Institutional and Structural Determinants of Investment Worldwide

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1 Introduction

The cross-country variation in investment activity is truly remarkable. For the 30-year period between 1980 and 2010, the rate of gross fixed capital formation worldwide ranged from 6 to 77 percent of production, a variance more than two times that of economic growth. Much of this variability stems from developing countries, which also exhibit a far greater diversity in terms of political-economic structure and institutions. However, since most empirical studies of aggregate investment tend to focus on a relatively small set of (mostly) developed countries (Byrne & Davis 2005; Davis 2010; Oliner, Rudebusch & Sichel 1995) and a well-defined set of theories (Chirinko 1993; Ferderer 1993; Kopcke & Brauman 2001), they gloss over such structural and institutional detail, since the environments faced in those instances are reasonably similar. This is not the case when attempting to explain a broader cross-section of countries, which can differ along economic, legal, and political dimensions. Consequently, failure to take into account structural differences that exist in the cross-country data risks missing an important part of the explanation for variations in international investment patterns.

Among the existing literature where a more general mix of economies is considered, the trend has been a focus on purely economic factors of a more cyclical nature, such as the real exchange rate (Servén 2003), fiscal and monetary policy (Greene & Villanueva 1991), and capital inflows (Wai & Wong 1982). The main shortcoming of such approaches is that they may fail to capture important discontinuities that may arise from longer-run changes in structural factors. A small number of papers do systematically examine the important role that institutional and structural factors play; however, most content themselves with the introduction of one or two such variables, such as the level of financial development (Benhabib & Spiegel 2000; Levine 2005; Love & Zicchino 2006) and structure (Ndikumana 2005), institutional quality (Campos & Nugent 2003; Mauro 1995; Morrissey & Udomkerdmongkol 2012) and structure Dawson (1998), and the business environment (Bartelsman, Haltiwanger & Scarpetta 2010; Utrero-González 2007). When addressed in isolation, however, it is difficult to place the importance of different structural variables in context.

Although there may be objection to the wholesale incorporation of such structural and institutional measures as atheoretical, this is only the case when such determinants are understood narrowly. Many structural determinants are in fact implied by pure investment theory. For example, the user cost of capital in a standard neoclassical model (Jorgenson 1963) may differ by country due to differences in tax structure (Hall & Jorgenson 1967). Alternatively, adjustment costs in either a Tobin's Q (Hayashi 1982; Tobin 1969) or (S, s)-type (Caballero & Engel 1999) setting may diverge between countries due to differences in the transactions costs related to the respective institutional frameworks.

Modern theoretical models that incorporate frictions that arise from capital market imperfections (Holmström & Tirole 1997) or uncertainty (Caballero & Pindyck 1996; Lucas & Prescott 1971) also implicitly point to the need to account for structural and institutional factors, since such frictions suggest that, *inter alia*, a country's financial structures and sophistication or

political-institutional risks may in fact matter for investment. More generally, the (at least partial) irreversibility of investment means that price (interest rate) signals alone may be insufficient to generate observed levels of investment activity (Dixit & Pindyck 1994), implying a need to pay greater attention to structural-institutional detail.

Recent work seeking to explain differences in cross-country investment patterns (Caselli & Feyrer 2007; Hsieh & Klenow 2007; Kraay, Loayza, Servén & Ventura 2005)—which stress the importance of uninsurable idiosyncratic investment risk—also support the notion that structural and institutional distinctions may be key frictions that prevent returns to capital, and hence investment, from normalizing across countries. Our work thus suggests that such distortions to the marginal product of capital may in fact derive, at least in part, from an economy's economic structure or its institutions.

Finally, the vast body of work examines the puzzle of high saving retention coefficients (Feldstein & Horioka 1980) in cross-country analyses of investment point, at least implicitly, to the need to account for endogeneity due to omitted variables, of which structural factors are key. While there have been subsequent theoretical (Bai & Zhang 2010; Kraay & Ventura 2000) and empirical (Byrne, Fazio & Fiess 2009; Hon 2012) attempts to either reconcile or reject the notion that a high correlation between investment and saving necessarily implies home bias in investment activity, the underlying misspecification concern underscored by this strand of literature strongly suggests that institutional and structural variation between countries should be properly accounted for in cross-country studies of capital formation.

In this paper, we seek to empirically identify and estimate the relative importance of the structural and institutional determinants that may be associated with cross-country patterns of aggregate investment. Using a standard neoclassical model as our theoretical launching point, we systematically introduce various families of structural and institutional determinants. Our estimation methodology relies on dynamic panel estimation via GMM (Arellano & Bover 1995; Blundell & Bond 1998), which allows us to capture potential partial adjustment effects, as well as some (weak) control of potential endogeneity. Our main contribution is thus the simultaneous evaluation of a host of institutional and structural variables, with the goal of identifying key determinants of investment worldwide.

We obtain two key findings. First, across a range of specifications and alternative measures, financial development and institutional quality are reasonably robust determinants of investment. While the former typically enters with a larger magnitude vis-á-vis the latter, institutional quality displays both a more stable coefficient and consistent statistical significance. Second, and related to the first, when potential endogeneity concerns are addressed more explicitly using external instruments, financial development drops out of statistical significance entirely, suggesting that—to the extent that the external instruments are reliable—institutional quality is less likely to be contaminated by reverse causality concerns, at least insofar as investment activity is concerned.

The rest of the paper is organized as follows. The following section outlines the main data

sources and definitions (Section 2.1), along with empirical methodology (Section 2.2). Section 3 discusses both the benchmark results as well as the robustness of these results to alternative specifications and measurements (Section 3.3) and more stringent endogeneity testing (Section 3.4). The section also attempts to tease out the manner by which interaction effects (Section 3.5) and subsamples (Section 3.6) be driving the key findings. A final section concludes with some reflections on policy implications.

2 Data and methodology

2.1 Data sources and definitions

The dataset for the investment regressions is an unbalanced country-level panel, covering up to 129 economies over 5-year periods between 1980–2009.[1] Variables for the benchmark regressions were sourced from the World Bank's World Development Indicators (WDI) as well as Financial Development and Structure (Beck, Demirgüç-Kunt & Levine 2000) databases, the International Country Risk Guide (ICRG), and Chinn & Ito (2008). Additional variables included in the robustness tests were drawn from the World Bank's Global Economic Monitor (GEM) and Doing Business databases, Beck, Clarke, Groff, Keefer & Walsh (2001), and Laeven & Valencia (2012).

Full details of variable sources, definitions, and other summary statistics are given in Appendices A.1, A.3, and A.4. Two important statistical features are worth noting. First, the standard deviation in the institutional and structural variables, while small relative to the level of investment, are nevertheless larger than most of the economic controls, which supports the notion that variations in the former may be important for better understanding cross-country investment patterns.

Second, the correlation among the distinct families of institutional and structural variables considered is actually fairly small; the highest correlation is between institutional quality and financial development ($\rho = 0.56$), and even then the relationship is not particularly strong. This suggests that the various variables of interest are sufficiently distinct—statistically speaking—to warrant their inclusion as independent variables.

Given the centrality of structural factors in this paper, we briefly discuss here the definitions for the main institutional and structural variables of interest, along with the motivation behind their selection. To accommodate the host of variables that we consider, we organize them into various classes of determinants, as suggested by theory.

One important factor we consider is the level of maturity of the financial sector as well as its its structure, which are measured respectively by domestic credit to the private sector (as a share of GDP) and the ratio of the total value traded in the stock market to domestic credit. Constraints arising from limited access to finance have the potential to adversely affect

[1] In the preferred benchmark specifications, however, the sample coverage is 105 economies. These are listed in Appendix Table A.2.

investment activity (Schiantarelli 1996), and even the organizational form of corporate financing may impact the ease of investment by firms (Dailami 1992).

Another important factor is related to quality of institutional mechanisms such as contract enforcement and property rights, both of which can influence aggregate investment through either altering incentives for new investment (Besley 1995), or by increasing the sensitivity of investment to technological shocks at the macroeconomic level (Cooley, Marimon & Quadrini 2004). Even the overall structure of institutions may play a role in encouraging or discouraging investment, through the manner by which they may seek to resolve commitment problems (Gehlbach & Keefer 2011). We proxy for institutional quality by averaging indices of corruption and rule of law, while institutional structure is captured measure of democratic accountability.

The overall business environment may also matter, especially as embodied by investor protections (Shleifer & Wolfenzon 2002) or the nature of corporate taxation (Devereux 1996; Hall & Jorgenson 1967). While at first glance there may appear to be some overlap in such measures with the overall institutional environment, business and regulatory factors typically affect investment more directly, and should be treated as distinct from the institutional setting that governs interactions between political-economic actors. Our gauge of the business environment is an index that approximates the strength of investor protection—selected in particular because its reflects the investment-related aspects of business regulation—while the tax structure is represented by the highest marginal corporate tax rate.

2.2 Empirical methodology

We motivate the empirical work to follow with a very simple theoretical specification of the (flexible) neoclassical model (Hall & Jorgenson 1967), where the optimal capital stock in country i at time t, K^*_{it}, is a function of production, Y_{it}, and the cost of capital, R_{it}, so that

$$K^*_{it} = \frac{\alpha Y_{it}}{R^{\sigma}_{it}}, \tag{1}$$

where α and σ are, respectively, the output and substitution elasticities of capital. To obtain investment, substitute the optimal capital stock with the equation of motion of capital

$$K_{i,t+1} = (1-\delta)\, K_{it} + I_{it},$$

and applying the result that, in the steady state, the growth rate of capital is the growth rate of output (so that $K_{i,t+1} = (1+\mu_{it})\, K_{it}$, where μ is the GDP growth rate), yields an estimable empirical specification

$$i_t = \beta + y_{it} + g_{it} - \sigma r_{it}, \tag{2}$$

where $\beta \equiv \ln \alpha$ and $g_{it} \equiv \ln(\mu_{it} + \delta)$ is the (depreciation-adjusted) growth rate, and lowercase letters indicate the logarithm of the respective uppercase variables. For the empirical specification that follows, we relax the parameter restriction of unity for the coefficient on growth

and output, and include additional economic variables $\mathbf{X_{it}}$ related to the open economy, and institutional and structural variables that may affect investment, $\mathbf{Z_{it}}$:

$$i_{it} = \beta + \phi i_{i,t-1} + \psi y_{it} + \gamma g_{it} - \sigma r_{it} + \mathbf{\Phi' X_{it}} + \mathbf{\Gamma' Z_{it}} + \epsilon_{it}, \tag{3}$$

where ϵ_{it} is a disturbance term. (3) further includes the lagged dependent variable $i_{i,t-1}$, to allow for partial adjustment in fixed capital formation.

The econometric analysis of (3) is performed with system GMM (Arellano & Bover 1995; Blundell & Bond 1998), which is well-suited for this application since estimates both accounts for between and within variation in the data—especially important since structural and institutional variations may be more substantial across countries, rather than within a country alone—along with some (weak) control of endogeneity in the regressors. Moreover, system GMM resolves problems that may arise from Nickell (1981) bias due to the inclusion of the lagged dependent variable, which is especially important since aggregate investment is a persistent series (Bond, Hoeffler & Temple 2001). There are also additional efficiency gains that accrue to system GMM, which is important given the relatively small size of the cross-section.

In all the specifications that follow, output, growth, and the real interest rate are treated as endogenous, and entered into the (orthogonalized) instrument matrix with two lags and deeper, while lagged investment, trade openness, and financial openness are treated as predetermined and entered with one or more lags. The institutional and structural variables are instrumented with their lagged values. The instrument set is then collapsed to limit instrument proliferation (Roodman 2009), and all standard errors are corrected to account for heteroskedasticity and arbitrary patterns of autocorrelation within countries.

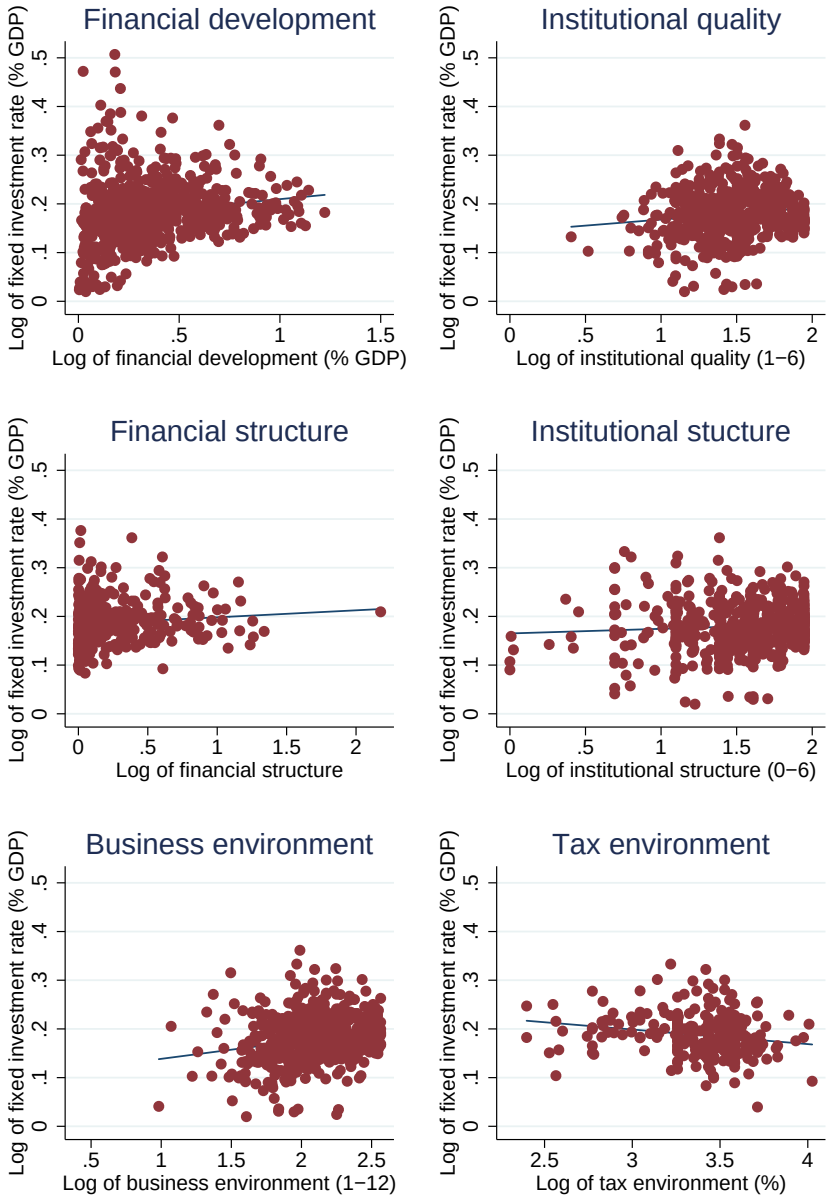
3 Results

3.1 Illustrative relationships

In order to establish an initial grasp on how structural factors may be related to investment, we plot the fixed investment rate against each of the structural variables of interest. This is shown in Figure 1.

Several features are worth noting. First, there appear to be significant bivariate relationships for a number of the structural variables of interest, notably for financial development, institutional quality, the business environment, and the tax environment. Since these are bivariate relationships, however, it is premature to claim that these factors will all survive in a more systematic empirical treatment.

Second, where applicable, the expected impact of these variables accord with *a priori* intuition. For example, higher levels of institutional quality correspond with higher rates of investment, while higher tax rates imply the opposite. With regard to financial and institutional structure—where there may be no definitive theoretical hypothesis—the small positive



Source: Author's calculations

Figure 1: Scatterplots of fixed investment rate (as a percentage of GDP) to structural variables of interest, unbalanced 5-year average panel, 1980–2009.

slopes appear to suggest that more market-based financial systems and more democratic systems are more likely to be associated with greater investment (although the relationships are weak and unlikely to be significant).

Finally, it is also worth noting that data limitations mean that the graphs are not all represented by the same sample. This is especially the case for financial structure and the tax environment, where the samples appear to be especially small. Such sample limitations may limit our ability to make strong inferences with the cross-country panel (an issue that we revisit in the more formal analysis that follows).

3.2 Benchmark results

Our benchmark results for (3) are reported in Table 1. Across all specifications, the included variables are jointly significant (as measured by the Wald χ^2 test), and the exogeneity of the instrument set is verified by the insignificant Hansen J statistics. The z statistic for the Arellano-Bond AR(2) tests do indicate that autocorrelation may be an issue for the first two specifications; however, these two are offered more as baselines, and hence their potential misspecification is less of a concern.

Column (B1) is a minimal specification—corresponding to (2)—while column (B2) allows for open-economy effects by introducing two medium-term determinants of external accounts (Calderón, Chong & Loayza 2002; Chinn & Prasad 2003) are included: trade openness and financial openness. The coefficients on these economic determinants are consistent with *a priori* expectations on their sign: economic size and growth are both positively correlated with the level of fixed investment, and the series displays a fair degree of persistence. The cost of capital—as proxied by the real interest rate—is statistically insignificant, a result consistent with the broader literature, which has struggled to establish a strong empirical relationship between the two variables (Caballero 1999).[2]

Interestingly, the coefficient on financial openness is negative and significant. This effect is nontrivial: a ten percent increase in financial openness—an decrease in restrictions on capital flows roughly comparable to moving from, say, that of Egypt to that of Singapore (for the year 2009)—could trigger a decrease in investment by between one and two percent. This implies that, *ceteris paribus*, more financially open economies tend to experience lower levels of investment; this would be the case if foreign direct investment (FDI) flows not only substitute but displace domestic flows more than one-for-one. Although somewhat surprising, this would be the case if FDI were more productive than domestic investment, and the relatively weak contribution of FDI to new domestic investment and growth is a result that has some limited support in the empirical literature (Agosin & Machado 2005; Görg & Greenaway 2004; Narula & Driffield 2012).

[2]Indeed, this has generally been the case even when more precise measures of the cost of capital (which account additional complications such as the corporate tax rate and investment tax credits) and more sophisticated econometric techniques, including the exploitation of natural experiments.

Table 1: Benchmark regressions for fixed investment, unbalanced 5-year average panel, 1980–2009[†]

	B1	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**
Lagged investment	0.463	0.608	0.373	0.466	0.471	0.475	0.359	0.458
	(0.18)***	(0.11)***	(0.23)	(0.17)***	(0.16)***	(0.18)***	(0.10)***	(0.08)***
Output	0.583	0.393	0.614	0.518	0.509	0.495	0.663	0.536
	(0.21)***	(0.12)***	(0.22)***	(0.19)***	(0.17)***	(0.19)***	(0.12)***	(0.09)***
Output growth	0.594	1.071	1.488	1.430	1.395	1.423	1.249	1.241
	(0.24)**	(0.25)***	(0.38)***	(0.26)***	(0.26)***	(0.30)***	(0.23)***	(0.29)***
Cost of capital	0.419	-0.895	-0.201	1.241	1.168	1.251	0.246	0.662
	(1.98)	(1.04)	(1.08)	(1.67)	(1.54)	(1.49)	(1.23)	(1.13)
Trade openness		-0.166	-0.046	-0.079	-0.017	-0.105	0.098	0.028
		(0.25)	(0.27)	(0.26)	(0.23)	(0.23)	(0.14)	(0.11)
Financial openness		-0.141	-0.140	-0.185	-0.169	-0.184	-0.116	-0.108
		(0.06)**	(0.08)*	(0.08)**	(0.07)**	(0.07)**	(0.08)	(0.05)**
Financial development			0.275	0.273	0.270	0.329	0.007	0.048
			(0.15)*	(0.13)**	(0.13)**	(0.13)***	(0.07)	(0.08)
Institutional quality				0.138	0.140	0.149	0.158	0.159
				(0.08)*	(0.08)*	(0.09)*	(0.09)*	(0.08)**
Business environment					-0.015	-0.130	-0.123	-0.023
					(0.10)	(0.18)	(0.12)	(0.12)
Institutional structure						0.101	0.112	0.053
						(0.08)	(0.08)	(0.08)
Tax environment							-0.045	
							(0.04)	
Financial structure								0.007
								(0.10)
Wald χ^2	1,858***	3,287***	10,798***	8,977***	9,642***	11,448***	20,917***	18,830***
Hansen J	19.663	35.256	34.427	29.065	29.541	30.135	30.029	40.157
AR(2) z	-1.936*	-2.364**	-1.588	-1.570	-1.547	-1.446	0.000	-0.763
Instruments	24	39	40	39	41	43	46	44
N (countries)	483 (129)	467 (125)	364 (123)	333 (105)	333 (105)	333 (105)	138 (79)	191 (81)

[†] All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

Columns (B3)–(B8) incrementally introduce structural and institutional controls: financial development, institutional quality, the business environment, institutional structure, the tax environment, and financial structure. Due to data limitations, the final two specifications are added independently (as evident, the sample size drops dramatically as a result of their inclusion). These two variables are, in any case, insignificant; we henceforth proceed with specification (B6) as our preferred benchmark specification.

Across these different specifications, institutional quality typically enters with a statistically significant coefficient (although often only at the 10 percent level). The coefficient is bound by $[0.136, 0.158]$, which, while small, is nonetheless economically relevant: a ten percent increase in institutional quality could translate into an increase of investment by 1.6 percent. This would be equivalent to an improvement from 2009 levels in Ukraine to that of Italy, or around the improvement in Chile's institutional quality between 1996 and 2009, the period where it transitioned away from the military junta under Augusto Pinochet.

It is interesting to contrast the positive and significant coefficient on the institutional quality variable against that of the business environment variable, which is insignificant. Given the specificity of the latter variable for investment activity, this result suggests that the importance of the rule of law goes beyond the manner by which institutions foster investment; rather, a strong institutional framework likely affords broad-based economic opportunity and fosters competition dynamics, which in turn leads to economywide incentives toward greater levels of investment. This result provides an alternative view of the institutions that are central to investment activity, in contrast to (Acemoğlu & Johnson 2005), who argue that property rights institutions dominate contracting institutions in the determination of investment.[3]

The magnitude of the positive coefficient on financial development—which averages 0.20 across the six specifications in which it is included—is also economically relevant, and around twice that of institutional quality in most specifications (although in the limited subsample of the final two specifications, the coefficient drops out of statistical significance). Given the sharp contraction in the size of the sample resulting from the inclusion of institutional structure or the tax environment, it is difficult to draw strong conclusions regarding the robustness of the statistical significance of financial development; however, we revisit the issue in the following subsections.

3.3 Robustness of the benchmark

In this section we consider the robustness of the benchmark results—as embodied by specification (B6)—to alternative measures of our variables of interest. Our choices of these alternative measures for the institutional and structural variables were predicated by the desire to offer a

[3] Acemoğlu & Johnson (2005) favor legal measures—such as the extent of formalism and procedural complexity and depth—as measures of contractual institutions, while they treat protection against expropriation as a property rights institution. We believe that all these measures are more reflective of the commercial and business climate, whereas the broader institutional environment, as measured by the rule of law and corruption, represents a more distinctive alternative determinant of investment activity.

variant to the conceptualization of the variable in the benchmark, rather than simply an alternative measure. Nevertheless, we recognize that different data sources may result in changes to the potential accuracy, reliability, and coverage of the variable in question. Accordingly, we considered several alternative sources for the variables in our benchmark (as before, detailed definitions are provided in Annex Table A.1).

In columns (R1) and (R2) of Table 2, we consider two alternative definitions of our dependent variable. (R1) uses the fixed investment *rate* (the fixed capital formation share of GDP), while (R2) employs *gross* investment (inclusive of inventory accumulation). Although the coefficients are not directly comparable, the qualitative messages are similar; notably, that financial development and institutional quality are important structural determinants, and the magnitude of the coefficient on the former is larger than that on the latter.[4]

Somewhat interestingly, the coefficient on business environment enters with a negative sign (and is marginally significant) in specification (R2). While counterintuitive at first, a careful perusal of the underlying data is illuminative: many economies with strong investor protection scores tend to be relatively less developed. This result may be rationalized by the acceding to the possibility that when investor protection clauses are in conflict with the more general sense of the rule of law (captured by institutional quality), investors may regard *de jure* laws as a negative signal and reduce their investment activity, resulting in a negative relationship.

Columns (R3) and (R4) introduce two alternatives to the baseline specification for the economic controls. The first of these imposes the constraint, suggested by (2), where the coefficient on growth and output are held at unity. The second substitutes the real interest rate measure of the cost of capital with an alternative computed from the differential between the domestic interest rate and an exchange rate-adjusted risk-free interest rate (an interest rate "arbitrage" measure); this alternative is to allow for the possibility that the real interest rate operates at the margin relative to a global risk-free rate.[5] Both changes have little impact on the main results, although predictably the coefficient on the alternative cost of capital measure is much smaller (although still statistically insignificant).

The robustness of the two key structural variables of interest is considered in columns (R5)–(R7). Specification (R5) utilizes an alternative definition of financial development, domestic credit by banks, which excludes nonbank sources of credit. Since investment financing in many developing economies are typically obtained from bank lending, using this alternative measure provides a better sense of the importance of financial development via the pure credit channel, as opposed to the possibility that the presence of deep capital markets may also play some role (which introduces elements of financial structure).

Specifications (R6) and (R7) decompose the institutional quality variable into, respectively, its rule of law and corruption subindices. Doing so renders the coefficient on the rule of law

[4]The coefficient on institutional quality in (R2), while statistically insignificant, is approaching significance ($p = 0.20$), and the sign remains unchanged.

[5]The reason why this measure is not favored for the baseline, however, is that there remain significant frictions to cross-border capital flows, so that domestic investors do not typically have ready access to global capital markets.

Table 2: Robustness regressions for fixed investment, unbalanced 5-year average panel, 1980–2009[†]

	R1	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**	**R11**	**R12**
Lagged investment/	0.404	0.429	0.473	0.438	0.578	0.528	0.503	0.315	0.445	0.667	0.476	0.498
share	(0.16)**	(0.09)***	(0.18)***	(0.18)**	(0.18)***	(0.23)**	(0.19)***	(0.12)***	(0.17)***	(0.09)***	(0.15)***	(0.18)***
Output	0.202	1.334	1.422	1.464	1.565	1.129	1.474	1.636	1.376	1.535	1.643	1.419
	(0.04)***	(0.22)***	(0.30)***	(0.27)***	(0.33)***	(0.34)***	(0.32)***	(0.24)***	(0.25)***	(0.34)***	(0.34)***	(0.28)***
Output growth		0.507	0.498	0.543	0.402	0.431	0.470	0.711	0.543	0.343	0.162	0.472
		(0.08)***	(0.19)***	(0.18)***	(0.18)**	(0.22)**	(0.19)**	(0.13)***	(0.18)***	(0.10)***	(0.30)	(0.18)***
Cost of capital	0.210	0.422	1.248		0.870	1.399	1.152	1.994	1.538	-1.850	2.537	1.361
	(0.17)	(0.76)	(1.53)		(1.45)	(1.55)	(1.55)	(1.38)	(1.76)	(1.37)	(1.06)**	(1.61)
Cost of capital				0.003								
alt.				(0.01)								
Trade openness 0.005	0.085	-0.101	0.001	-0.021	-0.020	-0.052	0.058	0.021	-0.425	-0.155	-0.120	
	(0.03)	(0.13)	(0.23)	(0.21)	(0.19)	(0.20)	(0.22)	(0.11)	(0.27)	(0.15)***	(0.20)	(0.23)
Financial openness	-0.035	-0.048	-0.183	-0.202	-0.181	-0.176	-0.192	-0.108	-0.173	-0.178	-0.188	-0.185
	(0.01)***	(0.05)	(0.07)**	(0.07)***	(0.08)**	(0.07)**	(0.07)***	(0.07)*	(0.07)**	(0.08)**	(0.09)**	(0.07)**
Financial	0.046	0.238	0.327	0.257		0.305	0.337	0.063	0.246	-0.031	0.366	0.332
development	(0.02)***	(0.11)**	(0.14)**	(0.12)**		(0.15)**	(0.14)**	(0.10)	(0.13)*	(0.11)	(0.15)**	(0.13)**
Financial					0.257							
development, alt.					(0.17)							
Institutional	0.026	0.086	0.149	0.053	0.170			0.185	0.142	0.254	0.178	0.147
quality	(0.01)*	(0.06)	(0.09)	(0.10)	(0.09)*			(0.08)**	(0.08)*	(0.12)**	(0.10)*	(0.09)*
Rule of law						0.182						
						(0.10)*						
Corruption							0.060					
							(0.07)					
Business	-0.033	-0.152	-0.129	0.105	-0.117	-0.194	-0.124	-0.094	-0.009		-0.224	-0.139
environment	(0.03)	(0.08)*	(0.18)	(0.18)	(0.18)	(0.21)	(0.20)	(0.10)	(0.11)		(0.20)	(0.17)
Business										-0.014		
environment, alt.										(0.02)		
Institutional	0.008	0.032	0.097	0.091	0.128	0.130	0.140	0.065		0.068	0.115	0.104
structure	(0.02)	(0.05)	(0.11)	(0.09)	(0.11)	(0.12)	(0.11)	(0.05)		(0.09)	(0.10)	(0.11)
Institutional									-0.003			
structure, alt.								(0.02)				
Financial								-0.050				
structure, alt.								(0.05)				
Capital stock											0.327	
											(0.23)	
Financial crisis												-0.075
												(0.15)
Wald χ^2	131***	8,638***	11,449***	14,417***	19,590***	10,673***	11,240***	8,955***	9,806***	9,179***	10,976***	10,721***
Hansen J	23.814	38.293	30.135	28.374	35.864	30.080	28.900	31.060	28.159	21.872	25.591	30.596
AR(2) z	-1.763*	-1.205	-1.446	-1.282	-1.528	-1.344	-1.668	0.108	-1.465	0.000	-1.173	-1.435
Instruments	39	50	43	43	46	41	41	45	42	38	46	44
N (countries)	333 (105)	340 (107)	333 (105)	324 (105)	334 (105)	333 (105)	333 (105)	234 (82)	330 (104)	174 (97)	317 (102)	333 (105)

[†] All variables, except the financial crisis dummy, are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

remains significant, while that on corruption is insignificant. This implies that the results may be driven more by cross-country variations in property rights and the rule of law, as opposed to the pervasiveness of corruption.[6]

In columns (R8)–(R10) we consider alternative measures of the other structural variables. (R8) substitutes the financial structure variable with the ratio of stock market capitalization to domestic credit, which better approximates the influence of financial structure size as distinct from financial structure activity (Levine 2002). Nevertheless, using this alternative measures makes little different to the coefficient, which remains insignificant. We conclude that, in contrast to financial development, financial structure appears to exert no independent effect on investment, a finding that echoes that of Ndikumana (2005).

Column (R9) offers an alternative measure of the structure of political institutions, a concentration index of the relative size of parties in parliament. This measure may offer a stronger sense of the level of political competition, as opposed to an index of democratic accountability alone. Finally, column (R10) replaces the business environment variable with an index of the extent of commercial contract enforcement. The main results in Table 1 are largely undisturbed by these three alternative measures, although we note that the coefficient on institutional quality tends to retain its statistical significance (and increase its magnitude) relative to the benchmark.

Finally, Table 2 also considers the robustness of the benchmark results to the inclusion of several additional covariates.

Column (R11) adds the capital stock, depreciated at a constant 5 percent.[7] In the final column (R12), we introduce an additional indicator variable for financial crises. We define financial crises as the coincidence of banking and currency crises. In contrast to, say, a currency crisis—which may only result in nominal dislocations—such "twin crises" typically exact a large output cost (Hutchison & Noy 2005), and hence are likely to be especially devastating for investment. The coefficients on these variables are of the expected sign, but are statistically indistinguishable from zero, and the other results are qualitatively unaltered by the inclusion of these additional factors.

3.4 Possible channels of endogeneity

In this subsection we consider the issue of endogeneity in the two structural variables of interest—financial development and institutional quality—more seriously. In particular, we exploit two external instruments for institutional quality and financial development that have been commonly used in the existing literature: legal origin (La Porta, López-de Silanes, Shleifer & Vishny 1998) (for financial development) and fraction of population speaking European lan-

[6]The correlation on the two is $\rho = 0.57$, which is certainly high but not excessively so. Indeed, replications of the benchmark regressions in Table 1 using only the rule of law variable generally result in more statistically significant coefficients for institutional quality (these are available from the author on request). We have retained the aggregate measure in the benchmark as we regard an aggregated measure as a more complete representation of institutional quality, rather than a measure of rule of law alone.

[7]Using an alternative depreciation method, such as hyperbolic discounting, does not markedly change the results.

guages (Hall & Jones 1999) (for institutional quality),[8] and embed them in the system GMM framework as additional exogenous instruments.

Table 3: Regressions for fixed investment with exogenous instruments, unbalanced 5-year average panel, 1980–2009†

	E1	**E5**	**E2**	**E6**	**E3**	**E7**
Financial development	-0.297 (0.26)	-0.131 (0.39)	-0.042 (0.27)	0.292 (0.15)**	-0.202 (0.23)	-0.185 (0.20)
Institutional quality	0.461 (0.19)**	0.453 (0.23)**	0.368 (0.20)*	0.256 (0.33)	0.266 (0.13)**	0.201 (0.08)**
Economic controls	Yes	Yes	Yes	Yes	Yes	Yes
Structural controls	No	Yes	No	Yes	No	Yes
Wald χ^2	17,411***	5,766***	18,052***	9,832***	8,422***	16,822***
Hansen J	38.280	33.215	35.482	28.811	36.237	39.364
AR(2) z	-1.446	-1.339	-1.286	-1.457	-1.536	-1.481
Instruments	42	41	41	41	41	43
External?	Both	Both	IQ only	IQ only	FD only	FD only
N (countries)	408 (106)	337 (105)	403 (106)	333 (105)	337 (105)	337 (105)

† All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects, a constant term, and economic (all specifications) and additional structural controls (E2, E4, E6) were included in the regressions, but not reported. IQ = institutional quality, FD = financial development. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

The results can be found in Table 3, both without (columns (E1)–(E3)) and with (columns (E5)–(E7)) additional institutional and structural controls (so that they are analogous to to specifications (B4) and (B6), respectively). To better understand the sensitivity of the results to the use of internal instruments, the first two columns (E1/E5)[9] include both external instruments, while the next two (E2/E6) take the (external) institutional quality instrument seriously by using *only* the language share instruments alongside lagged financial development (as internal instruments) in the exogenous instrument matrix. The final two columns (E3/E7) treat the external financial development instrument seriously by using only legal origins alongside lagged institutional quality in the exogenous instrument matrix.

Taken together, these results convey a consistent message: Conditional on the external instruments being valid, institutional quality is more likely to have a causal impact on investment, as opposed to financial development. Institutional quality retains its positive and significant coefficient in virtually all specifications, while financial development is only significant in one specification (E6), which relies on the internal instruments for financial development. Although the relatively weak result for financial development does not necessarily negate the possibility

[8] An alternative (and somewhat popular) instrument for institutions is settler mortality (Acemoğlu, Johnson & Robinson 2001). For the sake of parsimony, we report results using this instrument—which are similar to the language share instrument—in the annex.

[9] The nonconsecutive numbering of the columns is to allow correspondence with the full results, which are provided in the annex.

that it could still be an important structural determinant of fixed investment activity—there are potential issues with the quality of legal origin as an instrument, after all (Kraay 2012)—we are nevertheless led to the conclusion that institutional quality is more likely to exert an unequivocal causal effect on investment.

3.5 Interactions between development and structure

In this subsection we explore the interaction effects of financial development and institutional quality—which we regard as *development* measures—with that of *structure* measures corresponding to each. In particular, we interact our measure of financial development with that of financial structure, and institutional quality with that of institutional structure. In doing so, we hope to obtain further insight on the conditions in which our key variables of interest may or may not be operative.

These results are summarized in Table 4. We consider interaction effects pertaining to financial development and structure (I1)–(I3), and institutional quality and structure (I4)–(I5). In an analogous fashion to Table 3, we report the results with only economic controls (I1/I4), and with both economic and structural controls (I2–I3/I5) (for reasons documented in Section 3.2, including financial structure severely decreases the sample size; we therefore allow for either the exclusion or inclusion of this control to ensure that sample choice is not driving our results).

We consider these effects in turn. Insofar as institutional quality is concerned, the effect of institutional quality *does* appear to be conditioned by structure; the coefficient on the interaction term is significant across all three specifications (I1)–(I3). This suggests that, conditional on the quality of institutions, the degree of democratic development in an economy (recall, our benchmark institutional structure variable is an index of democratic accountability) raises the level of investment; this contrasts to the *unconditioned* effect of institutional structure being insignificant (Table 1 and Table 2).[10] The important conditioning effect required by institutional quality for institutional structure to play a role serves as an important caveat to more straightforward claims that merely improving democratic accountability and voice will necessarily lead to improved economic performance (in this case, investment).[11]

Note that, while the coefficient on institutional quality is now negative, the total effect—which requires that we add this coefficient to the product of institutional structure and the coefficient on the interaction term—is likely to be positive for the majority of observations. For example, for the fullest specification (I3), the sample mean of institutional quality and structure are 1.54 and 1.70, respectively, which yields the partial derivative of $-1.40 + 0.87\,(1.70) = 0.08$. Furthermore, when taken in tandem with the negative (and significant in 2 of the 3 specifications) coefficient on institutional structure, the combination points to why including

[10] It is useful to recall, as noted in Table A.4, that these two variables are actually fairly distinct, with the correlation between them (in our sample) being 0.45.

[11] Another way to frame this point is that inclusive political institutions (Acemoğlu & Robinson 2012) require not only that such institutions encourage broad-based participation from economic agents, but that this participation be premised on rules of the game that are supportive of economic activity.

Table 4: Regressions for fixed investment with interaction terms (variables of interest), unbalanced 5-year average panel, 1980–2009†

	I1	**I2**	**I3**	**I4**	**I5**
Financial development	0.017 (0.11)	0.028 (0.11)	0.034 (0.12)	0.102 (0.16)	0.097 (0.15)
Financial structure			0.052 (0.14)	0.166 (0.24)	0.084 (0.23)
Fin. dev. × fin. struc.				-0.153 (0.22)	-0.057 (0.21)
Institutional quality	-1.158 (0.60)*	-1.152 (0.60)*	-1.396 (0.91)*	0.162 (0.08)**	0.136 (0.10)
Institutional structure	-0.934 (0.48)*	-0.935 (0.47)**	-1.221 (0.75)		0.098 (0.09)
Inst. qual. × inst. struc.	0.692 (0.34)**	0.697 (0.33)**	0.869 (0.51)*		
Economic controls	Yes	Yes	Yes	Yes	Yes
Structural controls	No	Partial	Full	No	Yes
Wald χ^2	18,421***	18,225***	9,250***	10,117***	13,206***
Hansen J	29.435	28.634	30.755	28.874	29.156
AR(2) z	-1.927*	-1.853*	-1.003	0.165	0.105
Instruments	45	46	47	41	44
N (countries)	321 (105)	321 (105)	229 (82)	236 (82)	236 (82)

† All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects, a constant term, and economic (all specifications) and additional structural controls (I2–I4) were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

institutional structure alone (without an interaction term) may yield a coefficient statistically indistinguishable from zero, as the two cancel out.

For financial development, including an interaction term with financial structure leads to the coefficient on all three being statistically insignificant. This echoes the result in column (B8) of Table 1, and could be due to a more restrictive sample being employed when financial structure is included. However, another reason can be surmised by examining the coefficient on the interaction term: since it is negative (and relatively large), allowing for interaction effects likely means that the negative conditioning effect of financial structure on development may potentially give rise to a statistically insignificant coefficient on the independent term.

Finally, we should also note that, across all specifications, institutional quality tends to be statistically significant,[12] but not so for financial development. While we hesitate to rule out financial development altogether due to the more restrictive sample in most of the specifications in Table 4, it is nonetheless the case that—as it was in Table 3—the significant impact of financial development on investment is a somewhat more fragile result.

[12]Even for column (I5), where the coefficient on institutional quality is insignificant, $p = 0.158$.

3.6 Subsample analysis

In this subsection we probe further into when financial development and institutional quality may matter by splitting the main sample into distinct subsamples, chosen to potentially offer additional insight into the circumstances under which these variables are operative.

The first column (S1) of Table 5 presents results for a subsample comprising industrialized economies, as captured by membership in the Organisation for Economic Cooperation and Development (OECD) or its status as a Newly Industrialized Economy (NIE),[13] using our preferred specification (B6) that includes both structural and economic controls. Column (S2) reports results from the mutually exclusive (from S1) subsample of non-industrialized economies. For the final two columns, we split the sample by the mean level of financial development and institutional quality, and report regressions using the above-average subsample for the former (S3) and latter (S4).

Table 5: Regressions for fixed investment on selected subsamples, unbalanced 5-year average panel, 1980–2009†

	S1	**S2**	**S3**	**S4**
Financial development	0.192 (0.10)**	-0.025 (0.14)	0.117 (0.11)	0.154 (0.09)*
Institutional quality	-0.279 (0.18)	0.315 (0.19)*	0.223 (0.10)**	0.139 (0.17)
Economic controls	Yes	Yes	Yes	Yes
Structural controls	Yes	Yes	Yes	Yes
Wald χ^2	33,096***	3,454***	18,604***	51,763***
Hansen J	16.147	26.271	33.258	29.902
AR(2) z	0.004	-1.191	-0.834	0.287
Instruments	42	42	43	48
N (countries)	104 (32)	220 (73)	144 (51)	177 (68)
Subsample?	Ind.	Non-ind.	High FD	High IQ

† All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. FD = financial development, IQ = institutional quality. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

The results in Table 5 offers further hints as to what drives our main results. Consider, first, the results from the industrialized/non-industrialized subsamples. It is clear that, for industrialized economies, financial development is far more important in stimulating investment activity, whereas institutional quality is more central for investment in non-industrialized ones.[14] This result suggests that—in non-industrialized economies where the strength of institutions is typi-

[13] Defined to include Hong Kong SAR, South Korea, Singapore, and Taiwan; in our dataset, this only expands the OECD subsample to include Hong Kong and Singapore, since Taiwan is not in our data, and South Korea is in any case a member of the OECD.

[14] This finding survives in a pure-OECD/non-OECD subsample as well; these results are available on request.

cally weak—it is institutional quality that binds as a constraint on higher levels of investment, whereas financial depth is more central in industrialized economies.

The results from the high financial development/institutional quality subsamples further indicate that the influence of each on investment may well be nonlinear: At above-average levels of each respective variable, their effects flatten out, so that—while they retain their positive coefficients—their magnitudes are smaller, so they are no longer statistical significance (although the effect of the other corresponding variable remains at least marginally significant). Importantly, there is limited overlap between the two high subsamples: 34 economies appear in the high institutional quality subsample that do not appear in the high financial development subsample, and conversely, 18 countries appear in the high financial development subsample but not the high institutional quality one. Nor do these countries appear to be mainly high-income or developing. The implication of this fairly large non-overlap, then, is that the nonlinearity result does not seem to be driven by a small set of countries, but is reflective of a more systematic difference between economies that demonstrate high levels of either financial development or institutional quality.

4 Conclusion

In this paper, we have sought to empirically examine the manner by which structural and institutional factors contribute to cross-country variation in investment activity. We obtain two main findings. First, we find that financial development and institutional quality are reasonably robust determinants of investment, even after controlling for a host of additional candidate structural variables and economic controls, alternative measures of investment and other structural variables, additional confounding variables. Second, while these results are likely to be robust to weak endogeneity concerns, using external instruments leads to the conclusion that institutional quality is likely to be less sensitive to reverse causality concerns.

Our findings offer a nice complement to the existing literature on the role of financial development and institutions in economic growth. But in contrast to that voluminous literature, we are able to establish the contribution of these variables on a specific channel for growth—capital accumulation—and to demonstrate that the dominance of institutional quality in influencing economic performance (Rodrik, Subramanian & Trebbi 2004), while not ruling out the important role that financial development can play, in contrast to other structural determinants. Future research that seeks to model the key dynamics of investment can thus benefit from a more intentional modeling of these two factors, in particular the manner by which the two may interact to influence capital accumulation decisions.

The results in this paper point to the fact that a favorable investment climate is characterized not only by traditional policy areas that can foster private sector investment—such as a stable macroeconomic and regulatory regime, and tax credits favoring business investment—but also by the broader institutional environment in which firms operate, which includes secure property

rights and stable rule of law, and by the governance framework, such as adequate control of corruption. In an analogous fashion, policy that seeks to enhance investment financing should probably focus on improving the level of development of the financial sector, as opposed to narrowly-conceived investment credits and incentives. Such well-functioning financial systems are more likely to ensure a superior mobilization and corresponding allocation of saving toward the most productive investment opportunities, and raise the level of investment in the economy overall.

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Technical Appendix

Data description

This subsection reports basic features related to the data, for the main variables of interest. This includes detailed sources and definitions (Table A.1), countries included in the sample (Table A.2), standard summary statistics (Table A.3), and the corresponding correlation matrix (Table A.4).

Detailed robustness regression results

This subsection reports the full results of the regressions for fixed investment with exogenous instruments, with (Table A.6) and without (Table A.5) additional institutional and structural variables, analogous to specifications (B4) and (B6), respectively. The specifications below rely on exogenous instrument sets that vary from the benchmark according to: (A.E1) and (A.E5) utilize the Hall & Jones (1999) language share and La Porta *et al.* (1998) legal origin instruments; (A.E2) and (A.E6) utilize only language shares, with lagged domestic credit included as internal exogenous instruments; (A.E3) and (A.E7) utilize only legal origin, with lagged institutional quality included as internal exogenous instruments; and (A.E4) and (A.E8) utilize the Acemoğlu *et al.* (2001) settler mortality and legal origin instruments.

We also report full results for the regressions with interaction terms; these are likewise reported with and without additional institutional and structural controls (Table A.7). (A.I1) includes only economic controls for regressions that include an interaction term for institutional quality and structure, while (A.I2) includes additional structural controls, with the exception of financial structure (since this reduced the sample significantly). To ensure that the results were not dependent on the expanded sample, (A.I3) includes financial structure in the set of structural controls. (A.I4) and (A.I5) repeat the exercise with the interaction between financial development and structure, both without and with additional structural controls, respectively.

Finally, we report full results for regressions on subsamples, all with additional institutional and structural controls, analogous to specification (B6) (Table A.8). (A.S1) is for a subsample comprised of only economies in the OECD or are NIEs, while (A.S2) is for the mutually exclusive subsample of non-OECD/NIE economies. (A.S3) and (A.S4) are, respectively, subsamples where economies possess levels of financial development and institutional quality higher than their respective sample means.

Table A.1: Sources and definitions for main variables of interest

Variable	**Definition**	**Source**
	Economic variables	
Fixed investment	Gross fixed capital formation in constant 2000 U.S. dollars	WDI[†]
Output	Gross domestic product (GDP) in constant 2000 U.S. dollars	WDI
Output growth	Growth in real output[‡]	WDI
Cost of capital	Real interest rate (lending rate adjusted for inflation)	WDI
Trade openness	Imports plus exports divided by GDP	WDI
Financial openness	Index of restrictions on capital account openness	Chinn & Ito (2008)
	Structural and institutional variables	
Financial development	Domestic credit to private sector	WDI
Financial structure	Stock market value traded divided by domestic credit	Beck *et al.* (2000)
Institutional quality	Simple average of rule of law and control of corruption indices	ICRG[†]
Institutional structure	Index of democratic accountability	ICRG
Business environment	Index of strength of investment protection	ICRG
Tax structure	Highest marginal corporate tax rate	WDI
	Alternative measures	
Gross investment	Gross capital formation in constant 2000 U.S. dollars	WDI
Investment rate	Gross fixed capital formation as share of GDP	WDI
Alternative cost of capital	Difference in domestic and exchange-adjusted risk-free rate[*]	Bloomberg, WDI
Alternative financial development	Domestic credit by banking sector	WDI
Alternative financial structure	Stock market capitalization divided by domestic credit	Beck *et al.* (2000)
Alternative institutional structure	Herfindahl index of government parties	Beck *et al.* (2001)
Alternative business environment	Commercial contract enforcement index	Doing Business
Capital stock	Stocks of capital in constant 2000 U.S. dollars[§]	WDI and GEM[†]
Financial crisis	Indicator variable for occurrence of financial crisis[¶]	Laeven & Valencia (2012)

[†] WDI = World Development Indicators, ICRG = International Country Risk Guide, GEM = Global Economic Monitor. ICRG indicators are measured such that higher values indicate lower risk (better outcomes).

[‡] Since the depreciation rate is (assumed) constant across countries, the difference between adjusting output growth for depreciation, as implied by the theoretical model, is trivial.

[*] Computed as the U.S. real interest rate, multiplied by the change in the exchange rate.

[§] Computed using the perpetual inventory method, with an assumed constant depreciation rate of 5 percent. Countries with insufficient data in the constant investment series were backcasted using a regression of the investment deflator on the GDP deflator and available investment data.

[¶] Financial crisis defined as the coincident occurrence of a banking and currency crisis within the 5-year period.

Table A.2: Sample of countries

Albania	Finland	Netherlands
Algeria	France	New Zealand
Argentina	Gabon	Nicaragua
Armenia	Gambia	Norway
Australia	Germany	Pakistan
Austria	Greece	Panama
Azerbaijan	Guatemala	Papua N/ Guinea
Bahamas	Guinea	Paraguay
Bangladesh	Honduras	Peru
Barbados*	Hong Kong SAR	Philippines
Belarus	Hungary	Poland
Belgium	Iceland	Portugal
Belize*	India	Romania
Benin*	Indonesia	Russia
Bolivia	Iran	Senegal
Bosnia & Herz.*	Ireland	Serbia*
Botswana	Israel	Seychelles*
Brazil	Italy	Singapore
Brunei*	Japan	Slovak Rep.
Bulgaria	Jordan	Slovenia
Burkina Faso	Kenya	South Africa
Cameroon	Kyrgyz Rep.*	South Korea
Canada	Lao PDR*	Spain
Cape Verde*	Latvia	Sri Lanka
Cent. Afr. Rep.*	Lebanon	Swaziland*
Chad*	Lesotho*	Sweden
Chile	Liberia	Switzerland
China	Lithuania	Syria
Colombia	Luxembourg*	Tajikistan*
Costa Rica	Macao SAR*	Tanzania
Cote d'Ivoire	Macedonia, FYR*	Thailand
Croatia	Madagascar	Togo
Cyprus	Malaysia	Trin. & Tob.
Czech Republic	Maldives*	Tunisia*
Denmark	Mali	Uganda
Djibouti*	Malta	Ukraine
Dominica*	Mauritania*	United Kingdom
Dominican Rep.	Mauritius*	United States
Ecuador	Mexico	Uruguay
Egypt	Moldova	Venezuela
El Salvador	Morocco	Vietnam
Estonia	Mozambique	Yemen
Ethiopia	Namibia	Zambia

* Countries that were excluded (due to data limitations) from the preferred benchmark specifications (B4)–(B6) are denoted with an asterisk.

Table A.3: Summary statistics for main variables of interest

Variable	**N**	**Mean**	**Std Dev**	**Min**	**Max**
Fixed investment	483	22.331	2.294	16.810	28.368
Output	483	23.916	2.229	19.319	30.066
Output growth	483	0.177	0.141	-0.691	0.865
Cost of capital	483	0.717	0.051	0.370	1.199
Trade openness	482	0.584	0.244	0.124	1.646
Financial openness	468	1.051	0.510	0.000	1.670
Financial development	482	0.370	0.262	0.016	1.223
Financial structure	323	0.241	0.279	0.000	1.256
Business environment	418	2.117	0.270	1.071	2.565
Tax environment	234	3.338	0.478	0.000	3.976
Institutional quality	418	1.490	0.275	0.405	1.946
Institutional structure	418	1.598	0.336	0.024	1.946

Table A.4: Correlation matrix for main variables of interest

	Fixed inv.	Output	Output growth	Cost of capital	Trade open.	Fin. open.	Fin. dev.	Fin. struc.	Inv. climate	Tax env.	Inst. quality	Inst. struc.
Fixed investment	1.000											
Output	0.989	1.000										
Output growth	0.056	0.007	1.000									
Cost of capital	-0.101	-0.091	-0.027	1.000								
Trade openness	-0.292	-0.326	0.132	-0.112	1.000							
Financial openness	0.302	0.316	0.049	0.080	0.159	1.000						
Financial development	0.585	0.575	0.053	-0.120	0.172	0.408	1.000					
Financial structure	0.569	0.559	0.075	-0.185	0.037	0.233	0.424	1.000				
Investment climate	0.303	0.290	0.245	0.006	0.319	0.478	0.478	0.343	1.000			
Tax environment	0.265	0.285	-0.049	0.085	-0.254	0.138	-0.032	0.074	-0.199	1.000		
Institutional quality	0.372	0.376	-0.052	-0.049	0.184	0.328	0.561	0.245	0.348	-0.021	1.000	
Institutional structure	0.339	0.358	-0.109	0.013	0.005	0.417	0.379	0.081	0.384	-0.008	0.453	1.000

Table A.5: Regressions for fixed investment with exogenous instruments (economic controls only), unbalanced 5-year average panel, 1980–2009[†]

	A.E1	**A.E2**	**A.E3**	**A.E4**
Lagged investment	0.647	0.537	0.606	0.382
	(0.13)***	(0.19)***	(0.15)***	(0.23)*
Output	0.371	0.458	0.420	0.688
	(0.13)***	(0.18)**	(0.16)***	(0.22)***
Output growth	1.233	1.134	1.495	1.253
	(0.32)***	(0.28)***	(0.35)***	(0.61)**
Cost of capital	0.711	1.119	-0.588	-0.052
	(1.35)	(1.34)	(0.89)	(0.76)
Trade openness	-0.214	-0.091	-0.286	-0.020
	(0.26)	(0.23)	(0.22)	(0.38)
Financial openness	-0.194	-0.193	-0.140	-0.280
	(0.07)***	(0.07)***	(0.07)**	(0.08)***
Financial	-0.297	-0.042	-0.202	-0.452
development	(0.26)	(0.27)	(0.23)	(0.38)
Institutional	0.461	0.368	0.266	0.660
quality	(0.19)**	(0.20)*	(0.13)**	(0.31)**
Wald χ^2	17,411***	18,052***	8,422***	2,299***
Hansen J	38.280	35.482	36.237	22.966
AR(2) z	-1.446	-1.286	-1.536	-1.332
Instruments	42	41	41	36
N (countries) 408 (106)	403 (106)	337 (105)	408 (106)	

[†] All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

Table A.6: Regressions for fixed investment with exogenous instruments (economic and structural controls), unbalanced 5-year average panel, 1980–2009†

	A.E5	**A.E6**	**A.E7**	**A.E8**
Lagged investment	0.608	0.523	0.657	0.321
	(0.22)***	(0.23)**	(0.08)***	(0.26)
Output	0.415	0.454	0.368	0.755
	(0.23)*	(0.24)*	(0.10)***	(0.26)***
Output growth	1.415	1.513	1.395	1.053
	(0.42)***	(0.35)***	(0.26)***	(0.68)
Cost of capital	0.423	1.573	0.824	0.848
	(1.30)	(1.48)	(0.94)	(2.14)
Trade openness	-0.157	-0.083	-0.024	0.319
	(0.20)	(0.21)	(0.16)	(0.52)
Financial openness	-0.140	-0.195	-0.187	-0.148
	(0.08)*	(0.08)**	(0.06)***	(0.10)
Financial development	-0.131	0.292	-0.185	-0.133
	(0.39)	(0.15)**	(0.20)	(0.42)
Institutional quality	0.453	0.256	0.201	1.068
	(0.23)**	(0.33)	(0.08)**	(0.55)*
Business environment	-0.250	-0.268	0.031	-0.720
	(0.34)	(0.30)	(0.17)	(0.53)
Institutional structure	0.028	0.118	0.081	-0.192
	(0.14)	(0.12)	(0.09)	(0.27)
Wald χ^2	5,766***	9,832***	16,822***	1,817***
Hansen J	33.215	28.811	39.364	20.809
AR(2) z	-1.339	-1.457	-1.481	-0.459
Instruments	41	41	43	37
N (countries)	337 (105)	333 (105)	337 (105)	408 (106)

† All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

Table A.7: Regressions for fixed investment with interaction terms, unbalanced 5-year average panel, 1980–2009[†]

	A.I1	**A.I2**	**A.I3**	**A.I4**	**A.I5**
Lagged investment	0.600	0.620	0.421	0.356	0.403
	(0.11)***	(0.11)***	(0.08)***	(0.09)***	(0.10)***
Output	0.414	0.393	0.572	0.629	0.592
	(0.12)***	(0.11)***	(0.10)***	(0.10)***	(0.12)***
Output growth	1.078	1.068	1.723	1.175	1.374
	(0.29)***	(0.29)***	(0.30)***	(0.23)***	(0.33)***
Cost of capital	0.768	1.095	0.306	1.278	1.555
	(0.88)	(0.87)	(0.93)	(1.29)	(1.31)
Trade openness	0.158	0.185	0.056	0.086	0.087
	(0.16)	(0.16)	(0.13)	(0.12)	(0.11)
Financial openness	-0.156	-0.146	-0.075	-0.103	-0.123
	(0.06)**	(0.06)**	(0.08)	(0.06)*	(0.07)*
Financial	0.017	0.028	0.034	0.102	0.097
development	(0.11)	(0.11)	(0.12)	(0.16)	(0.15)
Financial			0.052	0.166	0.084
structure			(0.14)	(0.24)	(0.23)
Fin. dev. ×				-0.153	-0.057
fin. struc.				(0.22)	(0.21)
Institutional	-1.158	-1.152	-1.396	0.162	0.136
quality	(0.60)*	(0.60)*	(0.91)*	(0.08)**	(0.10)
Institutional	-0.934	-0.935	-1.221		0.098
structure	(0.48)*	(0.47)**	(0.75)		(0.09)
Inst. qual. ×	0.692	0.697	0.869		
inst. struc.	(0.34)**	(0.33)**	(0.51)*		
Business		-0.069	-0.055		-0.099
environment		(0.16)	(0.18)		(0.20)
Wald χ^2	18,421***	18,225***	9,250***	10,117***	13,206***
Hansen J	29.435	28.634	30.755	28.874	29.156
AR(2) z	-1.927*	-1.853*	-1.003	0.165	0.105
Instruments	45	46	47	41	44
N (countries)	321 (105)	321 (105)	229 (82)	236 (82)	236 (82)

[†] All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

Table A.8: Regressions for fixed investment on selected subsamples, unbalanced 5-year average panel, 1980–2009[†]

	A.S1	**A.S2**	**A.S3**	**A.S4**
Lagged investment	0.634	0.591	0.471	0.698
	(0.10)***	(0.13)***	(0.18)**	(0.21)***
Output	1.012	1.164	1.060	1.385
	(0.39)***	(0.39)***	(0.39)***	(0.32)***
Output growth	0.318	0.437	0.501	0.266
	(0.11)***	(0.14)***	(0.18)***	(0.21)
Cost of capital	-3.686	1.995	-0.431	-0.439
	(1.94)*	(1.26)	(0.84)	(1.02)
Trade openness	-0.099	0.243	-0.094	-0.071
	(0.16)	(0.24)	(0.11)	(0.14)
Financial openness	-0.096	-0.174	-0.068	0.002
	(0.08)	(0.09)*	(0.06)	(0.05)
Financial	0.192	-0.025	0.117	0.154
development	(0.10)**	(0.14)	(0.11)	(0.09)*
Institutional	-0.279	0.315	0.223	0.139
quality	(0.18)	(0.19)*	(0.10)**	(0.17)
Business	0.641	-0.209	-0.085	-0.103
environment	(0.26)**	(0.19)	(0.28)	(0.14)
Institutional	-0.041	-0.058	-0.162	0.063
structure	(0.14)	(0.11)	(0.13)	(0.08)
Wald χ^2	33,096***	3,454***	18,604***	51,763***
Hansen J	16.147	26.271	33.258	29.902
AR(2) z	0.004	-1.191	-0.834	0.287
Instruments	42	42	43	48
N (countries)	104 (32)	220 (73)	144 (51)	177 (68)
Subsample?	Ind.	Non-ind.	High FD	High IQ

[†] All variables are in log form. Heteroskedasticity and autocorrelation-robust standard errors are reported in parentheses. Period fixed effects and a constant term were included in the regressions, but not reported. FD = financial development, IQ = institutional quality. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.