of the specifications, and the magnitudes of the coefficient estimates are not significantly different across specifications.

The coefficient estimates for the Russian model are reported in Table 3. The equations are based on 275 firms over three years, yielding in first difference form 550 firm year observations. As with the Chinese model, we report coefficient estimates for four different specifications.. In Russia, change in labour input is the only economic variable that has a significant coefficient, albeit with the predicted sign (i.e., $\alpha > 0$). Neither changes in capital stock nor technology contribute significantly to an explanation of variations in sales growth. Further, neither privatisation to insiders nor government ownership of a significant proportion of the equity has any impact on the sales growth of the Russian firms. Indeed, inter-firm variations in sales growth are largely explained by industry-specific and region-specific factors. The goodness of fit, as measured by the adjusted R-square, rises steeply from below 0.3 to 0.41 after the inclusion of the regional dummy variables. Finally, unlike in the Chinese case, initial conditions matter, albeit marginally, with the coefficient on (log) sales in 1997 being significant at the 10% level for Spec 4, and at the 12-15% in the other specifications. As in the Chinese case, the results for the Russian sample are robust across specifications, with respect to both the signs and the magnitudes of the significant coefficients.

The regressions suggest that the marginal product of capital in Russia is approximately zero. This is likely to reflect the conditions of serious excess capacity in the Russian economy following the post-reform recession, in which measured real GDP fell by around 40%. There is also likely to be some measurement error in the capital series, which is based on a historic valuation often derived from the pre-reform era.[12]

The differences in the specifications and samples across China and Russia do not allow us to directly compare the goodness of fit of the regression models estimated for the two countries. However, the R-square values – 0.24 and 0.41 for China and Russia, respectively, for the full

specification – and the F-statistic indicate that our specification explains variations in sales growth across fairly well within each country. The contrast lies in the fact that the Chinese data yield a fairly well specified conventional sales function, with sales growth explained largely by changes in factor inputs and marginally by technology (see e.g. Jefferson, Rawski and Zheng, 1996), while, as in other studies (see e.g. Estrin and Wright, 1999), the Russian data yield an equation with much more limited economic interpretation.

5. Interpreting the Results

In this section, we offer some tentative explanations for the findings reported in tables 2 and 3. We first consider whether managerial quality may explain the differences in performance in the two countries. Transition involved the decentralisation of the enterprise sector, giving autonomy to managers so that variance in their quality or effectiveness could become an important determinant of performance (see Claessens and Djankov, 1999). Indeed, it has been argued that managerial quality and effort could be a major independent factor influencing enterprise performance (see Barberis, Shleifer and Vishny, 1996). Since our datasets provide information on this issue, with some similarity across the two countries, we test the impact on enterprise performance in each country, and examine the results in more details for China. We go on to explore possible interpretations for the significance of regional and industry factors in the Russian regressions.

To analyse the impact of managerial input empirically, we must alter equation (1) to allow for managerial input on the right hand side. After some manipulation, this would lead to the inclusion of M in the rate of change form in equation (5). However, it is difficult to measure managerial performance directly. Estrin, Gelb and Singh (1995) propose that changes in managerial input can be measured in transition economies by the extent of restructuring

[12] The marginal product of capital is estimated to be positive and significant but very small when a simple sales function (change of sales against employment and capital) is estimated on Russian data.

activity, using qualitative data from the responses of managers about what actions they have taken. The survey instruments used to collect data in both China and Russia allow us to generate such a measure of managerial input for use in the regression specification.

As mentioned earlier, the data regarding restructuring of Chinese and Russian firms are not strictly comparable. The Russian questionnaire elicits a binary (i.e., yes-no) response about 15 different types of restructuring during the 1997-99 period, while the Chinese questionnaire records the extent of 32 different types of restructuring on a 1-5 Likert scale. However, the 15 types of restructuring reported by the Russian firms are a subset of the 32 types of restructuring reported by the Chinese firms, and hence we can generate a comparable measure of restructuring for the Chinese firms, under the assumption that a measure of 4 or 5 on the 5-point scale corresponds to a "yes" on the Russian scale. In Table 4, we report the regression results for the Russian sample, after including the 0-15 point measure of restructuring in Russian firms, and the results for the Chinese firms involving both the 32-160 point measure (Spec A) and the comparable 0-15 point measure (Spec B).

It can be that the basic results mirror those reported in section 4; sales growth in China is explained by changes in both labour and capital inputs, while that in Russia is explained partly by change in labour input, but mostly by industry-specific and region-specific factors. Managerial input is not a determinant of performance in either China or Russia, when measured on the restricted 0-15 scale (Spec B for China). However, when we measure managerial input in Chinese firms on the finer 32-160 scale (Spec A), it contributes to the explanation of inter-firm variation in sales growth in China. The weakness of the 32-160 scale lies with the fact that, in the absence of explicit knowledge about the relative importance of the different types of restructuring activities across the firms, we weight all 32 activities equally, leading to significant measurement error for the relevant variable. However, while the results reported in Table 4 are merely suggestive of the potential impact of managerial input on firm performance, there is *prima facie* evidence to suggest that more careful

collection of data on this intangible input is required to allow a more complete analysis of firm performance in transition economies.

A very significant part of the inter-firm variation in sales growth in Russia is explained by regional dummy variables that were included in the specification to capture the impact of institutions – or the cross-regional difference thereof – on the growth of the firms. Indeed, almost none of the explanatory variables that owe their inclusion in equation (5) to economic theory have coefficients that are significantly different from zero. Since the data for the Russian firms span the 1997-99 period, and given that the debt and currency crises in Russia in 1998 may have affected the performance of the firms in a way that is not adequately captured by the specification, we estimate equation (5) using data on Russian firms separately for the 1997-98 and 1998-99 periods. If the results for the Russian firms presented in Table 3 had been driven by the events in 1998, the factors determining the growth of sales of firms might be noticeably different in 1998-99 as compared with 1997-98, though any findings must be interpreted cautiously because of the reduction in degrees of freedom required to undertake the experiment.

Table 5 presents the regression estimates for the two specifications – one including and the other excluding a measure for the initial conditions – for Russia, for the 1997-98 and 1998-99 time periods. They indicate that in each of these two sub-periods – 1997-98 and 1998-99 – changes in *both* factor inputs, labour *and* capital were correlated with growth of sales (i.e., α, $\beta \neq 0$). While the significance of capital, absent in the results presented in Table 3, is a welcome improvement, the coefficient is actually found to be negative in the 1998-99 period, probably reflecting a slow adjustment of the capital stock to the output shock. Capital quality and ownership continue to play no role in explaining Russian enterprise performance in either year. Thus we find that, even before the 1998 recession, much of the variation in sales growth across firms in Russia is explained by region-specific factors.

What inference can we draw from the fact that in China, economic factors like changes in labor and capital and, to a limited extent, the level of technology, explain inter-firm variation in sales growth, while in Russia most of this variation is explained by region-specific factors? The first and the most obvious implication is that, unlike in China, the Russian market remains fragmented both in the geographical and institutional sense, an observation that is consistent with our knowledge about the political economy of economic governance in Russia and China (see e.g. Hanson, 2002, Mau, 2000, Granick, 1990). Since institutional factors seem to have played such an important role in determining firm performance in Russia, and since dummy variables by themselves do not indicate the relative importance of the different types of institutions, we have re-estimated equation (5) substituting for the regional dummy variables with variables that capture the characteristics of the regions. Specifically, we used the Berkowitz and DeJong (2005) variables capturing inter-regional economic and institutional differences in Russia.[13] We also estimated specifications in which sectoral relative prices were used instead of industry dummies, but these regressions were found to be inferior in terms of goodness of fit and are therefore not reported.

Which institutional variables might have a significant impact on enterprise performance, Berkowitz and DeJong (2005) have explored in detail the determinants of differential growth rates across regions in Russia, and provide a useful source of information about inter-regional differences in demand, infrastructure, legal arrangements, political orientation and corruption. Most of these variables are highly correlated with each other, and hence one has to be careful about the choice of variables to be included in a regression specification. After some

[13] Berkowitz and DeJong (2005) have a number of variables highlighting the differences among the regions of Russia. However, predictably, the variables are highly correlated, and after taking into consideration the possible multicollinearity problems we were able to use five of the variables: industrial growth during 1997-99, unemployment in 1998, per capita gross regional product in 1997, proportion of debt that was overdue in 1998, and index of legislative quality in 1997. The first three variables are proxies for regional demand, while the

experimentation, we selected the variables that had the greatest impact on enterprise performance (on the basis of goodness of fit) and yet were not highly correlated with each other. Table 6 reports results from regressions on the entire Russian dataset and using specifications I and II the results indicate that regional unemployment rate, a proxy for regional demand, is the region-specific variable that has most significant impact on enterprise performance as measured by growth of sales.[14] The proportion of enterprise level debt that was overdue at the time of the crisis and the regional index for legislative quality, proxies for the quality of regional institutions, are significant in specification I, but unsurprisingly their significance is lost once initial conditions are introduced in specification II. The use of regional dummy variables and the Berkowitz and DeJong variables provide an equivalent explanation for the inter-firm variation in performance.

5. Conclusions

In this paper, we have estimated similar equations across enterprise samples in China and Russia, seeking to understand the factor driving of changing enterprise performance. China commenced the transition more than twenty years ago, and has embraced a path of gradual change, with liberalisation of domestic and international markets first and, more recently, privatisation and capital market development. Russian reforms began only a decade ago, from a much longer heritage of industrialisation and central planning, and with an almost simultaneous and instantaneous liberalisation of markets and mass privatisation. The results show that in the late 1990s economic factors had a much greater impact on enterprise performance in China than in Russia, even though we have contrasted samples of

fourth and fifth variables are proxies for the strength of market institutions and enforceability of contracts in the regions.

[14] The index accorded a value of 1-6 to each of the regions, 1 being the best and 6 the worst. Hence the negative sign of the coefficient.

firms from more isolated inland regions in China with companies from across Russia, including leading centres such as Moscow and St Petersburg.

In China, enterprises appear to be responsive to market and supply phenomena – managerial effort, technology and investment. We find little or no significant impact from competition, the extent of privatisation or from local or individual institutional factors in any of our equations. In contrast, Russian firms are unresponsive to almost all the normal economic drivers – outsider versus insider privatisation, competition, management effort, or technological factors - though we identify a positive relationship between changes in sales and in employment. The determinants of enterprise performance in Russia prove to be largely region-specific and our later regressions suggest that these findings may be explained by difference in managerial quality between Russia and China and inter-regional variation in the quality of institutions.

These findings cast some light on several important policy debates. They suggest that there may have been serious flaws in the reform strategy adapted in Russia, in either the design or the implementation of policy. The null hypothesis is not well specified, because it is not clear that alternative, more gradual and partial, strategies were a realistic option in Russia in the early 1990s (see Boycko, Shleifer and Vishny, 1995). Further, it is not evident whether the Chinese reform process itself is optimal, given the concerns about the health of the Chinese public sector banks and the resultant quasi-fiscal obligations of the government. However, the effectiveness of reforms that liberalise markets while leaving ownership unchanged or only partially adjusted seems to be strongly supported by our Chinese findings. We confirm that state owned

and corporatised firms in China are responding to market signals and improving performance along the same lines as privately owned firms in market economies (see Jefferson and Rawski, 1994). This suggests that, in certain contexts, such as the one of modern China, market incentives are sufficient to ensure some degree of efficiency in enterprise activity without immediate full privatisation. This is not to say that performance cannot be further improved by private ownership; indeed the evidence is strong that privatization improves enterprise performance (see Megginson and Netter, 2001). But it is consistent with the view (see e.g. Stiglitz, 1999) that neither "big bang" reform policies nor early privatisation are the *sine qua non* for successful transition.

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Table 1

Descriptive Statistics

Variables	China		Russia	
	1995	1999	1997	1999
Percentage of firms state owned	79	66		
Percentage of equity owned by government [a]			12	7
Percentage of equity owned by insiders			73	62
Sales				
Yuan/Rouble (thousands)	26006.87	28369.57	102694.20	166151.20
US dollars (thousands)	3114.60	3430.42	17705.90	6754.11
Labor force	4279	3889	971	887
Stock of capital				
Yuan/Rouble (thousands)	22393.55	33604.21	157665.40	78234.78
US dollars (thousands)	2681.86	4063.39	27183.69	3180.28
Average proportion of capital stock that is less than 5 years old		18		7

Notes: a) Almost all Russian firms in the sample had been privatised by 1999.
b) Measured as the ratio of temporary laborers to laborers with permanent/long term contracts.
c) The scale for Chinese data is 32-160, while the range for the Russian data set is 0-15.

Table 2

Determinants of Sales Growth in China

Explanatory Variables	**Spec 1**	**Spec 2**	**Spec 3**	**Spec 4**
Changes in (logarithm of) quantity of labor	0.83 *** (0.28)	0.83 *** (0.27)	0.78 *** (0.38)	0.78 *** (0.26)
Changes in (logarithm of) quantity of capital	0.43 *** (0.13)	0.42 *** (0.13)	0.43 *** (0.13)	0.42 *** (0.14)
Percentage of capital stock that is less than 5 years old	0.006 (0.003)	0.006 * (0.003)	0.006 (0.004)	0.006 (0.004)
Logarithm of sales in 1995		- 0.01 (0.01)	- 0.02 (0.04)	- 0.02 (0.04)
Dummy variable for state ownership in 1999	0.01 (0.15)	0.02 (0.15)	0.03 (0.16)	0.005 (0.172)
Constant	- 0.56 *** (0.14)	- 0.42 (0.38)	- 0.34 (0.44)	- 0.32 (0.44)
Industry controls	No	No	Yes	Yes
Regional controls	No	No	No	Yes
R-square	0.23	0.23	0.23	0.24
F-statistic (Prob > |F|)	9.90 (0.00)	8.37 (0.00)	5.44 (0.00)	4.57 (0.00)
Number of firms	138	138	138	138
Number of firm years	552	552	552	552

Table 3

Determinants of Sales Growth in Russia

Explanatory Variables	**Spec 1**	**Spec 2**	**Spec 3**	**Spec 4**
Changes in (logarithm of) quantity of labor	1.29 *** (0.18)	1.31 *** (0.18)	1.33 *** (0.18)	1.34 *** (0.18)
Changes in (logarithm of) quantity of capital	0.02 (0.03)	0.04 (0.03)	0.04 (0.03)	0.03 (0.03)
Percentage of capital stock that is less than 5 years old	0.0007 (0.001)	0.001 (0.002)	0.001 (0.002)	- 0.001 (0.002)
Logarithm of sales in 1995		- 0.06 (0.03)	- 0.05 (0.03)	- 0.06 * (0.03)
Dummy variable for controlling shares in hands of insiders	- 0.02 (0.08)	- 0.03 (0.08)	- 0.009 (0.08)	0.007 (0.07)
Dummy variable for greater than 25% of equity in state ownership	- 0.03 (0.08)	0.0003 (0.07)	- 0.005 (0.08)	- 0.02 (0.07)
Constant	0.64 *** (0.07)	1.29 *** (0.36)	1.16 *** (0.38)	1.52 *** (0.45)
Industry controls	No	No	Yes ***	Yes **
Regional controls	No	No	No	Yes ***
R-square	0.22	0.24	0.28	0.41
F-statistic (Prob > |F|)	13.30 (0.00)	11.76 (0.00)	7.65 (0.00)	8.88 (0.00)
Number of firms	275	275	275	275
Number of firm years	550	550	550	550

Table 4

Determinants of Sales Growth in Russia and China:

Impact of Restructuring

Explanatory Variables	Russia	China	
		Spec A	Spec B
Changes in (logarithm of) quantity of labor	1.35 *** (0.19)	0.74 *** (0.27)	0.78 *** (0.28)
Changes in (logarithm of) quantity of capital	0.03 (0.03)	0.44 *** (0.13)	0.42 *** (0.13)
Percentage of capital stock that is less than 5 years old	- 0.001 (0.002)	0.006 (0.004)	0.006 (0.004)
Restructuring achieved by firm since 1995 (China) and since 1997 (Russia)	0.006 (0.01)	0.008 * (0.005)	0.006 (0.004)
Logarithm of sales in 1995 (China) and in 1997 (Russia)	- 0.06 * (0.03)	- 0.04 (0.04)	- 0.02 (0.04)
Dummy variable for state ownership in 1999		- 0.006 (0.17)	0.005 (0.16)
Dummy variable for controlling shares in hands of insiders	0.009 (0.09)		
Dummy variable for greater than 25% of equity in state ownership	- 0.01 (0.07)		
Constant	1.49 *** (0.46)	- 0.70 * (0.43)	- 0.32 (0.42)
Industry controls	Yes **	Yes	Yes
Regional controls	Yes ***	Yes	Yes
R-square	0.42	0.25	0.24
F-statistic (Prob > |F|)	8.49 (0.00)	4.81 (0.00)	4.40 (0.00)
Number of firms	275	137	138
Number of firm years	550	548	552

Table 5

Determinants of Sales Growth in Russia:

Impact of Crisis

	1997-98		1998-99	
Explanatory Variables	**Spec 1**	**Spec 2**	**Spec 1**	**Spec 2**
Changes in (logarithm of) quantity of labor	0.86 *** (0.20)	0.95 *** (0.20)	1.19 *** (0.13)	1.19 *** (0.13)
Changes in (logarithm of) quantity of capital	0.07 * (0.04)	0.08 ** (0.03)	- 0.07 ** (0.03)	- 0.07 ** (0.03)
Percentage of capital stock that is less than 5 years old	- 0.0002 (0.001)	0.0002 (0.001)	- 0.0007 (0.001)	- 0.0005 (0.001)
Logarithm of sales in 1997 (for 1997-98) and in 1998 (for 1998-99)		- 0.06 * (0.03)		- 0.01 (0.02)
Dummy variable for controlling shares in hands of insiders	- 0.003 (0.06)	- 0.006 (0.06)	0.003 (0.06)	0.003 (0.06)
Dummy variable for greater than 25% of equity in state ownership	- 0.0007 (0.08)	0.01 (0.07)	- 0.06 (0.08)	- 0.05 (0.07)
Constant	0.17 (0.17)	0.88 ** (0.45)	0.65 *** (0.12)	0.80 ** (0.35)
Industry controls	Yes *	Yes *	Yes	Yes
Regional controls	Yes ***	Yes ***	Yes ***	Yes ***
R-square	0.21	0.24	0.29	0.29
F-statistic (Prob > |F|)	4.71 (0.00)	4.38 (0.00)	8.61 (0.00)	8.10 (0.00)
Number of firms	275	275	279	279

Table 6

Determinants of Sales Growth in Russia and China:

Impact of Regional Factors

Explanatory Variables	**Spec I**	**Spec II**
Changes in (logarithm of) quantity of labor	1.19 *** (0.16)	1.20 *** (0.16)
Changes in (logarithm of) quantity of capital	0.009 (0.04)	0.03 (0.03)
Percentage of capital stock that is less than 5 years old	- 0.002 (0.002)	- 0.001 (0.002)
Industrial growth during 1997-99	0.003 (0.002)	0.004 (0.003)
Proportion of debt that was overdue in 1998	- 0.008 * (0.004)	- 0.006 (0.004)
Unemployment rate in 1998	- 0.06 *** (0.01)	- 0.07 *** (0.01)
Per capita gross regional product in 1997	- 0.007 (0.008)	- 0.009 (0.008)
Index of legislative quality in 1997	- 0.03 * (0.01)	- 0.028 (0.018)
Logarithm of sales in 1997		- 0.08 ** (0.03)
Dummy variable for controlling shares in hands of insiders	0.01 (0.08)	0.01 (0.07)
Dummy variable for greater than 25% of equity in state ownership	- 0.08 (0.08)	- 0.05 (0.07)
Constant	1.52 *** (0.22)	2.49 *** (0.50)
Industry controls	Yes **	Yes **
R-square	0.42	0.45
F-statistic (Prob > |F|)	11.07 (0.00)	10.68 (0.00)
Number of firms **Number of firm years**	223 446	223 446