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Entrepreneurship and Post-socialist Growth*

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Abstract

We use a rich regional data set to obtain a statistical characterization of the relationship between entrepreneurial activity and economic growth within post-Soviet Russia. Russia is a useful laboratory for evaluating links between entrepreneurial activity and growth because of the striking variation in initial conditions, the adoption of policy reforms, and entrepreneurial activity observed across its large number of regions in the early stages of transition. Russia has also experienced striking regional variation in subsequent growth. Conditional on variations in initial conditions and policy reform measures, regional entrepreneurial activity exhibits a statistically and quantitatively significant relationship with subsequent economic growth.

I. Introduction

A growing body of national-level survey evidence indicates that entrepreneurial activity is a critical source of growth in post-socialist economies. Entrepreneurs operating small businesses have managed to rapidly fill niches that were ignored under socialism in industries ranging from construction, trade, commerce, small-scale manufacturing and services. In many post-socialist cities, entrepreneurs have thrived although their plants and equipment have been poorly protected; their contracts have been poorly enforced; their taxes have been high and the regulations they face have been burdensome; they have

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routinely been forced to make extra-legal payments to local mafias and government organs for protection; and they have had limited sources of external finance (Frye and Shleifer, 1997; Johnson, McMillan and Woodruff, 2002).

The view that entrepreneurial activity is an important engine of growth emerges from the observation that post-socialist economies that have experienced relatively robust patterns of entrepreneurial development have tended to enjoy relatively high rates of economic growth. For example, synthesizing a large body of work focusing on the experiences of Poland, China and Russia, McMillan and Woodruff (2002) conclude that the robust economic growth enjoyed by Poland and China is attributable in large part to the substantial entrepreneurial development they have experienced, while the economic stagnation Russia has endured during its transition has, as a root source, its record of relatively sluggish entrepreneurial development.[1]

The positive experiences of Vietnam and Hungary, contrasting with the negative experience of Ukraine, provide additional examples. Economic reforms implemented in Vietnam in 1986 led to the rapid resurgence of a virtually defunct private sector; 7 years later, small private firms servicing demands for clothing, footwear and manufactures such as metal- and wood-working accounted for an estimated 29% of national output (McMillan and Woodruff, 1999; Ronnas, 1998). Regarding Hungary, the relatively well-developed small-scale private sector that was in place prior to transition (operating primarily in manufactures, retail and trade) has also seen a substantial increase in market share during transition (Webster, 1993; Kornai, 2000). In both cases, economic growth has been robust during transition. In contrast, the experience of Ukraine mirrors that of Russia: the development of its entrepreneurial sector has been limited, and it has suffered economic stagnation during transition (World Bank, 1999).

We complement these existing studies here by using a rich regional data set to obtain a statistical characterization of the relationship between entrepreneurial activity and economic growth within post-Soviet Russia. Despite the relatively modest development of entrepreneurial activity experienced in Russia and the economic stagnation it has endured at the aggregate level, Russia provides an excellent laboratory for econometric analysis because it contains a large number of regions that exhibited striking variation in initial conditions, in the adoption of policy reforms, and in entrepreneurial activity in the early stages of its transition. It has also experienced striking regional variation in subsequent growth.

The data we analyse cover 70 of Russia's 89 regions. To quantify entrepreneurial activity, we measure the number of legally registered small

[1]Evidence on Poland is provided by Gomulka, Dabrowski and Rostowski (2001) and Djankov and Nenova (2001); evidence on China is provided by Qian and Xu (1993) and Che and Qian (1998); evidence on Russia is provided by Richter and Schaffer (1996) and Broadman (2000).

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private enterprises in place in each region as of December 1995 (relative to the regional population). These enterprises consist of small-scale start-up firms and private spin-offs from previously state-run enterprises. Growth is measured as the average annual growth in real per capita income observed between 1993:IV and 1997:IV, and between 1993:IV and 2000:IV (the former sub-period is analysed for comparison with results we presented in Berkowitz and DeJong, 2003, which we discuss below).

In our evaluation, we seek to account for factors that may have had a joint impact on entrepreneurial activity and growth. We also seek to control for potential problems arising from the possibility that the entrepreneurial activity we measure in part reflects optimism regarding prospects for subsequent growth. Given these objectives, we quantify a broad range of initial conditions and policy reform measures; the variables we use to do so pre-date our measures of entrepreneurial activity and growth. We then proceed in two steps. First, we assess the extent to which the initial conditions and policy reform measures help account for regional variation in entrepreneurial activity. Next, we conduct a standard two-stage least squares (2SLS) analysis to assess the relationship between entrepreneurial activity and growth.

Our results indicate the existence of a statistically and quantitatively significant relationship between regional entrepreneurial activity and subsequent economic growth. Specifically, our estimates indicate that a one-standard deviation increase in regional entrepreneurial activity (reflecting an additional 2.3 legally registered enterprises per 1,000 inhabitants as of December 1995) is associated with an increase in real economic growth in the neighbourhood of 3.4 annual percentage points over the period 1993:IV to 1997:IV, and 2.0 annual percentage points over the period 1993:IV to 2000:IV. In addition, we find that two variables are particularly important in quantifying regional patterns of entrepreneurial activity. The first is educational attainment (measured as the share of the regional population 15 years old and higher that completed high school and received at least some post-secondary training). The second is a measure of pro-reformist political orientation (measured as the share of the population that voted for pro-reformist candidates in the December 1993 parliamentary elections). Both variables exhibit a strong positive relationship with regional entrepreneurial activity. The importance of educational attainment is consistent with results obtained by Earle and Sakova (1999), who studied household-level determinants of entrepreneurship in post-socialist economies.

A previous work of ours (Berkowitz and DeJong, 2003) focused on the relationship between the regional implementation of policy reforms and subsequent economic growth within Russia. Measuring growth over a subset of the regions considered here (48 rather than 70) and over a shorter time horizon (1993:IV to 1997:IV), we found a general pattern of indirect links between the implementation of policy reforms and growth, with entrepreneurial activity

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serving as a critical conduit. This finding prompted the more comprehensive analysis of the relationship between regional patterns of entrepreneurial activity and economic growth presented here. The broader range of regions we are now able to study, and the longer time period over which we can measure growth, leaves us better equipped to characterize this relationship while controlling for potential problems arising from simultaneity. We proceed in section II with a description of our data set; we then describe our estimation procedure and present our regression results in sections III and IV; conduct a series of robustness checks in section V; and conclude in section VI.

II. Data summary

Our data set contains regional measures of real income growth, entrepreneurial activity, initial conditions, and initial policy reform measures. By 'initial', we mean measurements taken as close to January 1992 (the beginning of Russia's transition period) as possible. Most variables are measured as of 1993; none are measured later than 1994; some are measured in the mid-1980s. The importance of obtaining measurements early in the transition process is to use them either as instruments for our measure of entrepreneurial activity, or as conditioning variables in growth regressions.

The data set covers 70 of Russia's 89 regions. As most of the excluded regions are autonomous Oblasts, Okrugs and Krais now and that were once part of conglomerate regions early in Russia's transition process, separate measurements of 'initial' variables are unavailable for them. The war-torn Chechen Republic is also excluded for lack of data. The 70 regions covered in our data set represent all 11 of Russia's geographic territories.

Growth and entrepreneurship

We measure regional growth by computing the real purchasing power of average regional household income at three dates (1993:IV, 1997:IV and 2000:IV), and then by computing the average annual growth rate observed between 1993:IV and 1997:IV, and between 1993:IV and 2000:IV. We use regional consumer price index (CPI) statistics to eliminate the effects of inflation on these measures (source: Goskomstat data on monthly nominal household income and regional CPIs). We denote these measures as GROWTH.

To measure entrepreneurial activity (denoted as ENT), we use the regional registry of small private enterprises per 1,000 inhabitants as of 31 December, 1995 (source: Goskomstat Rossii, 1996). These enterprises are comprised primarily of legally registered start-ups and small spin-offs from former state-owned enterprises that first began to emerge in the Former Soviet Union during the perestroika reforms in the late 1980s (Aslund, 1997). This measure

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provides an accurate characterization of overall regional entrepreneurial activity, because as noted in the introduction, the bulk of legal entrepreneurial activity in Russia has been concentrated in small start-ups and spin-offs. Ideally, we would work with an earlier measure of this activity to reduce potential problems associated with simultaneity, but accurate and consistent measures do not exist prior to this date (Aslund, 1997). This lack of prior data availability serves as the primary motivation for the two-stage estimation procedure we employ in section III.

As indicated in Appendix A, Russia has experienced substantial variation in economic growth and entrepreneurial activity. Through 1997, the average annual regional growth rate was 1.46%, and the standard deviation was 4.75 percentage points. Average growth through 2000 fell to −7.31%, with a standard deviation of 3.25 percentage points. One reason for this striking drop is the financial crisis Russia suffered in August 1998. Regarding ENT, it ranges from a low of 1.71 (enterprises per 1,000 inhabitants) in the Kursk Oblast to 16.61 in Moscow; its average is 4.19, and its standard deviation is 2.29.

Moscow is exceptional both in terms of the entrepreneurial activity it has fostered and the economic growth it has experienced. Annualized growth in Moscow through 1997 was an astounding 22.06%, and 3.49% through 2000 (due in large part to the financial crisis of 1998, all other regions in the sample had negative growth rates through 2000). Thus in the context of the analysis that follows, Moscow warrants particular attention as having the potential to exert undue influence on our results. Indeed, standard regression-diagnostic measures (e.g. Cook's, 1977, distance statistic) confirm this potential. We deal with this issue in two ways. First, our analysis of the determinants of entrepreneurship in section III employs least absolute deviations (LAD) estimators rather than ordinary least squares (OLS) estimators; it also reports the impact of the exclusion of Moscow on our results. Secondly, in section V, we conduct a thorough set of robustness checks, including a two-stage analysis in which we replace OLS estimates with LAD estimates. This is designed to evaluate the impact of potential outliers (including Moscow) on the 2SLS analysis we conduct in section IV, and serves to illustrate the robustness of the statistically and quantitatively significant relationship between entrepreneurial activity and economic growth observed in the full sample.[2]

Initial conditions

We control for six initial conditions that summarize regional population, industrial and locational characteristics. Regarding population characteristics, one variable we consider is the share of the 15-year-old population and higher

[2]We thank Jonathan Temple for prompting this portion of our analysis.

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as of 1994 that completed high school and received at least some post-secondary training (EDU). This variable was collected in the 1994 Russian household micro-census (Goskomstat Rossii, 1995). Secondly, we consider the initial reformist orientation of the population (REF), which is measured as the share of the population that voted for pro-reformist candidates in the December 1993 parliamentary elections (source: Clem and Craumer, 1993). Thirdly, we measure regional initial standards of living (INITIAL) by computing the average ratio of average household money income within a region to the average cost of a basket of 25 food goods in the same region (using the same goods and weights for all goods across all regions) during 1993:IV (source: Goskomstat Rossii data). Because there are striking price differentials for similar goods within Russia, it is important to convert initial average regional household income to a purchasing-power measure that is comparable across regions. The purchasing power of average household money income in terms of food is an meaningful measure because food purchases accounted for more than half of household expenditures in the 1990s (Goskomstat Rossii, 2000, p. 167), and we have a uniform measure of a food basket that covers all of Russia's regions; 1993:IV marks the earliest date for which comprehensive food-basket prices and household money-income data are available.

We use two variables to quantify initial regional industrial characteristics. The first is a measure of initial production potential (IO); the second is a measure of the regional importance of the defence industry (DEFENSE). The IO variable is designed to measure the profitability of the industrial capital stock in place in each region as of 1985. To compute it, we multiplied the industry's labour share (source: Gaddy, 1996) by its value added, net of labour costs (this is the intermediate shadow-profit rate based on world-market prices and computed by Senik-Leygonie and Hughes, 1992); we then summed the resulting products. This measure is limited to industries that produce tradable goods, and is meant to quantify the competitiveness of a region's industrial structure on world markets prior to transition. The oil and gas industries have the highest value added, while food processing has the lowest (in fact, negative) value added. DEFENSE is measured in each region as the number of workers employed in the defence industry per 1,000 employed workers in 1985 (source: Gaddy, 1996). As emphasized by Gaddy (1996), DEFENSE is a potentially important conditioning variable as the defence industry served as a significant attractor of skilled workers, and gave regional elites close connections to powerful defence industries in Moscow. Moreover, the defence industry continues to be an important and relatively stable sector in Russia's otherwise chaotic industrial environment.

Finally, in order to take into account the potential impact of location, we measure the log of a region's transport distance from Moscow (LNDIST).

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Moscow was the major source of commercial, political, transport, cultural, educational, and financial activity in the Former Soviet Union, and still continues to command this important status within Russia. Thus, transport distance is a potentially useful measure of a particular region's access or lack thereof to critical activity within Russia.

As Appendix A indicates, we generally observe substantial regional variation in these measures of initial conditions. For example, the voting shares quantified under REF range from 13% (Dagestan) to 61% (St Petersburg), with a mean of 33.3% and standard deviation of 10.16%. EDU is somewhat exceptional in this regard: it is relatively tightly dispersed, with a mean of 13.73% and a standard deviation of only 3.69%.

Initial policy implementation

We use two variables to quantify regional variations in the implementation of policy reforms early in Russia's economic transition: the extent of small- and large-scale privatization. As background, the transition began in January 1992 with the implementation of rapid price, trade and financial-market liberalization initiatives. Privatization began in 1993, when the government allocated all state-owned enterprises to the property funds operated by the federal government, and the governments located in Russia's 89 regions (including the primary regional governments, and the subordinate local governments in cities, city districts, settlements, etc.). Local governments typically gained control over small shops and enterprises that operated in trade and retail markets, and sold off these enterprises for cash in the small-scale privatization programme. The federal government obtained control over the larger state enterprises in sectors such as manufacturing, heavy industry, energy and communications. The federal government was then instructed to work with relevant regional governments to form a plan consistent with the dictates of the large-scale privatization programme. In a successful large-scale privatization, the federal government and associated regional governments sold off ownership shares to insiders at a discount, and then allowed groups of outside investors to purchase equity in the enterprise using vouchers. The vouchers were equity claims that the Russian federal government had issued to its entire population before proceeding with the privatization.

We measure small- and large-scale privatization (SPRIV and LPRIV, respectively) using the number of enterprises privatized by local and federal governments in 1993 per thousand inhabitants in each region (source: Goskomstat Rossii, 1994). These measures exhibit substantial regional variation. For example, while the secessionist Republics of Bashkortostan, Sakha and Tatarstan had no large privatizations in 1993, Magadan, Tyumen, Ivanovo and Pskov Oblasts rapidly privatized their large state enterprises. As

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reported in Appendix A, the (mean, standard deviation) of SPRIV is (0.20, 0.12), and for LPRIV is (0.05, 0.04).

From a theoretical perspective, the prospective empirical relationship between privatization, entrepreneurial activity and economic growth is unclear. In their influential book on Russia's reform, Boycko, Shleifer and Vishny (1995) argue that an immediate and massive privatization of state-owned enterprises would provide an incentive to local and regional governments to support market reforms because they would receive revenues from sales. Moreover, rapid privatization of large enterprises would make reform irreversible because politicians would not be able to use these enterprises to promote their political objectives. Thus rapid privatization would encourage entrepreneurship because politicians would no longer have an incentive to harass new small businesses in an effort to protect state enterprises. However, Kornai (1990, 2000) and Black, Kraakman and Tarassova (2000) argue that the discounted ownership positions and privileged access made available to insiders in Russia (workers and mangers in enterprises undergoing privatization) encouraged politicians and insiders to collude in an effort to gain privatization rents. A potential manifestation of this collusion is that local politicians would have an incentive to harass small-scale entrepreneurs competing with the large privatized enterprises. Boycko *et al*. (1995) also argue that the efficiency gains from privatization would enhance growth, while Kornai (1990, 2000) and Black *et al*. (2000) argue that insider privatization creates a corrupt environment that potentially inhibits growth.

Correlation patterns

Appendix B reports correlation patterns measured among the variables we have compiled. Note that most variables are more weakly correlated with growth measured through 1999:IV than through 1997:IV, although as both measures are closely correlated (0.769), correlation patterns in general are similar across growth measures. The strongest patterns of correlation with growth are concentrated among three variables: entrepreneurial activity, educational attainment, and reformist voting patterns. These three variables are also closely correlated with each other (0.5, at least). Thus not only is there considerable regional variation in the measures we have compiled but the variation is also fairly systematic. We now turn to an analysis of conditional correlation patterns, i.e. a regression analysis.

III. Accounting for entrepreneurial development

While our primary interest is in the relationship between entrepreneurial development and subsequent economic growth, factors that have influenced

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TABLE 1

Determinants of entrepreneurship, LAD estimates; dependent variable: small-enterprise formation

Specification	*(1)*	*(2)*	*(3)*
Initial income	0.125 (0.128)	0.129 (0.052)**	
IO	−0.014 (0.021)	−0.017 (0.006)**	
Defence	−0.114 (2.652)		
Distance (log)	−0.205 (0.205)		
Education	0.395 (0.112)***	0.230 (0.042)***	0.317 (0.060)***
Large-scale privatization	4.360 (10.222)		
Small-scale privatization	0.488 (3.166)		
Reformist voting	0.081 (0.040)**	0.076 (0.015)***	0.075 (0.022)***
Pseudo-R^2-value	0.319	0.298	0.279
Quantitative significance			
Initial income	0.330	0.342	
IO	−0.206	−0.239	
Defence	−0.015		
Distance (log)	−0.282		
Education	1.460	0.850	1.171
Large-scale privatization	0.158		
Small-scale privatization	0.057		
Reformist voting	0.825	0.772	0.761
P-values for *F*-tests of exclusion restrictions			
Compared with unrestricted specification (1)		0.929	0.895
Compared with restricted specification (2)			0.006

Notes (apply to all subsequent tables): Standard errors accompanying point estimates are given in parentheses.

*Statistical significance at 10% level.

**Significance at 5% level.

***Significance at 1% level.

'Quantitative significance' indicates the response of the dependent variable implied by the point estimate of a one-standard deviation increase in the corresponding explanatory variable. In all cases, a constant term has been estimated but is not reported.

entrepreneurial development are of interest in their own right. Thus we begin with a detailed discussion of these factors.

Table 1 presents three sets of LAD estimates obtained by regressing ENT on the measures of initial conditions and policy variables described above. (All the estimates reported herein were obtained using STATA. Standard errors on LAD coefficient estimates were calculated following the procedure outlined in Koenker and Bassett, 1982.) The three sets were obtained using the full set of regions included in the sample; we obtained an additional three sets (not reported in the table, but discussed below) given the exclusion

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of Moscow from the sample. As noted above, we considered this exclusion because of Moscow's potential to exert undue influence on our estimates.

For both samples, we obtained the three sets of estimates as follows. We first regressed ENT on the entire set of explanatory variables. Secondly, we used a stepwise procedure to eliminate insignificant variables from the regression model, in the spirit of the general-to-specific modelling strategy advocated, e.g. by Hendry (2000). Beginning with the fully specified model, the procedure involves eliminating the variable the corresponding *t*-statistic of which (associated with the null hypothesis of a zero regression coefficient) has the largest *P*-value, so long as this value exceeds 0.2, and continuing this process until the remaining set of variables have *P*-values no greater than 0.2. Finally, we regressed ENT only on EDU and REF, the two variables with which it is most closely correlated.

Regarding the full-sample results presented in Table 1, using the full set of variables, no variable other than EDU and REF is estimated as statistically significant even at the 30% level. In contrast, EDU and REF are significant both statistically (at the 1% and 5% levels, respectively) and quantitatively. Regarding quantitative significance, a one-standard deviation increase in EDU (REF) translates into an additional 1.46 (0.83) new small private enterprises per 1,000 regional inhabitants. Under the stepwise regression, INITIAL and IO enter in as statistically significant (5% level). However, note from the final regression that eliminating these additional variables results in a reduction in the pseudo-R^2 statistic of only 0.02 (from 0.30 to 0.28). Thus EDU and REF are clearly important in accounting for regional patterns of entrepreneurial activity, while the marginal explanatory power of the remaining variables is minimal.

A similar pattern of results is obtained when Moscow is excluded from the sample. Once again, only EDU and REF are estimated as statistically significant in the regression involving the full set of variables (at the 10% and 1% levels, respectively). Under the stepwise regression, INITIAL and IO once again enter in as significant, and in this case LNDIST and LPRIV do so as well. Finally, eliminating all variables other than EDU and REF results in a somewhat greater decline in the pseudo-R^2 statistic (0.06 in this case, from 0.28 to 0.22). However, EDU and REF are most important in accounting for regional patterns of entrepreneurial activity. The most significant implication of excluding Moscow from the sample regards the quantitative-significance measure obtained for EDU, which drops to 0.41 (from 1.46) using the full set of variables, and to 0.75 (from 1.17) using only EDU and REF.

IV. Two-stage least squares analysis

As noted, our analysis of the relationship between entrepreneurial development and growth is based on two measures of growth: that observed between

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1993:IV and 1997:IV; and that observed between 1993:IV and 2000:IV. In part, we consider the former measure to illustrate how our 70-region analysis compares with our previous 48-region analysis (Berkowitz and DeJong, 2003). Also, we are interested in learning whether the relationship has changed appreciably over time.

Results based on growth measured through 1997:IV and 2000:IV are reported in Tables 2 and 3, respectively. In each table, panel A reports estimates of the structural equation for growth obtained using 2SLS. Four specifications are reported in each table. In the first two, REF and EDU are excluded from the structural equation for the purposes of identification; the validity of these exclusion restrictions are examined using Sargan's (1958) test and Hansen's (1982) *J*-test for over-identification.[3] The first specification is otherwise unrestricted, and includes the full set of remaining potential explanatory variables as regressors. The second specification is relatively parsimonious: variables estimated as insignificant in the first specification (using the stepwise algorithm described in section III) were eliminated in this specification (in both the first- and second-stage regressions). We report this specification because of concerns associated with potential 'over-fitting bias', which can arise in two-stage regressions from an excessive use of instruments (e.g. see Hahn and Hausman, 2002). In the third specification, we augment the parsimonious specification with the inclusion of EDU as an additional explanatory variable; and in the fourth specification, we augment the parsimonious specification with the inclusion of REF (dropping EDU). These latter two specifications are reported to provide further evidence regarding the validity of the joint exclusion of EDU and REF in the parsimonious specification, beyond that provided by Sargan's test for over-identification.[4]

Panel B in each table reports first-stage reduced-form estimates of the small-enterprise specifications corresponding to the second-stage estimates reported in panel A. Also reported are *F*-tests of the exclusion of EDU and REF from these specifications. In all cases, these exclusion restrictions are rejected, which serves to indicate the strength of these variables as instruments. (In addition, we also obtained, but do not report in full here, LAD and OLS estimates of the growth equation for comparison with the 2SLS structural estimates reported in panel A. While results differ quantitatively across specifications in some respects, the qualitative relationship between

[3]These tests hold as null hypotheses that EDU and REF are uncorrelated with the error term of the structural equation for growth. Failure to reject the null indicates a lack of statistical evidence against the validity of the use of REF and EDU as instruments for identifying the impact of small enterprises on growth. Hansen's *J*-statistic is asymptotically distributed as χ^2 for general error processes. Sargan's statistic is also asymptotically distributed as χ^2 (i.e. the two tests are asymptotically equivalent) given conditionally homoskedastic errors. For details on these statistics, see, e.g. Hayashi (2000).

[4]We also conducted this latter exercise by introducing EDU and REF (one at a time) in the first specification, and obtained similar results. Results of this exercise are available upon request.

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TABLE 2

Panel A: 2SLS estimates of structural equation for growth; dependent variable: growth, 1993:IV–1997:IV

Specifications	*(1) Unrestricted*	*(2) Parsimonious*	*(3) Parsimonious, control for EDU*	*(4) Parsimonious, control for REF*
Initial income	0.093 (0.213)			
IO	0.096 (0.037)**	0.092 (0.033)***	0.089 (0.040)**	0.084 (0.032)**
Defence	6.185 (3.785)	5.787 (3.627)	7.143 (4.621)	6.308 (3.499)*
Distance (log)	0.248 (0.397)			
Education	Exclusion restriction	Exclusion restriction	−0.620 (0.592)	Exclusion restriction
Large-scale privatization	−10.236 (14.486)			
Small-scale privatization	0.289 (4.506)			
Reformist voting	Exclusion restriction	Exclusion restriction	Exclusion restriction	0.087 (0.065)
Small enterprises	1.542 (0.315)***	1.509 (0.261)***	2.724 (1.203)**	1.150 (0.367)***
Quantitative significance				
Initial income	0.264			
IO	1.389	1.329	1.289	1.208
Defence	0.800	0.748	0.924	0.816
Distance (log)	0.341			
Education			−2.290	
Large-scale privatization	−0.372			
Small-scale privatization	0.034			
Reformist voting				0.320
Small enterprises	3.350	3.454	6.237	2.632
P-values for hypothesis tests				
Parsimonious vs. unrestricted reg.		0.876		
Over-identification Sargan test	0.301	0.200	Exactly identified	Exactly identified
Hansen *J*-test	0.295	0.214		

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TABLE 2

(continued)

Panel B: First-stage (reduced-form) estimates; dependent variable: small-enterprise formation

Corresponding structural growth equation	*Unrestricted*	*Parsimonious*
Initial income	0.183	
	(0.066)***	
IO	−0.019	−0.004
	(0.013)	(0.012)
Defence	−0.279	−0.530
	(1.304)	(1.371)
Distance (log)	−0.228	
	(0.132)*	
Education	0.333	0.394
	(0.058)***	(0.056)***
Large-scale privatization	5.726	
	(4.977)	
Small-scale privatization	−0.881	
	(1.566)	
Reformist voting	0.059	0.055
	(0.020)***	(0.020)***
R^2-value	0.689	0.623
Quantitative significance		
Initial income	0.482	
IO	−0.270	−0.051
Defence	−0.036	−0.069
Distance (log)	−0.314	
Education	1.229	1.454
Large-scale privatization	−0.104	
Small-scale privatization	−0.104	
Reformist voting	0.596	0.559
P-values for *F*-tests of exclusion restrictions		
Education and reformist voting	0.000	0.000

small enterprise formation and growth that emerges is remarkably robust. Complete details are available upon request.)

Consider first Table 2, panel A, wherein the structural estimates for growth are measured through 1997:IV. In the unrestricted specification (1), two variables are statistically significant: IO and the instrumented ENT (the corresponding *P*-values are 0.012 and 0.000). A third variable is marginally significant: DEFENSE (0.107). Moreover, with *P*-values of 0.301 and 0.295, the Sargan and *J*-tests, respectively, fail to reject the null hypothesis that REF and EDU are valid instruments. Moving to the parsimonious specification (2), the joint test of the validity of the exclusions it imposes relative to specification (1) has a corresponding *P*-value of 0.876; the Sargan and *J*-tests again fail to reject the null that REF and EDU are valid instruments; and the coefficient estimates

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TABLE 3

Panel A: 2SLS estimates of structural equation for growth; dependent variable: growth, 1993:IV–2000:IV

Specifications	*(1) Unrestricted*	*(2) Parsimonious*	*(3) Parsimonious, control for EDU*	*(4) Parsimonious, control for REF*
Initial income	−0.105			
	(0.159)			
IO	0.078	0.071	0.071	0.071
	(0.028)***	(0.024)***	(0.025)***	(0.025)***
Defence	1.322			
	(2.822)			
Distance (log)	0.220			
	(0.296)			
Education	Exclusion restriction	Exclusion restriction	−0.037 (0.343)	Exclusion restriction
Large-scale privatization	−14.697	−18.167	−18.542	−17.921
	(10.801)	(9.699)*	(10.487)*	(9.994)*
Small-scale privatization	−2.045			
	(3.359)			
Reformist voting	Exclusion restriction	Exclusion restriction	Exclusion restriction	0.006
				(0.051)
Small enterprises	0.937	0.883	0.955	0.859
	(0.235)***	(0.195)***	(0.702)	(0.291)***
Quantitative significance				
Initial income	−0.276			
IO	1.122	1.032	1.031	1.024
Defence	0.171			
Distance (log)	0.302			
Education			−0.136	
Large-scale privatization	−0.534	−0.660	−0.674	−0.658
Small-scale privatization	−0.240			
Reformist voting				0.021
Small enterprises	2.146	2.021	2.187	1.967
P-values for hypothesis tests				
Parsimonious vs. unrestricted reg.		0.844		
Over-identification			Exactly identified	Exactly identified
Sargan's test	0.846	0.913		
Hansen's *J*-test	0.859	0.927		

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TABLE 3

(continued)

Panel B: First-stage (reduced-form) estimates; dependent variable: small-enterprise formation

Corresponding structural growth equation	*Unrestricted*	*Parsimonious*
Initial income	0.183	
	(0.066)***	
IO	−0.019	−0.005
	(0.013)	(0.012)
Defence	−0.279	
	(1.304)	
Distance (log)	−0.228	
	(0.132)*	
Education	0.333	0.384
	(0.058)***	(0.055)***
Large-scale privatization	5.726	6.483
	(4.977)	(4.762)
Small-scale privatization	−0.881	
	(1.566)	
Reformist voting	0.059	0.058
	(0.020)***	(0.020)***
R^2-value	0.689	0.633
Quantitative significance		
Initial income	0.482	
IO	−0.270	−0.073
Defence	−0.036	
Distance (log)	−0.314	
Education	1.229	1.420
Large-scale privatization	0.270	0.236
Small-scale privatization	−0.104	
Reformist voting	0.596	0.591
P-values for *F*-tests of exclusion restrictions		
Education and reformist voting	0.000	0.000

on IO, DEFENSE and the instrumented ENT are very similar to those estimated in specification (1). According to these estimates, the quantitative significance of the included explanatory variables is substantial: a one-standard deviation increase in IO corresponds with a 1.33 percentage point annual increase in growth; the figures for DEFENSE and ENT are 0.75 and 3.45, respectively. Finally, specifications (3) and (4) indicate that both EDU and REF are estimated as entering insignificantly when introduced into specification (2), providing further evidence of the validity of their joint exclusion from (2).

Turning to the reduced-form estimates for ENT reported in Table 2, panel B, just as in section III, EDU and REF are once again seen as important determinants of small-enterprise formation. Notably, their quantitative significance measures [1.454 and 0.559 in specification (2), respectively] are

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similar to those reported in Table 1; and tests of their joint exclusion yield *P*-values of 0. Finally, we note that OLS and LAD estimates of the growth specifications (1) and (2) correspond closely to their 2SLS counterparts. In particular, while measures of the quantitative significance of ENT are estimated as somewhat lower in these cases, they are nevertheless substantial: relative to the estimate of 3.45 obtained using 2SLS applied to specification (2), corresponding LAD and OLS estimates are 1.64 and 2.68.

Results obtained in measuring growth through 2000:IV (Table 3A) feature two important differences relative to those obtained using growth measured through 1997:IV. First, while IO and ENT continue to survive the stepwise elimination algorithm used to obtain the parsimonious specification (2), in this case DEFENSE no longer remains significant, while LPRIV becomes significant. The significance of LPRIV, with a quantitative significance measure of −0.66 under specification (2), is particularly important in the light of the controversy discussed in section II regarding the effectiveness of Russia's large-scale (voucher) privatization programme (Boycko *et al*., 1995; Black *et al*., 2000). In particular, the skepticism regarding the effectiveness of this programme voiced by Black *et al*. (2000) appears validated by this result. Secondly, the quantitative significance of ENT appears lower using this measure of growth. Under the parsimonious specification (2), quantitative significance is estimated at 2.02, amounting to a reduction of nearly 1.5 percentage points. However, even this reduced estimate conveys an important quantitative relationship; and the clear statistical significance of ENT continues to be evident in this case.

Regarding the reduced-form estimates for ENT reported in Table 3B, note that only the parsimonious specification differs from its counterpart in Table 2, as DEFENSE is replaced by LPRIV in this case. Note that the statistical significance of LPRIV in this specification is marginal (its *P*-value is 0.178). Moreover, with an associated quantitative significance measure of 0.236, the indirect impact of a one-standard-deviation increase in LPRIV on growth is $0.236 * (0.883) = 0.21$, where 0.883 is the coefficient on ENT in the corresponding growth equation. Thus this indirect effect is insufficient to offset the direct negative impact of LPRIV estimated in the growth equation. Finally, we note that the LAD and OLS counterparts to the 2SLS estimates reported in Table 3A are once again similar, just as was the case in measuring growth through 1997:IV. In all cases, a strong link between small-enterprise formation and growth is clearly evident.

V. Robustness checks

Table 4 contains a series of checks for the robustness of the results reported in Table 3 for growth measured through 2000:IV (the checks were also conducted

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TABLE 4

Panel A: Outlier analysis; estimates of parsimonious structural equation for growth; dependent variable: growth, 1993:IV–2000:IV

	Estimation procedure					
	2SLS	*LAD*	*2SLS*	*2SLS*	*2SLS*	*2SLS*
Outliers removed	None	None	Moscow	Growth‡	Small ents‡	Growth and small ents
IO	0.071 (0.024)***	0.079 (0.039)**	0.074 (0.026)***	0.070 (0.023)***	0.073 (0.026)***	0.070 (0.024)***
Large-scale privatization	−18.167 (9.699)*	−21.171 (18.997)	−19.607 (10.669)*	−15.004 (9.053)*	−19.313 (10.690)*	−15.566 (9.950)
Small enterprises	0.883 (0.195)***	0.834 (0.317)**	0.972 (0.339)***	0.810 (0.179)***	0.886 (0.299)***	0.783 (0.276)***
Quantitative significance						
IO	1.032	1.137	1.064	1.005	1.053	1.011
Large-scale privatization	−0.660	−0.769	−0.712	−0.545	−0.702	−0.566
Small enterprises	2.021	1.909	2.226	1.855	2.029	1.792
P-values for hypothesis tests						
Parsimonious vs. unrestricted regression†	0.844	0.988	0.848	0.926	0.741	0.799
Over-identification Sargan's test	0.913	n.a.	0.957	0.429	0.877	0.486
Hansen's *J*-test	0.927	n.a.	0.967	0.456	0.904	0.498

Continued overleaf

Note: Identification strategy: reformist voting and education are excluded.

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TABLE 4

(continued)

Panel B: First-stage (reduced-form) estimates; dependent variable: small-enterprise formation

	Estimation procedure					
	OLS	*LAD*	*OLS*	*OLS*	*OLS*	*OLS*
Outliers removed	None	None	Moscow	Growth‡	Small ents‡	Growth and small ents
IO	−0.005 (0.012)	−0.013 (0.007)*	−0.012 (0.011)	−0.004 (0.012)	−0.013 (0.008)	−0.012 (0.008)
Education	0.384 (0.055)***	0.352 (0.040)***	0.240 (0.064)***	0.419 (0.056)***	0.258 (0.048)***	0.292 (0.050)***
Large-scale privatization	6.483 (4.762)	6.998 (3.418)**	9.472 (4.449)**	4.422 (4.735)	6.733 (3.478)*	4.954 (3.506)
Reformist voting	0.058 (0.020)***	0.087 (0.014)***	0.061 (0.018)***	0.045 (0.020)**	0.077 (0.014)***	0.068 (0.014)***
R^2-value	0.633		0.463	0.654	0.658	0.674
Pseudo-R^2-value		0.298				
Quantitative significance						
IO	−0.073	−0.193	−0.176	−0.060	−0.185	−0.171
Education	1.420	1.300	0.888	1.547	0.954	1.080
Large-scale privatization	0.236	0.254	0.344	0.161	0.245	0.180
Reformist voting	0.591	0.889	0.616	0.461	0.780	0.686
P-values for *F*-tests of exclusion restrictions						
Education and reformist voting	0.000	0.000	0.000	0.000	0.000	0.000

Notes:

†Variables excluded from the unrestricted regression are initial income, defence, distance (log) and small privatization.

‡A growth outlier is defined as a region with a corresponding residual estimated in the LAD growth equation that differs from zero by more than two standard deviations. There are two growth outliers: the Mariy-El Republic and the North Osetian Republic. A small-enterprise outlier is defined analogously. There are four small-enterprise outliers: Moscow, the Dagestan Republic, Orenburg Oblast and Tyumen Oblast.

for growth measured through 1997:IV, yielding similar results). The purpose of these checks is to account for the potential influence of outliers on the 2SLS analysis presented above, with special attention given to Moscow. Specifically, Table 4A presents six sets of estimates of the parsimonious growth equation (2). The first contains the original full-sample 2SLS estimates. The second contains full-sample two-stage estimates obtained using the LAD criterion rather than the least-squares criterion. The third contains 2SLS estimates obtained given the exclusion of Moscow from the sample. The fourth and fifth contain 2SLS estimates obtained given the exclusion of regions deemed to be outliers based on residuals in both the growth and small-enterprise equations corresponding to the LAD estimates reported in column 2. Finally, the sixth contains 2SLS estimates obtained given the joint exclusion of the regions deemed to be outliers in the fourth and fifth specifications.[5] Table 4 reports estimates obtained for the corresponding first-stage specifications.

Regarding the estimates reported in Table 4, the coefficients associated with IO and ENT are statistically significant across all six specifications. Moreover, the quantitative significance measure for IO has a very tight range (1.005–1.137); the range for ENT is 1.792–2.226. LPRIV is statistically significant (at the 10% level) in four of the six specifications; its quantitative significance measure ranges from −0.566 to −0.769. Finally, in all cases we fail to reject the exclusion restrictions implied in moving from the unrestricted growth specifications to the parsimonious specifications reported in the table; and in all cases, the Sargan and *J*-tests continue to indicate the validity of EDU and REF as instruments.[6]

Turning to the reduced-form estimates in Table 4B, REF and EDU remain statistically significant in all specifications, and their associated parameter estimates are quite stable across specifications. The only variable sensitive to outliers is LPRIV. While it consistently exhibits a positive association with small-enterprise formation, it is statistically significant at no less than the 10% level in only three of the six specifications.

VI. Conclusion

Exploiting the rich regional variation in entrepreneurial activity and initial conditions that existed within Russia early in its transition, in addition to the regional variation in subsequent growth it has realized, we have found a statistically and quantitatively significant relationship between entrepreneurial activity and growth. This intra-national evidence thus complements evidence

[5]A region was deemed to be an outlier if its corresponding residual differed from zero by more than two standard deviations. Two outliers were thus defined based on estimates of the growth equation, and four were thus defined based on the ENT equation; the outliers are listed in Table 4.

[6]Note, however, that tests for instrument validity do not exist under the LAD procedure.

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of the importance of entrepreneurial activity for growth that has emerged from international comparisons of transitional economies. The fact that we observe such a strong and robust statistical relationship in this case is particularly noteworthy given Russia's relatively poor showing in these international comparisons.

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Appendix A: Summary statistics

Variable	*Timing*	*Average*	*Median*	*Standard deviation*	*Minimum*	*Maximum*
Growth	1993:IV–1997:IV	1.46%	1.54%	4.75%	−8.18%	22.06%
Growth	1993:IV–2000:IV	−7.31%	−7.70%	3.25%	−14.63%	3.49%
Small private enterprises	31 Dec. 1995	4.19	3.87	2.29	1.71	16.61
Education	1994	13.73%	12.70%	3.69%	9.20%	33.40%
Initial income	1993:IV	8.80	8.11	2.64	3.29	19.57
Reformist voting	Dec. 1993	33.30%	32.40%	10.16%	13.00%	61.00%
IO	1985	5.11	7.19	14.45	−71.74	42.30
Defence	1985	0.23	0.22	0.13	0.00	0.57
Distance from Moscow (ln)		7.04	7.07	1.37	0.00	9.37
Large-scale privatization	1993	0.05	0.05	0.04	0.00	0.16
Small-scale privatization	1993	0.20	0.20	0.12	0.00	0.78

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Appendix B: Correlation matrix

	Growth: 1993–1997	*Growth: 1993–2000*	*Small-Ents*	*Edu*	*Init Inc*	*Ref. voting*	*IO*	*Def*	*Dist*	*Small-scale Priv*	*Large-scale Priv*
Growth: 1993–1997	1.000										
Growth: 1993–2000	0.769	1.000									
Small-Ents	0.536	0.397	1.000								
Education	0.492	0.415	0.760	1.000							
Initial income	0.334	0.168	0.343	0.156	1.000						
Reformist voting	0.496	0.378	0.567	0.506	0.207	1.000					
IO	0.214	0.241	−0.109	−0.144	0.182	0.0289	1.000				
Defence	0.185	0.086	0.004	0.080	−0.076	−0.061	0.086	1.000			
Dist from Moscow (ln)	−0.215	−0.170	−0.258	−0.246	−0.040	−0.003	−0.237	−0.163	1.000		
Large-scale Priv	0.021	−0.116	0.118	0.043	0.143	−0.040	0.042	−0.049	−0.034	1.000	
Small-scale Priv	−0.076	−0.194	−0.046	−0.107	0.070	0.068	−0.109	−0.033	0.156	0.360	1.000

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