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Property Rights and Finance

By SIMON JOHNSON, JOHN McMILLAN, AND CHRISTOPHER WOODRUFF*

Which is the tighter constraint on private sector investment: weak property rights or limited access to external finance? From a survey of new firms in post-communist countries, we find that weak property rights discourage firms from reinvesting their profits, even when bank loans are available. Where property rights are relatively strong, firms reinvest their profits; where they are relatively weak, entrepreneurs do not want to invest from retained earnings. (JEL D23, P23)

Property rights are fundamental: entrepreneurs will not invest if they expect to be unable to keep the fruits of their investment. Country-level studies consistently show that less secure property rights are correlated with lower aggregate investment and slower economic growth (Stephen Knack and Philip Keefer, 1995; Paolo Mauro, 1995; Jakob Svensson, 1998; Daron Acemoglu et al., 2001). The microeconomic evidence is more limited, but Timothy Besley (1995), for example, finds in Ghana a significant link between property rights and investment.

Secure property rights may be necessary for entrepreneurial investment, but are they sufficient? External finance could also matter for investment and growth, for if bank credit is not available it may be hard for entrepreneurs to take advantage of new opportunities. There is evidence that a well-functioning financial system contributes to investment and growth (Ross

Levine, 1997; Raghuram Rajan and Luigi Zingales, 1998). Is external finance, in addition to secure property rights, necessary for entrepreneurs to invest, or is property-rights security all that is needed? Broad cross-country studies cannot answer this question because effective protection for property rights is positively correlated with the use of external finance. For example, Rafael La Porta et al. (1997, 1998, 2000) show more external finance is available when there is a stronger legal system in general and more effective protection of investors in particular, while Asli Demirguc-Kunt and Vojislav Maksimovic (1998) find that firms invest more from external funds in countries with secure property rights.

Recent experience in Eastern Europe and the former Soviet Union offers an experiment that can help disentangle the effects of property rights and external finance. Although all these former communist countries have relatively weak institutional environments, there is considerable variation in the extent to which property rights are protected. For example, Timothy Frye and Shleifer (1997) and Shleifer (1997) provide evidence that the Russian government acts like a "grabbing hand," discouraging entrepreneurs from investing, while the Polish government does not. In general, property rights have proven more secure in Poland than in other parts of Eastern Europe and the former Soviet Union. Within countries, also, there is variation in both the perceived security of property rights and in the access to bank credit. Given these countries' banking systems, small firms are able to borrow only if they can provide adequate collateral. Owning collateral is therefore a good proxy for at least having the possibility to

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borrow. Firm-level evidence from these post-communist countries therefore allows us to determine whether secure property rights are (a) necessary, (b) sufficient, or (c) necessary and sufficient for investment by entrepreneurs.

Our data come from a 1997 survey of recently formed and relatively small manufacturing firms in five transition countries: Poland, Romania, Slovakia, Ukraine, and Russia. The perceived security of property rights and the use of bank credit vary considerably both across and within these countries. As an outcome variable, we focus on the amount entrepreneurs choose to reinvest out of their profits. This provides a robust measure of investment, as our survey work indicates, that is comparable across firms.

Our approach has two parts, both of which are designed to be straightforward to implement in countries where standard financial information is hard to obtain. First, we explain the data we were able to obtain, putting particular emphasis on what our investigation shows is a reasonable way to ask questions about sensitive financial information and property-rights issues (Section I).¹ Second, we test whether secure property rights are sufficient for investment by entrepreneurs (Sections II and III).

The entrepreneurs in our sample reinvest less of their retained earnings when they perceive their property rights to be insecure, irrespective of whether they own the collateral that is generally needed to obtain credit. This effect is large. Those entrepreneurs in our sample with the least secure property rights invest nearly 40 percent less of their profits than those with the most secure property rights (specifically, entrepreneurs with the least secure perceived property rights reinvest 32 percent of their profits, while those with the most secure reinvest 56 percent). Secure property rights are necessary for the entrepreneurs in our sample to take full advantage of opportunities to invest. Moreover, we find that the absence of bank finance does not prevent the entrepreneurs in our sample from investing. Controlling for property rights, there is no evidence that access to bank

¹ For more detail on the survey see Appendices A, B, and C, which are on the *American Economic Review* web site: (www.aeaweb.org/aer). The questionnaire and the complete raw data are available at (<http://www-irps.ucsd.edu/faculty/cwoodruff/data.htm>).

credit leads to more investment for these firms. Secure property rights are therefore also sufficient for investment. In fact, the firms in our sample with weak perceived property rights and high levels of unreinvested profits do not want to borrow.

Part of the explanation for these results is that, for the firms in our sample, retained earnings have consistently been large, and therefore have been a source of potential investment funds. Many of these new firms are extremely profitable because the relatively hostile business environment creates barriers to entry and because the partially reformed economy offers entrepreneurs lucrative unfilled niches.² High profits mean that entrepreneurs have the resources they need for expansion, without needing to borrow. The issue is not whether entrepreneurs have enough resources, but rather whether they want to invest their retained earnings or instead consume these earnings, perhaps outside the country.

At the low level of institutional development of the countries in our sample, secure property rights are both necessary and sufficient to induce investment by entrepreneurs. The availability of bank loans surely matters for growth, but perhaps only once property rights are perceived to be secure. If property rights are insecure, it is immaterial whether or not finance is available. Our findings thus add empirical detail to the view that certain market-supporting institutions will work only after other institutions have been built (McMillan, 1997; Shleifer and Vishny, 1998).

Because our survey covers only firms already in existence, we cannot infer anything about the relative importance of property rights and finance for potential entrepreneurs who are considering entry. We focus instead on entrepreneurs who are already in business with small-scale operations. Our question is: under what conditions

² High profits to new entrants appear to have been common in the early stages of reform in the formerly planned economies. China's newly entering rural firms had an average rate of profit on capital of 40 percent in 1978, the first year of reform; in subsequent years this profit rate fell as China's marketization proceeded (Barry Naughton, 1995, p. 150). Anecdotal evidence that early entrants in Poland earned high profits is given in Johnson and Gary W. Loveman (1995).

will these entrepreneurs reinvest their profits to make their businesses grow?

I. The Data

A. The Sample

We surveyed private manufacturing firms in May and June of 1997 in Russia and Ukraine and from September to December of 1997 in Poland, Slovakia, and Romania.³ The survey was designed to find similar relatively small firms in comparable cities in all five countries.

We chose the countries explicitly to look for variation in institutional conditions. The previously available cross-country evidence, for example from European Bank for Reconstruction and Development (EBRD, 1996) and Shleifer (1997), suggested that property rights were less secure in countries further to the East. We intentionally surveyed only firms that were going concerns, in order to focus on investment decisions by firms that had managed to enter an industry and survive. Other researchers have found that weak property rights increase barriers to entry (Simeon Djankov et al., 2002). Daniel Berkowitz and David N. DeJong (2002) find variation across Russian regions in the rate of formation of new firms is associated with the degree of local political support for reform. This paper looks instead at the effects of weak property rights on entrepreneurial investment conditional on entry having occurred.

The sample includes about 300 manufacturing firms with between seven and 270 employees in each country; the total sample size for most variables is about 1,400 observations. Some of the firms were started from scratch and others were spun off from state enterprises, which probably reflects characteristics of the population of firms. In our sample for Poland, Romania, and Slovakia, start-ups far outnumber spin-offs; in Russia and especially Ukraine, spin-offs predominate. We control for these

³ We chose these three countries on the basis of country-level measures that indicated substantial variation in institutional environment. The survey is described in more detail in Appendix A, and Appendix C summarizes our key questions about finance, profits, investment, and property rights. (These Appendices are available at www.aeaweb.org/aer.)

characteristics of the firms in our regression analysis.

B. The Questions

The survey design incorporated both experience of previous surveys on these topics and the results of pilot studies we carried out in each country. The pilots tested precisely how people understood various questions and established the best ways to ask about sensitive information. For the purposes of this paper, the most important issue was how to ask about profits and their reinvestment.

We expected respondents would be reluctant to answer questions about the specific nominal amounts of profits and investments, and we found this to be the case. However, they were more willing to answer questions posed in terms of ratios. We also found that respondents found it much easier to answer questions that posed this ratio in terms of a closed-end question listing various ranges from which they could choose. For example, our key question was: "How much did you reinvest out of profits during 1996?" We offered respondents six choices: 0 percent, 1–10 percent, 11–25 percent, 26–49 percent, 50–75 percent, or more than 75 percent. Both the use of ratios and the closed categories represent compromises. We obtain much higher response rates: in the case of reinvestment rates, the response rate exceeded 94 percent.⁴ But we have only categorical rather than continuous data. As a result, our regressions will be ordered probits.

Previous research indicated that for particularly sensitive issues, for example relating to bribes and other issues linked to security rights, the response rate was higher when we posed the questions in terms of asking about "firms in your industry" rather than the entrepreneur's own firm.⁵ Our assumption, based on other

⁴ For questions where the range of potential responses ranged too widely to use categories, we did ask for specific nominal amounts. In these cases—for example, when we asked firms how much capital they invested in the firm at start-up—response rates were much lower.

⁵ This way of asking about sensitive issues, such as property rights and underground economic activity, was developed by Daniel Kaufmann in his earlier empirical work; see, for example, Joel Hellman et al. (2000). The

TABLE 1—PERCEIVED SECURITY OF PROPERTY RIGHTS

Survey result	All countries	Poland	Slovakia	Romania	Russia	Ukraine
1) Percentage of respondents who say firms make extralegal payments for government services	37.3 (1,117)	20.1 (298)	38.2 (306)	20.0 (315)	91.2 (114)	86.9 (84)
2) Percentage of respondents who say firms make extralegal payments for licenses	37.9 (1,128)	19.3 (300)	42.2 (303)	17.0 (317)	91.7 (120)	87.5 (88)
3) Percentage of respondents who say firms make payments for protection	24.4 (1,163)	7.9 (302)	14.9 (308)	0.6 (320)	92.9 (126)	88.8 (107)
4) Percentage of respondents who say firms make unofficial payments for ongoing registration	14.0 (805)	0.4 (234)	3.0 (236)	19.1 (267)	80.0 (55)	76.9 (13)
5) Percentage of respondents who say firms make unofficial payments for fire/sanitary inspection	19.2 (881)	2.8 (254)	12.1 (248)	21.8 (289)	67.9 (56)	91.2 (34)
6) Percentage of respondents who say firms make unofficial payments for tax inspection	12.9 (843)	0.8 (247)	2.5 (242)	17.3 (289)	75.6 (45)	85.0 (20)
7) Tax payments to government as a percentage of sales for firms in industry	18.9 (1,130)	15.5 (277)	16.4 (278)	17.2 (321)	26.9 (119)	28.0 (135)
8) Percentage of respondents who say courts cannot be used to enforce contracts	31.6 (1,470)	27.1 (303)	32.1 (308)	13.1 (321)	44.2 (269)	45.4 (269)
Number of entrepreneurs surveyed	1,471	303	308	321	269	270

Note: The number of observations is given in parentheses below each response level.

experience, is that answers to this question reflect the entrepreneur's own experience. At least one respondent confirmed this, telling our survey firm that he knew the questions were designed to "disguise the fact that [the survey] was after information about his own firm." He responded to the questions anyway.

C. Measuring Property Rights

The entrepreneur's beliefs about the security of his or her property rights are indicated by responses to several survey questions. We asked entrepreneurs first whether firms in their industry make "extralegal payments" for government services, and second whether firms in their industry make "extralegal payments" for licenses. More than 90 percent of the Russian entrepreneurs and almost 90 percent of Ukrainian entrepreneurs answered affirmatively to these questions (see the first two rows of Table 1).

results seem consistent with available cross-country evidence and across surveys.

Only one in five entrepreneurs in Poland and Romania said firms make extralegal payments for services or licenses. The response rates for these questions are well above 98 percent in the three Eastern European countries, but are 40 percent or less in Russia and Ukraine. One reasonable interpretation of a refusal to answer the question, in this context, is that the entrepreneur makes these payments and—for obvious reasons—does not want to discuss them.

We also asked whether firms make payments for "protection" of their activities, finding a similar pattern of responses across the countries (in the third row of Table 1). We chose not to ask directly about whether firms made payments to organized crime, because we expected that most entrepreneurs would not admit this. However, the indirect question probably picks up whether a firm believes it is likely to be subject to extortion by some form of mafia—although we would caution that anecdotal evidence suggests this sort of organized crime often operates with the tacit protection of some local government officials.

For further measures of property-rights se-

curity, we asked entrepreneurs whether they make “unofficial” payments for specific services: payments for renewing their business registration, and payments to fire, sanitary, and tax inspectors (see the fourth, fifth, and sixth rows of Table 1). Though the response rates to these questions are lower, the pattern is the same. A majority of entrepreneurs in Russia and Ukraine say such payments are common, while a minority of entrepreneurs in the other three countries say the same. We use these detailed corruption measures to check the robustness of results from our basic regression.

Official payments to government are also higher in Russia and Ukraine, where tax payments are more than one quarter of sales, compared to about a sixth of sales in Eastern Europe (see the seventh row of Table 1).⁶ We control for tax payments as a percent of sales to see whether this is a direct disincentive to invest. We do find some evidence that investment rates are negatively impacted by higher tax rates, though in contrast to other results, the tax rate findings are not robust.

Using courts to enforce contracts with trading partners is a logically distinct activity from protecting property rights. Nevertheless the effects on investment are similar. Inadequate contractual enforcement could put firms’ profits at risk and make them reluctant to invest. Asked whether courts could be used to enforce an agreement with a customer or supplier, most firms in all of the countries said they could. Affirmative answers to this question ranged from 87 percent in Romania to 56 percent in Ukraine (see the last row of responses in Table 1).

Overall, Table 1 shows that the five countries fall into two distinct groups—the three East European countries have relatively more secure

⁶ We asked entrepreneurs to report taxes as a percent of total sales. Firms in Eastern Europe and the former Soviet Union routinely underreport sales to avoid taxes and extortion (Johnson et al., 1997). In separate questions, entrepreneurs indicated that the percentage of sales hidden by firms in their industry is about 41 percent in Ukraine, 29 percent in Russia, and around 6 percent in the other three countries. It may be that some entrepreneurs reported taxes and profits as a percent of official sales rather than total sales. If so, then the tax burden and profit rates will be overstated, especially for Russia and Ukraine. But this should not affect our analysis of reinvestment rates.

property rights than do the two former Soviet Union countries. Courts are less reliable in resolving commercial disputes in Russia and Ukraine, and interactions with the government are also more costly in these countries. This is consistent with the existing evidence that the regulatory environment in Eastern Europe is less hostile to business activity than in the former Soviet Union (see, for example, Frye and Shleifer, 1997).

Entrepreneurs’ perceptions of the security of property rights may vary within a country for three reasons. First, different firms may face different realities. Interaction with the government may be more frequent in some industries than in others. Activities may vary in the ease with which they can be hidden from government bureaucrats. And some entrepreneurs may have connections that allow them to avoid extortion. In our data, for example, entrepreneurs who previously worked as high-level entrepreneurs in state-owned enterprises are less likely to say bribes are paid. Second, entrepreneurs may differ in their perceptions. This is especially likely in an economy undergoing deep reform, where institutions and circumstances change quickly. We find, for instance, that older entrepreneurs are less likely to say bribes are paid. Third, the responses may reflect some other characteristic of the firm or the entrepreneur. In our regressions we control for as many characteristics as possible, but some unobserved attributes may matter for investment.

D. An Index of the Insecurity of Property Rights

Table 2 shows the correlations among our property-rights measures for individual firms in all five countries. Not surprisingly, most are highly correlated. Extralegal payments for services and extralegal payments for licenses have a correlation coefficient of 0.66, while the correlation between payments for “protection” and either of these measures is larger than 0.50.

For our regression analysis, we combine the three main property-rights questions—extralegal payments for licenses, extralegal payments for services, and paying for protection—into an additive index of property-rights insecurity for

TABLE 2—CORRELATIONS AMONG VARIOUS INDICATORS FOR THE SECURITY OF PROPERTY RIGHTS

Indicator	Payments for services	Payments for licenses	Payments for protection	Index of property rights
Firms make extralegal payments for licenses	0.66 (1,105, <0.01)			
Firms make payments for protection	0.52 (1,109, <0.01)	0.54 (1,122, <0.01)		
Index of property rights insecurity	0.87 (1,099, <0.01)	0.87 (1,099, <0.01)	0.79 (1,099, <0.01)	
Courts cannot enforce contracts	0.1 (1,117, <0.01)	0.11 (1,117, <0.01)	0.22 (1,163, <0.01)	0.15 (1,099, <0.01)
Tax payments as a percentage of sales for firms in industry	0.24 (996, <0.01)	0.24 (1,007, <0.01)	0.31 (1,042, <0.01)	0.29 (981, <0.01)
Firms make unofficial payments for ongoing registration	0.29 (775, <0.01)	0.27 (783, <0.01)	0.36 (789, <0.01)	0.38 (769, <0.01)
Firms make unofficial payments for fire/sanitary inspection	0.33 (840, <0.01)	0.32 (843, <0.01)	0.29 (857, <0.01)	0.39 (830, <0.01)
Firms make unofficial payments for tax inspection	0.36 (816, <0.01)	0.34 (818, <0.01)	0.32 (828, <0.01)	0.43 (806, <0.01)
Firm had loan before 1996	0.15 (1,072, <0.01)	0.16 (1,082, <0.01)	0.26 (1,115, <0.01)	0.20 (1,055, <0.01)
Firm has collateral	-0.05 (997, 0.13)	-0.03 (1,006, 0.28)	-0.03 (1,040, 0.28)	-0.05 (980, 0.09)

Notes: Correlations are for all five countries combined. The number of observations and significance level are in parentheses.

each firm. The property-rights index we construct ranges from 0 to 3, with 3 indicating that the entrepreneurs said all three payments were common, 2 indicating an affirmative response to two of the payments, 1 indicating an affirmative response to one of the payments, and 0 indicating an affirmative response to none. A higher value of this index therefore represents less secure property rights.

An alternative index for property rights insecurity would equal one if firms make any one of the three types of payments and zero otherwise. Either of these indexes can be justified theoretically.

The additive index is appropriate if responding affirmatively to more than one question indicates a greater level of insecurity than responding affirmatively to only one question. The either/or index is appropriate if one bribe-taker has the same effect as multiple bribe-takers. According to the model of Shleifer and Vishny (1993), if two or more corrupt bureaucrats coordinate so as to maximize their total bribes, they will extract the same total amount

as a monopoly extortionist. If they compete with each other, however, their total bribes will, by prisoners'-dilemma logic, exceed the bribe-maximizing amount. The data show the effects of corruption are additive, as discussed below (Section III), suggesting the rate of total bribes might exceed what even the bribe-takers would want.

A belief that courts are not effective in enforcing contracts is positively correlated with the corruption measures, but the correlation is smaller. The correlation between courts and the index for insecurity of property rights is 0.15. While this correlation may seem low, it probably reflects the fact that believing the courts can enforce private contracts is quite different from trusting the government not to expropriate your property. With regard to courts, the issue is presumably whether judges are incompetent or corruptible. With regard to security of property rights, the issue is to what extent members of the executive feel constrained to act responsibly and within the law. Even in environments where the executive is quite predatory

TABLE 2—Continued.

Courts enforce	Taxes as a percentage of sales	Bribes registration	Bribes fire/sanitary	Bribes taxes	Loan before 1996
0.11 (1,130, <0.01)					
0.06 (805, 0.09)	0.19 (756, <0.01)				
0.03 (881, 0.40)	0.17 (820, <0.01)	0.49 (757, <0.01)			
0.01 (843, 0.74)	0.16 (789, <0.01)	0.47 (734, <0.01)	0.63 (811, <0.01)		
0.06 (1,302, 0.02)	0.15 (1,094, <0.01)	0.16 (739, <0.01)	0.16 (863, 0.01)	0.08 (828, 0.02)	
-0.05 (1,217, 0.08)	-0.04 (1,018, 0.25)	0.08 (739, 0.03)	0.03 (805, 0.37)	0.04 (769, 0.29)	0.30 (1,189, <0.01)

(Russia, for example), we see considerable willingness on the part of entrepreneurs to rely on courts for the enforcement of contracts with other entrepreneurs.

In the main regressions, we use the effectiveness of courts alongside the index of property rights. We also run regressions using the components of the index separately. Finally, an alternative index of property rights that we use in the regressions, ranging from 0 to 4, adds to the first index the measure of the ineffectiveness of courts (that is, we add one if the entrepreneur thinks the courts cannot be used to enforce contracts and zero otherwise).

E. Reinvestment of Profits

Initial entrants in transition economies often earn large profits, which decline over time as new firms enter (McMillan, 1997). Our data are consistent with this at the country level. Table 3 (second line) shows the firms' average profit after taxes as a percent of sales in 1996. Re-

ported after-tax profits are much higher in Russia (21 percent) and Ukraine (18 percent), where there has been the least progress with economic reform, than in Poland (10 percent), where the transition has progressed much further. Romania is in between (13 percent). Slovakia appears to be the outlier in this pattern, with profit rates much lower than in any of the other countries (6 percent).⁷ Entrepreneurs were also asked to estimate profit rates after taxes in their industry, as a percent of sales. As we would expect, the estimates of industry profits and the firm's own profit rates are highly correlated ($p = 0.41$). At the country level, these estimates, also shown in Table 3 (third line),

⁷ Responses to questions about the entrepreneur's own profits were provided in categories. Appendix B (at www.aeaweb.org/aer) explains how the numbers in Table 3 were calculated from these responses. The profit data are also compared in Appendix B to data from the National Survey of Small Business Finance, conducted in 1993 in the United States among similarly sized firms (Federal Reserve Board of Governors, 1994).

TABLE 3—USE OF INTERNAL FINANCE

Measure	Poland	Slovakia	Romania	Russia	Ukraine
Number of firms	303	308	321	269	270
1996 profit after taxes, percentage of annual sales	9.9	5.7	12.9	20.6	18.0
Estimated industry profit rate after taxes	11.1	10.0	13.4	17.6	14.3
Profit reinvestment, percentage of profits after taxes	52.6	42.3	52.8	38.8	29.6
Unreinvested profit, percentage of annual sales	4.8	3.6	5.7	11.7	12.3
Profit after taxes in first year of operation, for firms started in:					
1989–1991	9.9	2.4	8.3	4.3	7.6
1992–1993	4.2	−0.2	7.8	4.5	6.6
1994–1996	2.1	−1.1	6.7	3.9	7.4
<i>Start-ups:</i>					
Number of firms	237	238	281	128	82
1996 profit after taxes, percentage of annual sales	10.5	6.0	13.4	20.8	19.0
Estimated industry profit rate after taxes	11.3	9.8	13.8	18.3	14.9
Profit reinvestment, percentage of profits after taxes	53.6	44.8	54.2	37.5	29.4
Unreinvested profit, percentage of annual sales	4.8	3.7	5.8	12.2	12.9
<i>Spin-offs:</i>					
Number of firms	66	70	40	123	183
1996 profit after taxes, percentage of annual sales	7.7	4.6	9.6	20.3	17.7
Estimated industry profit rate after taxes	10.1	10.6	10.5	17.1	14.0
Profit reinvestment, percentage of profits after taxes	49.0	33.7	42.5	39.4	29.6
Unreinvested profit, percentage of annual sales	5.0	3.5	5.0	11.2	12.1

Notes: Profit reinvestment as a percentage of profits excludes firms with zero or negative profits. In order to make the data more comparable to the external finance data shown in Table 4, we assume that firms with negative or zero profits reinvest zero percent of sales and have unreinvested profits of zero percent of sales. Profit reinvestment as a percentage of annual sales is calculated by multiplying profits as a percentage of sales by profit reinvestment as a percentage of profits. Unreinvested profits as a percentage of sales is calculated as profits as a percentage of sales times one minus profit reinvestment as a percentage of profits. See Appendix B at (www.aeaweb.org/aer) for more details on the calculations.

indicate a similar pattern, but with less variation across countries.⁸

⁸ Throughout, we use the reported rate of profit as a proxy for the firm's cash flow available for reinvestment. In reality, profits and cash flow may diverge for a number of reasons, in particular depreciation. However, information

These profit rates are high relative to the available data for large firms in these countries. The best data are for Poland. According to the most recent data in Worldscope, average profit/

on depreciation recorded by the firms is not available from the survey.

sales for Polish firms from all industries is about 5 percent.⁹ However, this average hides considerable disparity. In particular, large firms operating in sectors with substantial barriers to entry, for example due to regulations, had profits as a percent of sales that were comparable to the small firms in our sample.

These data are consistent with the idea that the insecurity of property rights may deter entry into the small-firm sector (Djankov et al., 2002). In addition, these partially reformed post-communist economies offer entrepreneurs lucrative unfilled niches. There is also presumably a survivorship bias for small firms. We are measuring only the firms that have not gone out of business (although arguably this should overstate the importance of external finance and underestimate the importance of expropriation risk). Large firms may not show such a bias because, in these countries, the government may provide implicit subsidies that prevent them from going out of business.

Entrepreneurs also reported profits as a percentage of sales during their firm's first full year of operation. We show in Table 3 (see the sixth, seventh, and eighth lines) the average first-year profit rates by country and by year in which the firms began operation. In Poland, firms started between 1989 and 1991, just after the reforms, reported earning an average of 9.9 percent of sales during their first year of operation. First-year profits were markedly lower—4.2 percent of sales—for firms started in 1992 or 1993, and lower still for the most recent group of entrants (2.1 percent of sales for firms entering between 1994 and 1996). These data are consistent with our expectation that entry leads to lower profit rates.

A downward trend over time in profit rates for entrants in their first year of business is also evident in Slovakia and Romania, though the rate of fall is not as steep as in Poland. There is even less difference across time in the profit rates of start-up firms in either Russia or Ukraine. Firms entering between 1989 and 1991 had average first-year profit rates of 4.3 percent and 7.6 percent of sales in Russia and Ukraine,

⁹ Worldscope also has data for Russia and Slovakia, although this is available for fewer firms. The average profit-sales ratio in Russia for 1999 is 7.11 percent, although firms with substantial market power show higher profit rates. Almost all the Slovak firms show losses.

respectively. Those entering five years later had average profit rates of 3.9 percent and 7.4 percent of sales, respectively.¹⁰

We also asked what fraction of 1996 profits after taxes were reinvested in the firm. Polish and Romanian firms reinvested the highest fraction, slightly more than 50 percent on average (fourth line of Table 3). Reinvestment rates average about 40 percent in Slovakia and Russia, and 30 percent in Ukraine.¹¹ We also compute the profits entrepreneurs choose not to reinvest in their businesses (fifth line of Table 3). Unreinvested profits as a percentage of sales are highest in Russia and Ukraine, where they exceed 10 percent of sales, and lower in Romania (5.9 percent of sales), Poland (5.2 percent), and Slovakia (5.1 percent). In Russia and Ukraine, where property rights are the least secure, entrepreneurs are on average the most reluctant to reinvest their profits.

Table 3 also divides these data into start-ups and spin-offs. Start-ups are more profitable than spin-offs in all five countries, though the difference is much greater in Poland and Romania than in the other three countries. Start-ups reinvest a greater proportion of their profits than spin-offs in Poland, Slovakia, and Romania.

F. External Finance

The survey contains three indications of having received bank credit. First, we asked firms what their sources of start-up capital were. A minority of firms, ranging from 6.6 percent of Polish firms to 27 percent of Slovakian firms, obtained part of their start-up capital from bank loans (see the second line of Table 4). Second, we asked whether they obtained a loan at some point in the past. Over 90 percent of Russian firms and 79 percent of Ukrainian firms say they have received loans at some time (third line of Table 4). Only half of Slovakian and Romanian firms have had a loan at

¹⁰ *T*-tests comparing the profit rate in the early period (1990–1992) with the profit rate in the last period (1994–1996) indicate that the drop in first-year profit rates is significant at the 1-percent level in Poland ($t = 3.38$) and in Slovakia ($t = 2.96$), but not in Romania ($t = 0.99$), Russia ($t = 0.30$), or Ukraine ($t = 0.61$).

¹¹ See Appendix B at www.aeaweb.org/aer for the details of these calculations as well as some caveats to their interpretation.

TABLE 4—SOURCES OF EXTERNAL FINANCE

Measure	Poland	Slovakia	Romania	Russia	Ukraine
Number of firms	303	308	321	269	270
Percentage of firms with bank loans at start-up	6.6	27.0	9.7	15.2	12.2
Percentage of firms with bank loans ever	70.0	51.0	49.8	92.4	79.0
Percentage of firms with bank loans in 1996	48.8	27.6	24.1	17.0	13.8
Percentage of firms with collateral at the time of interview	95.7	80.8	94.4	87.2	75.5
Average 1996 loan, percentage of annual sales					
All firms (no loan = 0 percent)	2.3	2.5	1.7	2.3	0.8
Firms with loans	4.8	10.6	7.3	24.7	13.4
Accounts payable, percentage of annual sales					
All firms	2.7	3.4	NA	0.1	0.7
Firms with 1996 loans	2.5	4.2	NA	0.04	0.3
<i>Start-ups:</i>					
Number of firms	237	238	281	128	82
Percentage of firms with bank loans: ever in 1996	72.2 50.6	42.4 22.7	46.6 20.8	95.4 12.0	81.9 11.1
Average 1996 loan, percentage of annual sales (no loan = 0 percent)	2.5	2.0	1.7	1.7	1.3
Accounts payable, percentage of annual sales	2.5	3.2	NA	0.1	0.9
<i>Spin-offs:</i>					
Number of firms	66	70	40	123	183
Percentage of firms with bank loans: ever in 1996	62.1 42.4	80.0 44.3	72.5 47.5	89.4 21.5	78.5 14.6
Average 1996 loan, percentage of annual sales (no loan = 0 percent)	1.5	4.4	2.2	2.8	0.6
Accounts payable, percentage of annual sales	3.2	4.0	NA	0.1	0.7

Note: For details of variable definitions, see Section II of the text.

some point in the life of the enterprise. Third, we asked whether they obtained loans from banks in 1996, the year before the survey. The greatest percentage of current borrowers was in Poland, where just under half (49 percent) of firms said they had loans in 1996. About a quarter of firms in Slovakia and Romania said they had loans in 1996, with lower percentages in Russia (17 percent) and Ukraine (14 percent).¹²

¹² There are no reliable comparable data on credit to the private sector across transition countries, but the ratio of broad money to GDP provides a rough indicator. In 1996,

Although fewer firms in Russia and Ukraine received loans than in the other three countries, the average loan size was larger there. Loans average less than 5 percent of a borrower's

broad money was 37.5 percent of GDP in Poland, 28.9 percent in Romania, 13.1 percent in Russia, 71 percent in Slovakia, and 11.16 percent in Ukraine (EBRD, 1997). The real money supply in Russia and Ukraine fell dramatically between 1991 and 1996, which partially accounts for credit becoming harder to get in these two countries (EBRD, 1997). Of course, our sample has quite different characteristics from the large state or privatized firms that receive (or do not receive) most of the credit in these transition economies.

annual sales in Poland, more than 10 percent of annual sales in Slovakia and Ukraine, and almost 25 percent of annual sales in Russia. As a result, the variation across countries in the total funds provided by banks is small. Including firms who do not receive loans, Slovakian firms received the most credit in 1996, amounting to 2.5 percent of annual sales. In Poland and Russia, finance provided by banks represents 2.3 percent of annual sales, in Romania 1.7 percent, and in Ukraine 0.8 percent.

Even though Polish firms are much more likely to have obtained a loan in 1996 than firms in the other four countries, the Polish credit markets are underdeveloped by western standards. In the United States, small and medium-sized firms are surveyed periodically by the Federal Reserve Board of Governors (FRBG). Among the 344 firms in the 1993 National Survey of Small Business Finances (NSSBF) that are manufacturers with between ten and 270 employees, 84 percent reported having a loan at the time of the survey. This level is substantially higher than the 49 percent rate in Poland. Moreover, loan amounts were 16 percent of sales among the group of small U.S. manufacturers, several times the levels in any of the countries we surveyed.¹³

Compared to a developed capital market, loans in our five countries are also much more likely to require collateral. While 20 percent of bank loans obtained by U.S. firms were without collateral, less than 2 percent of the firms in our sample obtaining loans did so without collateral. A lack of collateral, however, is not the main reason for less borrowing in our sample than in the United States. More than 75 percent of firms in each of the countries—and more than 90 percent of firms in Poland and Romania—say they were able to offer collateral to banks. At least in the minds of entrepreneurs, a lack of collateral does not appear to be a major constraint on borrowing.¹⁴

¹³ When lines of credit are excluded, loans were 5.8 percent of sales among the small manufacturers in the NSSBF survey. Both of these averages assign a value of zero to firms without loans. (See Appendix B, at www.aeaweb.org/aer, for more discussion of the NSSBF data.)

¹⁴ While the response rate to the collateral question was more than 99 percent in Romania, it was only 76 percent in Ukraine and 61 percent in Russia. If nonrespondents are less

An alternative source of external funds is credit received from other firms. We measure trade credit by the level of accounts payable reported by firms (the eighth and ninth rows of Table 4). Trade credit is almost nonexistent in Russia (0.1 percent of annual sales) and is low in Ukraine (0.7 percent), but is an important source of capital in Poland (2.7 percent) and Slovakia (3.4 percent). Credit received from suppliers is comparable in size to credit received from banks in Poland, Slovakia, and Ukraine. Reliable data for this question are not available for Romania.¹⁵ (For more on trade credit, see Johnson et al., 2002, where we use trade credit as a measure of a firm's trust in its trading partner.)

Profit reinvestment is a larger source of investment capital than either bank funds or trade credit in all five countries, as is seen by comparing Tables 3 and 4 (except that trade credit is bigger than profit reinvestment in Slovakia). In Poland, firms internally generate funds for investment averaging 9.9 percent of sales (Table 3, second line). Bank loans average 2.3 percent of sales for the whole sample and 4.8 percent of sales for firms receiving loans in Poland (Table 4, sixth and seventh lines). In contrast, we estimate that firms in Russia and Ukraine have unreinvested profits averaging 12 percent of sales (Table 3, fifth line). This suggests the Russian and Ukrainian firms could have used their unreinvested profits in productive projects (earning high rates of return), but for some reason they chose not to. The potential for using retained earnings as a source of capital is seen from the fact that, in all five countries, the capital available from unreinvested profits exceeds the capital provided by banks (compare the fifth row in Table 3 with the sixth row in Table 4).

Table 2 shows correlations between the various measures of property rights on the one hand and variables indicating access to credit on

likely to have collateral, then the numbers in Table 2 may overstate the availability of collateral in Russia and Ukraine. Still, as a lower bound (taking all nonrespondents as having no collateral), the survey indicates that more than half of firms in Russia (53 percent) and Ukraine (57 percent) are able to offer collateral.

¹⁵ Apparently respondents misunderstood what we were asking. This question may not have been translated properly.

the other. We would be concerned if access to capital is strongly correlated with security of property rights, because that would make it difficult to disentangle access to credit from security of property. We measure the ability to access credit in 1996 with two variables—an indication that the firm received a bank loan at some point before 1996, and an indication that the firm has collateral that can be used to obtain a loan. The correlations indicate that firms with less secure property rights are more likely to have had a loan before 1996. Firms with less secure property rights are less likely to have collateral to offer banks, but the correlation is small and is significant only for the index of insecurity and for a lack of confidence in courts. Hence, we are not concerned that our measures of insecure property rights are proxying for a lack of access to credit.¹⁶

G. Assessment

The cross-country evidence suggests that property rights are an important determinant of investment by entrepreneurs. In Poland, where property rights are relatively secure, we find high rates of reinvestment. In contrast, in Russia and Ukraine, where property rights are weak, we find that the level of unreinvested profits is high; entrepreneurs there have the ability to do much more investment than they actually do. The next question is whether these results hold in the firm-level data when we control for characteristics of the firm and entrepreneur.

II. A Framework for Investment Decisions

This section lays out a simple framework that explains and defends the assumptions needed for our regression analysis. A firm's desired investment level is a function of both industry and firm-specific factors. Firms in growing in-

¹⁶ The correlations between property rights and access to credit are driven primarily by differences across countries. When Poland, Slovakia, and Romania are separated from Russia and Ukraine, insecure property rights are positively correlated with a lack of collateral. However, the correlations are low, all below 0.11, and there is no correlation between security of property rights and having had a loan before 1996. In Russia and Ukraine, firms with less secure property rights are more likely to have collateral to offer and to have had a loan before 1996.

dustries are faced with more investment opportunities than are firms in declining industries. Production in a capital-intensive industry also necessitates higher investment levels. More able entrepreneurs will find investments more profitable in any industry. All of these factors affect the profitability of potential investments.

Investment demand also depends on the ability of entrepreneurs to retain any profits they make. Entrepreneurs may be unwilling to invest when returns are insecure. The effect of entrepreneurs' perceptions of property rights on investment decisions is the main issue we want to explore. Suppose that the firm makes its investment and borrowing decisions simultaneously, and extortion, if it occurs, comes after any profits are realized, so that firm's demand for investable funds is given by

$$(1) \quad I^d = I(\pi, s, r^I, r^L)$$

where π represents expected (pre-extortion) profits, s represents the amount of those profits that will be extracted by corrupt bureaucrats or criminals, r^I represents the interest rate the entrepreneur can earn by investing the firm's profits outside the firm and r^L the interest rate the entrepreneur pays on borrowed money. Investable funds may be obtained either internally from retained earnings or externally through credit markets. Thus:

$$(2) \quad I^d = R + L^d$$

where R represents reinvested earnings and L^d is the firm's demand for loans.

The usual assumption is that the value to the firm of internal funds, r^I , is less than the cost to the firm of external funds, r^L . The wedge between the two interest rates arises because entrepreneurs have better information about their prospects than outside lenders or investors. Lenders demand a premium to offset their informational disadvantage. The difference between r^I and r^L creates a pecking order in which internal funds are exhausted first before external funds are obtained (Stewart C. Myers and Nicholas S. Majluf, 1984; Lakshmi Shyam-Sunder and Myers, 1999). This idea was developed from the experience of firms in the United States. The wedge between the value of internal

funds and the cost of external funds is likely to be larger in transition countries than in developed market economies because information sources are missing and investment uncertainties are much greater in transition countries. Information asymmetries are therefore likely to be more severe.

Firms in transition economies have another reason to prefer internal financing in addition to borrower/lender information asymmetries. External financing makes it hard for firms to hide their activities from tax collectors or the mafia. The effective cost of external finance in Russia is increased, according to Anna Meyendorff (1998), by the fact that firms that apply for a bank loan are more likely to have to pay their taxes. According to Richard Lotspeich (1996), firms are reluctant to disclose information to banks for fear it will be leaked to the mafia. Given these conditions, the assumption that the value of internal funds is less than the cost of external funds is a reasonable one to make in examining the investment decisions of firms.

The difference in cost of internal and external funds leads to a discontinuity between the investment of internal funds and the decision to seek external funds. Investment projects must have an expected return (after extortion and adjusted for risk) comparable to r^I to be profitable when financed by internal funds, but a return comparable to r^L to be profitable when financed by external funds. As a result, a firm's decision to invest internally generated funds is made independently of a decision to seek external finance. This allows us to estimate econometrically an equation for reinvestment of profits independent of the demand for external finance.

We represent the pecking-order hypothesis by supposing that firm i has a maximum amount of money that it is willing to reinvest out of its current profits, E_i ; this might be the total current profit, or it might be strictly less than that. We assume E_i depends on entrepreneur-specific characteristics. Then the pecking-order hypothesis implies:

$$(3) \quad \begin{aligned} I^d &= R && \text{if } I^d \leq E_i \\ I^d &= E_i + L^d && \text{if } I^d > E_i. \end{aligned}$$

This gives us the main equation we will esti-

mate, relating the firm's willingness to reinvest its profits to its expected profits and the security of its property rights:

$$(4) \quad \begin{aligned} R &= I(\pi, s, r^I) && \text{if } I^d \leq E_i \\ R &= E_i && \text{if } I^d > E_i. \end{aligned}$$

In our data, we will use explicit measures of π and s . Differences in r^I across firms in the sample will be subsumed in country/industry control variables.

If the assumption that investment of internally generated funds is independent of access to external funds were invalid, then investment of internal and external funds would need to be examined simultaneously. There are (at least) three reasons that investment of internal funds might depend on access to external funds. First, r^L may not be higher than r^I if loans are subsidized by the government. This does not appear to be the case in our data. Subsidies were most important in loans to state-owned firms. There are no state-owned firms in our sample. Only in Romania do we find that interest rates paid by firms spun off from state-owned enterprises are lower than those paid by de novo start-ups. In the remaining countries, there are no significant differences in loan rates between the two groups of firms. Moreover, across the sample, loans given by state banks have higher interest rates than loans given by private banks. In Poland and Slovakia, where loans are equally divided between state and private banks, interest rates are nearly the same, with rates from state banks very slightly higher than rates from private banks.

Second, entrepreneurs for whom property rights are insecure may prefer to invest bank funds in their businesses and to divert internally generated funds to more secure accounts. This implies that firms receiving loans should invest, on average, a lower proportion of their own profits than firms without loans. The data suggest this is not the case. Among the most profitable firms (those with profits 10 percent or more of sales) who are investing less than half of their profits, loans are infrequent. Only 64 of 476 (13 percent) of these firms received loans in 1996. On the other hand, 104 of the 259 (40 percent) firms investing more than 75 percent of

TABLE 5—REINVESTMENT RATES, FIRMS WITH AND WITHOUT LOANS

Reinvestment rate ^a	Percentage of firms	
	Firms with loans in 1996	Firms without loans in 1996
0–25 percent	26.0	33.0
26–49 percent	21.0	31.5
50–75 percent	21.3	18.2
76–100 percent	31.7	17.4

^a Percentage of after-tax profits.

their profits received loans.¹⁷ The survey does not indicate whether a loan received in 1996 represented new capital, or a rollover of a loan from previous years. But we would expect that firms investing most of their profits are both more likely to roll over existing loans and more likely to take out new loans. In either case, firms that are investing aggressively will be more likely to have a loan in 1996, as the data suggest.

Finally, investment may be lumpy, with the minimal investment larger than retained earnings can accommodate. Given the level of technology used by small-scale manufacturers in these countries, however, it seems unlikely that investments are lumpy. Moreover, Table 5 shows that 35 percent of firms without loans in 1996 reinvested half or more of their profits, indicating that the lack of external finance does not preclude internally funded investment. (By comparison, 53 percent of firms with loans in 1996 invested half or more of their profits.) Further evidence on this is discussed in Section III, where we use a firm's ability to offer collateral and loans prior to 1996 as a measure of access to loans in the 1996 reinvestment equation. If investments are lumpy then reinvestment should be positively associated with collateral; we find no significant interaction.

Thus, examining reinvestment of profits in-

¹⁷ Because of the categorical responses, we cannot determine how many firms obtained new loans and invested more than 100 percent of their profits, though it is likely that some did. Just over a fifth of the firms reported investing more than 75 percent of profits, the highest reinvestment category. In Poland, 35 percent of firms reported investing at least 75 percent of profits.

dependent of access to external finance appears to be reasonable for our data. In the next section, we examine the determinants of the firm's decision to reinvest from its profits [equation (4)]. The main hypothesis is that firms reinvest less if they perceive their property rights to be more insecure.

III. Determinants of Profit Reinvestment

Security of property rights is positively correlated with profit reinvestment rates at the country level, as we saw in Section I. Reinvestment rates are highest in Poland and Romania, where extralegal payments and payments for protection are lowest and the reliability of the courts is highest. Reinvestment rates are lowest in Ukraine and Russia, where extralegal payments are highest and courts less effective. Reinvestment rates are affected, however, by factors other than property rights.

A. Basic Specification

In this subsection, we estimate the reinvestment-demand equation (4), with the percentage of its profits a firm reinvests as the dependent variable and our property-rights indices as independent variables. Our data on reinvestment rates are categorical rather than continuous, and hence we use ordered probit regressions (although we have checked the robustness of our results using alternative specifications). We control for factors affecting investment demand other than property rights: the industry profit rate (as a proxy for expected investment opportunities more generally),¹⁸ the age of the firm, access to external finance (represented by whether the firm had collateralizable assets), entrepreneur characteristics, and other industry effects.

¹⁸ We do not use the firm's own profit rate due to concern about reverse causation: higher investment levels might lead to higher rates of profits. Given our belief that the manager's estimate of industry conditions is based on his own experience, use of industry profits does not completely eliminate endogeneity concerns. However, none of the results we report are altered if we use the firm's profit rate during its first year of operation, or exclude all measures of profits.

TABLE 6—ORDERED PROBITS FOR REINVESTMENT RATE IN 1996

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Index for perceived insecurity of property rights	-0.17 (5.51)	-0.12 (3.39)	-0.12 (1.97)	-0.18 (2.83)	-0.0003 (0.01)		-0.18 (2.87)		-0.17 (2.88)
Dummy for believing courts ineffective		-0.18 (2.01)	-0.18 (1.85)	-0.15 (1.31)	-0.11 (0.47)		-0.16 (1.32)	-0.45 (1.95)	-0.23 (1.85)
Index for perceived insecurity of property rights including courts (four-element index)						-0.17 (2.93)			
Estimated industry profit rate	0.005 (1.13)	0.004 (0.91)	0.01 (1.80)	-0.02 (0.97)	0.01 (1.81)	0.01 (1.86)	-0.07 (1.55)	0.01 (1.90)	
Log of firm age	-0.25 (3.34)	-0.30 (3.73)	-0.25 (2.35)	-0.77 (3.51)	-0.25 (2.36)	-0.25 (2.40)	-0.35 (1.22)	-0.33 (2.69)	
Dummy for being a start-up	0.30 (2.80)	0.35 (2.73)					-0.04 (0.15)		
Tax payments as a percentage of sales	-0.01 (1.69)	-0.01 (1.68)	-0.004 (0.92)	-0.02 (1.50)	-0.004 (0.93)	-0.003 (0.86)		-0.002 (0.43)	
Dummy for collateral to offer bank								-0.11 (0.64)	
Dummy for obtaining loan prior to 1996								0.14 (1.57)	
Industry controls	no	yes	yes	yes	yes	yes	yes	yes	yes
Country controls	no	no	yes	yes	yes	yes	yes	yes	yes
Manager characteristics included in regression	no	no	yes	yes	yes	yes	yes	yes	yes
Number of observations:	815	815	815	619	196	619	574	116	559
Chi-square:	30.3	236.2	570.4	722.9	28.3	314.6	549.2	98.8	263.6
Probability:	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001

Notes: Regressions are ordered probits. The dependent variable is the firm's profit reinvestment rate, divided into categories, with a higher value indicating more investment as a percentage of profits (see Appendix B at www.aeaweb.org/aer for details). Numbers in parentheses are *t*-statistics based on robust standard errors. Country and industry controls are interacted when both are included. Manager controls are manager's age and education level, an indicator that the manager was previously a high-level manager in a state-owned enterprise and an indicator that the manager has previous experience in the private sector. Columns (1)–(6) present results for all five countries from regressions including:

- 1) all firms, without country and industry controls;
- 2) all firms, without country controls;
- 3) all firms, with country controls;
- 4) start-ups only;
- 5) spin-offs only;
- 6) the four-element alternative index of security of property rights.

Column (7) presents results from regressions including only start-ups in Poland, Slovakia, and Romania. Column (8) presents results using all firms in Russia and Ukraine only. Finally, column (9) gives results for start-ups with loan variables, using data from all five countries. (See text for additional details.)

Table 6 presents the results of these regressions. There are six categories of responses to the reinvestment question, increasing in the rate of reinvestment. A positive coefficient indicates that an increase in the level of the independent variable increases the chance that a firm is in a higher reinvestment category.¹⁹ We exclude

from the regression sample firms that had zero or negative profits in 1996, since we are unable to measure their reinvestment rate. We also exclude firms not operating at the start of the

¹⁹ We have run all of the regressions using ordinary least squares, using the midpoint of the reinvestment categories, with robust standard errors. The results are qualitatively

similar to those reported. We prefer the ordered probit because it does not require the assumption that investment rates are exactly at the midpoint of the categories specified in the survey. (See Appendix B at www.aeaweb.org/aer for the details on the six categories of responses to the reinvestment question.)

year in 1996. Both start-ups and spin-offs are included in the initial regressions (first and second columns). Recall that the questions on which the key independent variables are based refer to payments made by firms in the respondent's industry. To be conservative, we therefore report t -values based on standard errors adjusted for clustering for 44 industry/country groups. Adjusting for clustering has only a small effect on the standard errors in these regressions and does not affect the significance level for any of our results.

The first column of Table 6 includes only the index that represents the insecurity of property rights. Greater insecurity is associated with lower levels of profit reinvestment, and this effect is highly significant. The second column adds the variable that indicates the entrepreneur thinks courts are ineffective. Ineffective courts are associated with lower levels of investment as well, an effect significant at the 0.05 level. Additional variables added in the second column control for the entrepreneur's estimate of the industry profit rate²⁰ and tax rate, the log age of the firm in years, a dummy variable indicating that the firm is a start-up and nine industry dummy variables. Older firms invest a lower proportion and start-ups a higher proportion of their profits. Higher tax rates are associated with lower investment rates, though the effect is significant at only the 0.10 level. The regression also controls for the age of the firm and whether the firm is a start-up.

Our index for the insecurity of property rights is additive. An alternative index would take a value of one if firms make any one of the three types of payments, and a value of zero otherwise. Both indices have theoretical merit, but the additive index explains the data better. The either/or index is significant ($\beta = -0.27$, $t = 3.48$), but has a lower t -value and results in a lower χ^2 (60.8 vs. 65.4 with the additive index).

²⁰ We use the entrepreneur's estimate of industry profits rather than the firm's own profits because we believe the former are more likely to represent the expected profits from new investments. Additionally, own profits may be determined in part by reinvestment, creating endogeneity problems. Nevertheless, when we rerun all of the regressions in Table 6 with own profits replacing industry profits, we find that own profits are significant everywhere that industry profits are significant. The property-rights index and courts results are not affected.

The additive index can be used to create four dummy variables, the first representing an index value of zero, the second representing an index value of one, and so on. When dummies representing index values of three, two, and one are used in place of the index (with the value zero being the base group), the coefficients are -0.35 , -0.26 , and -0.14 , respectively. These results suggest that the effects of corruption are additive, perhaps because multiple affirmative responses indicate stronger convictions on the part of the entrepreneur. Alternatively, the better performance of the additive index may indicate that those extracting payments do not coordinate their activities, consistent with the model of Shleifer and Vishny (1993).

The first two regressions do not control for country effects. Since much of the variance in security of property rights is across countries rather than within country, this measures the full effect of property rights. However, there may be other factors that vary across countries and affect the demand for investment. If so, then these other country-level effects will be correlated with our measures of property rights. The regressions in columns (3)–(9) control for differences in each industry in each country using 39 industry/country dummy variables. We include interacted controls because the factors affecting investment demand in the food industry in Poland, for example, may differ from factors affecting investment demand in the food industry in Russia. Neither the index of property rights nor the reliability of the courts is much affected by the inclusion of the industry/country dummies, though the index is now significant only at the 0.05 level.²¹

B. Alternative Specifications

The regressions in columns (3)–(9) also include a set of four variables measuring entrepreneur characteristics. These variables measure the age, years of schooling, and prior work experience of the entrepreneur. The two work experience variables indicate whether the entre-

²¹ Because response rates were lower in Russia and Ukraine, only 14 percent of the observations in the regressions are firms in those countries. This may explain why the country controls have only a small impact on the property-rights variables.

preneur previously was a high-level manager in a state-owned enterprise and whether the entrepreneur had prior experience in the private sector. The coefficients of these controls for entrepreneur characteristics (not shown on Table 6) indicate that investment rates are higher for younger entrepreneurs ($\beta = -0.01$, $t = 2.77$ in the third-column specification) and for entrepreneurs who were previously high-level managers at state-owned enterprises ($\beta = 0.24$, $t = 2.98$ in the third-column specification). Education and private sector experience have no significant effect.

We split the sample, in the fourth and fifth columns, into firms that are start-ups and those that were spun off from a state enterprise. For start-ups, the coefficients are similar to those obtained for the whole sample, though the measure of courts is not significant at the 0.10 level. The industry tax rate is not significant in either subsample. However, the entrepreneur's estimated profit rate for the industry is significant at the 0.10 level among start-ups. Among spin-offs, no variable measuring property rights has any effect on investment. The industry profit rate has the wrong sign and is insignificant. There are significant differences between the behavior of spin-offs and start-ups, with the regressions doing a better job explaining the behavior of start-ups. Given that most of the spin-offs underwent downsizing after being privatized, other factors may play an important role in determining reinvestment rates for these firms. For the regressions in the sixth, seventh, and ninth columns we limit the sample to start-up firms.

The regression in the sixth column uses an alternative index of security of property rights. This alternative index ranges from zero to four—it adds one to the original index if the entrepreneur thinks courts are ineffective for enforcing contracts. As with the original index, a higher value represents less secure property rights. The four-element index has the expected negative sign, and is significant at the 0.01 level.

Last, we divide the sample by region, first considering investment among start-ups in Poland, Slovakia, and Romania (the seventh column), and then considering all firms in Russia and Ukraine (the eighth column). (The number of start-ups with nonmissing responses in Russia and Ukraine is too small for us to use only start-ups in this regression.) The two property-

rights measures both have the expected sign in the three Eastern European countries. The index is significant at the 0.01 level; the significance of the effectiveness of courts falls below the 0.10 level. In Russia and Ukraine, the effectiveness of courts is significant. The index of property rights is not included in this regression because there is not enough variation in the index in the Russia/Ukraine sample to make the results meaningful. (Only three of 116 firms in the sample answer "no" to any of the three questions in the index!)

The ordered probit coefficients represent changes in the probabilities of being in each category of investment. Hence, giving an economic interpretation of their magnitude is difficult. To gain a better picture of the effect of property rights on investment, we calculate the probability of being in each investment category conditional on different values of the property-rights index. We use the regression reported in the sixth column of Table 6, using the four-element security index. The results are shown in Table 7. The bottom row of the table shows the weighted average reinvestment rate for each value of the index, using the midpoint of each reinvestment category. Firms with the most secure property rights (those with an index value of zero) have an average predicted reinvestment rate of 55.1 percent; those with the least secure property rights have an average predicted reinvestment rate of 33.5 percent. The most insecure firms' investment is therefore 39 percent lower than the investment of the most secure firms.

In sum, the index of property rights has a significant effect on firms' investment rates, especially among de novo start-ups. We find only weak evidence that tax rates affect investment demand. The lack of robustness in the tax effects may reflect a lack of variance in taxes across firms, since statutory tax rates vary only across countries. Alternatively, perhaps it is the clandestine and unpredictable nature of the unofficial payments, rather than just the fact that some profits will be taken, that discourages firms from investing.

C. Access to Credit

Our framework assumes that the decision to invest internally generated funds is independent

TABLE 7—PREDICTED PROFIT REINVESTMENT RATE FROM THE ORDERED PROBIT RESULTS
IN TABLE 6, COLUMN (6)

Profit reinvestment rate (percent)	All firms	Percentage of firms in investment category				
		Insecurity of property-rights index ^a				
		4	3	2	1	0
0	3.3	9.2	6.5	4.4	3.2	1.9
1–10	13.7	25.0	21.0	16.6	13.6	10.4
11–25	10.9	14.9	14.0	12.4	11.1	9.5
26–49	20.2	21.3	21.8	21.3	20.6	19.2
50–75	21.0	16.1	18.4	20.3	21.4	22.0
76–100	30.8	13.5	18.3	25.0	30.2	36.9
Weighted investment rate:	49.9	33.5	39.0	45.3	49.8	55.1

Notes: We calculate the probability of being in each investment category conditional on different values of the property-rights index. We use the regression reported in column (6) of Table 6, utilizing the four-element security index (i.e., including belief in the effectiveness of the courts). The last row of Table 7 shows the weighted average reinvestment rate for each value of the index, using the midpoint of each reinvestment category.

^a Scale for insecurity of property-rights index ranges from 0 (most secure) to 4 (least secure).

of access to external funds. It is possible, however, for internal and external funds to complement one another. If investment projects are lumpy, then firms may need outside finance in order to undertake investment projects at all. In this case, those not receiving loans would not invest internal funds either. We cannot include a direct measure of whether the firm has a loan because the latent variable—investment demand—determines (at least in part) both reinvestment of profits and demand for loans. Instead, we test for the importance of loans by including variables that are correlated with access to finance but that we expect are uncorrelated, or only weakly correlated, with investment demand.²² We include two variables, one indicating that the firm has collateralizable assets, and the other indicating the firm received a loan prior to 1996. Both of these variables are strongly correlated with receiving a loan in 1996. Collateral is necessary for access to loans. Only six of 310 firms reporting loans in 1996 said they did not provide collateral. Loans obtained prior

to 1996 provide an additional indication of creditworthiness. In most cases (69 percent) where firms had loans prior to 1996 and in 1996 as well, the firm obtained both loans from the same bank. Given that our sample is limited to firms with positive profits in 1996, we believe these two variables are good indications of access to credit.²³ Neither has a significant effect on the rate of reinvestment (ninth column of Table 6). The inclusion of the instruments for bank finance has little impact on the magnitude or significance of the coefficient on the index of property-rights insecurity. The variable measuring the reliability of courts is now significant at the 0.10 level.

In unreported regressions available from the authors, we pursued an alternative test for an interaction between security of property rights and use of external credit. We included the index of insecurity as an independent variable in a regression with the receipt of a loan in 1996 as the dependent variable. We found that the index of insecurity has no effect on the likelihood a firm obtained a loan in 1996. This provides additional evidence that less secure property rights did not encourage entrepreneurs to invest

²² Because investment opportunities may be correlated across time within a firm, we had some concern that either of these variables might be partially endogenous to current reinvestment rates. Their insignificance in the reinvestment equation suggests that endogeneity of our measures through temporal correlation of investment rates is not a serious problem.

²³ Our results are consistent with those found by Andrzej Bratkowski et al. (2000), who find for a sample of new firms in the Czech Republic, Hungary, and Poland that loans are significantly associated with collateral and past loans.

TABLE 8—ORDERED PROBITS FOR REINVESTMENT RATE IN 1996:
ALL FIVE COUNTRIES, START-UPS ONLY

Dummy variables	(1)	(2)	(3)	(4)	(5)	(6)
Firms make extralegal payments for services	-0.42 (4.33)					
Firms make extralegal payments for licenses		-0.11 (0.84)				
Firms make payments for protection			-0.34 (1.60)			
Firms make unofficial payments—ongoing registration				-0.40 (3.04)		
Firms make unofficial payments—fire and sanitary inspections					-0.31 (2.45)	
Firms make unofficial payments—tax inspection						-0.27 (1.76)
Courts cannot be used to enforce contracts	-0.16 (1.39)	-0.14 (1.20)	-0.13 (1.13)	-0.21 (1.65)	-0.14 (1.21)	-0.20 (1.63)
Controls included	industry/ country yes	industry/ country yes	industry/ country yes	industry/ country yes	industry/ country yes	industry/ country yes
Manager characteristics						
Number of observations:	619	619	619	499	538	529
Chi-square:	428.4	339.8	235.2	512.3	470.2	169.1
Probability:	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Notes: All regressions are ordered probits. The dependent variable is the level of investment, divided into categories, with a higher value indicating more investment as a percentage of profits (see Appendix B at www.aeaweb.org/aer for details). All regressions also include the entrepreneur's estimate of the industry profit rate and the age of the firm. Numbers in parentheses are *t*-statistics based on robust standard errors.

from bank funds rather than from their own profits. In the regressions, both the availability of collateral and receipt of loans prior to 1996 had large and significant effects on the likelihood a firm received credit in 1996, suggesting that banks' willingness to lend is an important determinant of credit availability. The level of unreinvested profits also has a large and significant effect on the likelihood a firm received credit. The last result suggests an indirect link between property rights and credit: firms perceiving property rights as insecure invest less, and so demand less credit. Low levels of observed credit may result from a lack of demand as well as a lack of supply.

D. Further Robustness Checks

Table 8 reports regressions that use the components of the index one at a time. We use the sample of start-ups in these regressions. Among

the elements of the index, extralegal payments for government services clearly have the most significant effect (the first column). Payments for protection fall just below the 0.10 level of significance, and payments for licenses is insignificant as well (the third and second columns, respectively).

The fourth, fifth, and sixth columns of Table 8 replace the components of our index with the responses to questions about bribes paid for specific services. All three types of bribes—payments for ongoing registration, payments for fire/sanitary inspection, and payments for tax inspection—are negatively and significantly associated with reinvestment levels. The sample size in these regressions varies and is smaller than the other regressions because the response rate for these questions is generally lower. The variable representing trust in the courts has the correct sign in all of the regressions reported on Table 8, though it is insignificant in all but one

of the specifications (see the last row of coefficients in each column).

Our findings are also robust to alternative ways of defining the dependent variable. Ordinary least-squares regressions using the midpoint of the investment categories (i.e., five for the 1–10 percent category, eighteen for the 11–25 percent category, and so on) produce very similar results. Probits for over/under 75 percent reinvestment or over/under 50 percent reinvestment also produce similar findings.

E. Caveats to Our Interpretation

In the regressions, we treat property rights as exogenous to the investment decisions of our firms. There are at least two reasons why this may not be a valid assumption. First, higher investment rates may lead to more secure property rights, as in the model of Besley (1995). While it is plausible that very large firms in post-communist transition countries may endogenously create property rights by becoming “too big to fail,” we do not view this as likely for our firms, given their relatively small size.

Of more concern is the possibility that higher reinvestment rates and more secure property rights may both reflect the optimism of the responding managers. Managers may also attempt to justify an unwillingness to invest by saying that property rights are insecure. In either of these cases, endogeneity of property-rights security arises from our inability adequately to control for manager characteristics. We lack direct measures of a manager’s attitudes, but managers who say property rights are less secure also say their own profits and their industry’s profits are higher. Insecurity is also significantly correlated with characteristics of the manager that we can measure. For example, older managers and managers who formerly worked as a high-level manager of a state-owned enterprise say property rights are more secure. These correlations suggest there is an important exogenous component of our insecurity index. Nevertheless, the estimated impacts of insecurity on investment may be overstated if unmeasured manager characteristics are important.

Alternatively, our regression coefficients may underestimate the effects of property-rights insecurity. Since we surveyed existing firms, our sample omits both failed firms and potential firms

that were deterred from entering. Both failure and the decision not to enter presumably reflect the insecurity of property rights. Additionally, because our regressions look at the determinants of firms’ marginal investment decisions in their current lines of activity, we cannot pick up possible intersectoral distortions. For example, certain industries might be especially susceptible to extortion; the insecurity of property rights might cause entrepreneurs to shun those industries. If capital is more susceptible to extortion than labor, weak property rights may also cause production to be inefficiently labor intensive. We have no way of determining the net effect of the biases of opposite directions.

In summary: Weak perceived property rights have a consistently negative effect on reinvestment in our regressions. The index of property rights is significant in all subsamples apart from spin-offs. The measure of trust in courts has a less robust effect on reinvestment, but is significant for the full sample. The availability of collateral is not correlated with the reinvestment of profits.

IV. Conclusion

Firms’ investment is affected by the perceived security of property rights, as shown by both our cross-country data and firm-level regressions. Reinvestment rates are lowest in Russia and Ukraine, where bribes for government services and licenses are common, firms make payments for protection, and the courts are least effective, and highest in Poland and Romania, where property rights are the most secure. Within countries, also, there is also significant variation, as our firm-level regressions indicate. The entrepreneurs who perceive their property rights to be the least secure reinvest 32 percent of their profits, while those with the most secure property reinvest 56 percent. Insecurity of property rights, all else equal, reduces a firm’s investment by over a third.

Most of the firms say they were able to offer collateral to banks (more than three-quarters of the firms in each of the countries). Lack of collateral, therefore, does not appear to have been a binding constraint on firms’ investment. There are two reasons why, until now, external credit has not been essential for private-sector development. First, insecure property rights mean firms have limited incentive to invest and

therefore little demand for external finance (especially in Russia and Ukraine). Second, the high profits of early entrants in all these transition economies meant that firms that wished to invest were able to do so. The potential for using retained earnings as a source of investment is seen from the fact that, in all five countries, unreinvested profits exceed the funds provided by banks. Our evidence indicates, then, that secure property rights have been both necessary and sufficient for investment.

Although the firms have had little demand for external finance at the time of our survey, they will begin to need access to credit as these economies develop their market-supporting institutions. This is because legal and bureaucratic reforms increase the demand for investable funds by solidifying property rights;²⁴ and because profits will be driven down to normal levels as transaction costs fall and market competition increases, so investment from internal funds will not be sustainable.

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²⁴ Low reinvestment may be the result of a high required rate of return, rather than a high probability of expropriation, because imperfect financial markets mean entrepreneurs bear a large amount of idiosyncratic risk. Improved capital markets would then facilitate investment because they would increase diversification possibilities and reduce idiosyncratic risk.

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