Online Appendix to "Financial Contracts and the Political Economy of Investor Protection"

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1 Empirical Evidence

1.1 Investor Protection and Output per Worker

Table 1 provides results from cross-country regressions of various investor protection indicators on the logarithm of real GDP per worker and the legal origin of countries. The partial regression plots in Figure 1 of the paper are constructed from these regressions. Data on the anti-director rights, creditor rights, and anti-self-dealing indices take into account laws in effect in 2003. Data on the private enforcement index take into account laws in effect in 2000. Real GDP per worker used in the regressions corresponds to the year in which the laws were applicable.

1.2 Description of Variables and Data Sources

anti-director rights: Sum of six dummy variables indicating whether (1) the country allows shareholders to mail their proxy vote, (2) shareholders are not required to deposit their shares prior to the General Shareholders Meeting, (3) cumulative voting or proportional representation of minorities on the board of directors is allowed, (4) an oppressed minorities protection mechanism is in place, (5) the minimum percentage of share capital required to call an Extraordinary Shareholders Meeting is less than or equal to ten percent, (6) shareholders have preemptive rights that can only be waived by a shareholders meeting. The index was developed by La Porta et al. (1998) for 49

Table 1: Regressions of investor protection

	Anti-director rights[b]	Creditor rights[c]	Anti-self-dealing[b]	Private enforcement[d]	Private enf. (PHL excluded)
Log(real GDP per worker)[a]	0.172	0.183**	0.069***	0.052*	0.071***
	(0.122)	(0.078)	(0.024)	(0.026)	(0.012)
French legal origin[b,c]	−1.413***	−0.927***	−0.351***	−0.279***	−0.312***
	(0.281)	(0.233)	(0.054)	(0.056)	(0.047)
German legal origin[b,c]	−1.287***	−0.136	−0.329***	−0.237**	−0.257**
	(0.323)	(0.268)	(0.075)	(0.110)	(0.110)
Scandinavian legal origin[b,c]	−0.636**	−0.875*	−0.371***	−0.196***	−0.219***
	(0.291)	(0.482)	(0.064)	(0.066)	(0.063)
Socialist legal origin[b,c]	−0.509	−0.045	−0.320***	–	–
	(0.314)	(0.225)	(0.108)		
Constant	2.527**	0.586	−0.004	0.175	−0.006
	(1.231)	(0.746)	(0.234)	(0.252)	(0.188)
Nbr. observations	72	133	72	49	49
R^2	0.30	0.21	0.45	0.37	0.50

Robust standard errors in parentheses. ***, **, and * significant at the 1, 5, and 10 percent levels. Data sources: [a] Heston, Summers and Aten (2011), [b] Djankov et al. (2008), [c] Djankov, McLiesh and Shleifer (2007), [d]La Porta, Lopez-De-Silanez and Shleifer (2006).

countries, reflecting laws in 1993. It was revised and extended by Djankov et al. (2008) to 72 countries, based on laws in place in 2003. In the regression, I use the revised version of the index.

creditor rights: Sum of four dummy variables indicating whether (1) there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization, (2) there is no automatic stay on assets, (3) secured creditors are paid first out of liquidation, (4) management does not retain administration during the reorganization. The index was developed by La Porta et al. (1998) for 49 countries, based on laws in effect in 1993. It was revised and extended by Djankov, McLiesh and Shleifer (2007) to 133 countries for the interval 1978 - 2003. In the regression, I use the revised version of the index for the year 2003.

anti-self-dealing: Measures legal protection of minority shareholders against expropriation by corporate insiders. Focuses on private enforcement mechanisms, such as disclosure, approval, and litigation. Based on local law firms' assessment of effective outcomes in a standardized case study of insider expropriation. Reflects legal rules prevailing in 2003. Ranges from 0 to 1. Constructed by Djankov et al. (2008).

private enforcement: Captures disclosure requirements and liability standards for issuers and distributors of securities and accountants of publicly traded companies. Constructed by La Porta, Lopez-De-Silanez and Shleifer (2006) as the arithmetic average of the disclosure requirement index and the liability standard index.

The disclosure requirement index is the arithmetic average of six variables:

1. Prospectus: Equals one if the law prohibits selling securities that are going to be listed on the largest stock exchange of the country without delivering a prospectus to potential investors and equals zero otherwise.

2. Compensation: An index of prospectus disclosure requirements regarding the compensation of the Issuer's directors and key officers. Equals one if the law or the listing rules require that the compensation of each director and key officer be reported in the prospectus of a newly listed firm, equals one half if only the aggregate compensation of directors and key officers must be reported in the prospectus of a newly listed firm, and equals zero when there is no requirement

to disclose the compensation of directors and key officers in the prospectus for a newly listed firm.

3. Shareholders: An index of disclosure requirements regarding the Issuer's equity ownership structure. Equals one if the law or the listing rules require disclosing the name and ownership stake of each shareholder who, directly or indirectly, controls 10% or more of the Issuer's voting securities; equals one half if reporting requirements for the Issuer's 10% shareholders do not include indirect ownership or if only their aggregate ownership needs to be disclosed; and equals zero when the law does not require disclosing the name and ownership stake of the Issuer's 10% shareholders. We combine large shareholder reporting requirements imposed on firms with those imposed on large shareholders themselves.

4. Inside ownership: An index of prospectus disclosure requirements regarding the equity ownership of the Issuer's shares by its directors and key officers. Equals one if the law or the listing rules require that the ownership of the Issuer's shares by each of its directors and key officers be disclosed in the prospectus, equals one half if only the aggregate number of the Issuer's shares owned by its directors and key officers must be disclosed in the prospectus, and equals zero when the ownership of the Issuer's shares by its directors and key officers need not be disclosed in the prospectus.

5. Irregular contracts: An index of prospectus disclosure requirements regarding the Issuer's contracts outside the ordinary course of business. Equals one if the law or the listing rules require that the terms of material contracts made by the Issuer outside the ordinary course of its business be disclosed in the prospectus, equals one half if the terms of only some material contracts made outside the ordinary course of business must be disclosed, and equals zero otherwise.

6. Transactions: An index of the prospectus disclosure requirements regarding transactions between the Issuer and its directors, officers, and/or large shareholders (i.e., "related parties"). Equals one if the law or the listing rules require that

all transactions in which related parties have, or will have, an interest be disclosed in the prospectus, equals one half if only some transactions between the Issuer and related parties must be disclosed in the prospectus, and equals zero if transactions between the Issuer and related parties need not be disclosed in the prospectus.

The liability standard index is the arithmetic average of three variables:

1. Liability standard for the Issuer and its directors: Index of the procedural difficulty in recovering losses from the Issuer and its directors in a civil liability case for losses due to misleading statements in the prospectus. We first code separately the liability standard applicable to the Issuer and its directors and then average the two of them. The liability standard applicable to the Issuer's directors equals one when investors are only required to prove that the prospectus contains a misleading statement. Equals two thirds when investors must also prove that they relied on the prospectus and/or that their loss was caused by the misleading statement. Equals one third when investors must also prove that the director acted with negligence. Equals zero if restitution from directors is either unavailable or the liability standard is intent or gross negligence. The liability standard applicable to the Issuer is coded analogously.

2. Liability standard for distributors: Index of the procedural difficulty in recovering losses from the distributor in a civil liability case for losses due to misleading statements in the prospectus. Equals one when investors are only required to prove that the prospectus contains a misleading statement. Equals two thirds when investors must also prove that they relied on the prospectus and/or that their loss was caused by the misleading statement. Equals one third when investors must also prove that the distributor acted with negligence. Equals zero if restitution from the distributor is either unavailable or the liability standard is intent or gross negligence.

3. Liability standard for accountants: Index of the procedural difficulty in recovering losses from the accountant in a civil liability case for losses due to misleading

Table 2: Regressions of stock market capitalization

Dependent variable:		excluding	
Stock market capitalization/GDP	full sample	HKG SGP LUX	IV
Net exporter[a]	−0.323	−0.211	−0.393
	(0.223)	(0.228)	(0.281)
Openness × Log(avg. real GDP per worker)[b]	−0.023*	−0.020*	−0.018
	(0.012)	(0.011)	(0.015)
Openness × Log(avg. real GDP per worker) × Net export	0.075***	0.059**	0.081**
	(0.024)	(0.027)	(0.032)
Log(real GDP per worker in 1980)[b]	0.108***	0.112***	0.106***
	(0.038)	(0.038)	(0.039)
Constant	−0.560*	−0.618*	−0.556*
	(0.321)	(0.323)	(0.311)
Nbr. observations	100	97	90
R^2	0.50	0.29	0.48

In column IV, Openness × Log(avg. GDP per worker) and Openness × Log(avg. GDP per worker) × Net export are instrumented by interactions of Log(avg. GDP per worker) and Log(avg. GDP per worker) × Net export with the constructed trade shares from Frankel and Rose (2005). The constructed trade shares are not available for 10 countries from the initial sample.
Robust standard errors in parentheses. ***, **, and * significant at the 1, 5, and 10 percent levels.
Data sources: [a] World Development Indicators (2011), [b] Heston, Summers and Aten (2011).

statements in the audited financial information accompanying the prospectus. Equals one when investors are only required to prove that the audited financial information accompanying the prospectus contains a misleading statement. Equals two thirds when investors must also prove that they relied on the prospectus and/or that their loss was caused by the misleading accounting information. Equals one third when investors must also prove that the accountant acted with negligence. Equals zero if restitution from the accountant is either unavailable or the liability standard is intent or gross negligence.

1.3 Financial Development and Openness

Table 2 provides results from cross-country regressions of stock market capitalization to GDP ratio on openness and the export status of the countries, using an alternative specification considered by Rajan and Zingales (2003). In this specification, the main explicative variable is the interaction of country's average openness over the period 1980-2009 with the log of the average GDP per capita over the same period. The

regressions show a statistically significant differential effect of the net exporter variable, which is in line with the implications of the theoretical model.

2 Computation of Economic Equilibria

The main steps of the algorithm for computing the political equilibrium follow the methodology of Krusell and Ríos-Rull (1996) and are described in the Appendix of the paper. This section provides a more detailed description of the computation of economic equilibria for a given policy function Ψ and the computation of economic equilibria with one-period deviation from Ψ. Obtaining solutions to these problems is necessary for evaluating agents' indirect utilities under alternative policies in Step 2 of the main algorithm described in the Appendix of the paper.

2.1 Economic Equilibrium under a Given Policy Function

The characterization of the economic equilibrium can be rewritten as a system of functional equations in which the endogenous variables $(q_t, K_{t+1}, \underline{z}_t, w_t, R_t)$ are functions of the aggregate state (θ, K) and the policy function Ψ that specifies the level of investor protection for each aggregate state. Since the capital supply curve directly depends on the current level of investor protection, the functions characterizing $\underline{z}_t$ and K_{t+1} will directly depend on Ψ. The price functions, on the other hand, depend on Ψ only indirectly and will be functions of the aggregate state (θ, K) only.[1] For expositional reasons, I consider in this section only the case of an economy without trade in goods. The case with trade is analogous except that we need to keep track separately of the capital owned by domestic residents K^s and the capital used by the firms in the consumption goods sector K^d, with the government balanced budget condition pinning down the relationship between these two variables. Adopting the convention that primes indicate the next period variables, the functional equations characterizing the economic equilibrium are:

[1] Essentially, under a different policy function $\tilde{\Psi}$, we will have different price functions (e.g., $\tilde{q}(\theta, K)$).

1. The arbitrage condition for investors

$$E_{\theta'}\left[R\left(\theta', K'\right) + (1-\delta)\, q\left(\theta', K'\right)\right] = (1+r)\, q\left(\theta, K\right), \tag{1}$$

2. the first-order conditions for maximization of profit in the consumption goods sector

$$R\left(\theta, K\right) = \theta F_1\left(K, 1\right), \tag{2}$$

$$w\left(\theta, K\right) = \theta F_2\left(K, 1\right), \tag{3}$$

3. the indifference condition characterizing the skill type of the infra-marginal entrepreneur

$$\underline{z}\left(\theta, K; \Psi\right) = \frac{\phi\left(\gamma\right)}{\phi\left(\gamma\right) - 1} \frac{A\left(1+r\right) - q\left(\theta, K\right)\left(\kappa - \pi\gamma\right)}{w\left(\theta, K\right)\left(1+r\right)}, \tag{4}$$

4. the law of motion of the aggregate stock of capital

$$K' = H\left(\theta, K; \Psi\right) = (1-\delta)\, K + \kappa\left\{1 - G\left[\underline{z}\left(\theta, K; \Psi\right)\right]\right\}, \tag{5}$$

5. the condition that the current investor protection policy γ is consistent with the policy function Ψ:

$$\gamma = \Psi\left(\theta, K\right). \tag{6}$$

To compute an economic equilibrium under Ψ, I need to find a fixed point of the system of equations (1)-(6). In practice, I approximate the solution by solving the fixed point problem on a discretized grid of state variables and using the shape-preserving cubic spline interpolation to evaluate the function q on the points outside the grid. The algorithm for computing the economic equilibrium consists of the following steps:

1. Discretize the state space into a two-dimensional grid of (θ, K).

2. Guess function $q\left(\theta, K\right)$ on the discretized grid. For each (θ, K) on the grid:

3. Compute $w\left(\theta, K\right)$ from equation (3).

4. Set $\gamma = \Psi(\theta, K)$.

5. If the policy function prescribes imperfect investor protection $\gamma > 0$:

   (a) Compute $\underline{z}(\theta, K; \Psi)$ from equation (4).

   (b) Compute K' from equation (5).

   (c) Compute the price function

$$\hat{q}(\theta, K) = \frac{1}{1+r} E_{\theta'} \left[\theta' F_1(K', 1) + (1-\delta) q'(\theta', K') \right],$$

   where $q'(\theta', K')$ is the shape-preserving cubic spline interpolant of q evaluated at (θ', K').

6. If the policy function prescribes perfect investor protection $\gamma = 0$:

   (a) Set the price function $\hat{q}(\theta, K) = \frac{A(1+r)}{\kappa}$, where $\frac{A(1+r)}{\kappa}$ is the unique equilibrium price under perfect investor protection.

   (b) Compute K' as the solution to

$$\hat{q}(\theta, K) = \frac{1}{1+r} E_{\theta'} \left[\theta' F_1(K', 1) + (1-\delta) q'(\theta', K') \right],$$

   where $q'(\theta', K')$ is the shape-preserving cubic spline interpolant of q evaluated at (θ', K').

   (c) compute the least wealthy entrepreneur as $\underline{z}(\theta, K; \Psi) = G^{-1}\left[1 - \frac{K' - (1-\delta)K}{\kappa}\right]$.

7. Check if $\hat{q}(\theta, K)$ is sufficiently close to $q(\theta, K)$ at all (θ, K) on the grid. If yes, a solution has been found. If not, update the guess for $q(\theta, K)$ and iterate on steps 2-7 until convergence.

2.2 Economic Equilibria with One-Period Deviation from Ψ

These are equilibria that agents need to think about in order to evaluate alternative policies. Here, the current policy is given by $\tilde{\gamma} \neq \Psi(\theta, K)$, and all future policies take

values generated by $\Psi(\theta, K)$. The new current policy implies that the current price of capital must be evaluated by a new price function $\tilde{q}(\theta, K)$, whereas all future prices are evaluated through $q(\theta, K)$, which applies under Ψ. The algorithm to compute these equilibria follows:

1. Discretize state space into a two-dimensional grid of (θ, K).
2. Guess function $\tilde{q}(\theta, K)$ on the discretized grid. For each (θ, K) on the grid:
3. Compute $w(\theta, K)$ from equation (3).
4. Set $\gamma = \tilde{\gamma}$.
5. If the deviation policy prescribes imperfect investor protection $\tilde{\gamma} > 0$:
   (a) Compute $\tilde{\underline{z}}(\theta, K; \Psi)$ from equation (4).
   (b) Compute $\tilde{K}'$ from equation (5).
   (c) Compute the price function

$$\hat{\tilde{q}}(\theta, K) = \frac{1}{1+r} E_{\theta'} \left[\theta' F_1 \left(\tilde{K}', 1 \right) + (1-\delta) q' \left(\theta', \tilde{K}' \right) \right],$$

   where $q'(\theta', \tilde{K}')$ is the shape-preserving cubic spline interpolant of q, the equilibrium price function under Ψ obtained previously, evaluated at $(\theta', \tilde{K}')$. Notice that it is important to use the equilibrium q under Ψ and *not* $\tilde{q}$ to evaluate future prices.
6. If the deviation policy prescribes perfect investor protection, $\tilde{\gamma} = 0$:
   (a) Set the price function $\hat{\tilde{q}}(\theta, K) = \frac{A(1+r)}{\kappa}$, where $\frac{A(1+r)}{\kappa}$ is the unique equilibrium price under perfect investor protection.
   (b) Compute $\tilde{K}'$ as the solution to

$$\hat{\tilde{q}}(\theta, K) = \frac{1}{1+r} E_{\theta'} \left[\theta' F_1 \left(\tilde{K}', 1 \right) + (1-\delta) q' \left(\theta', \tilde{K}' \right) \right],$$

where $q'(\theta', \tilde{K}')$ is the shape-preserving cubic spline interpolant of q, the equilibrium price function under Ψ obtained previously, evaluated at $(\theta', \tilde{K}')$. Notice that it is important to use the equilibrium q under Ψ and *not* $\tilde{q}$ to evaluate future prices.

(c) compute the least wealthy entrepreneur as $\tilde{\underline{z}}(\theta, K; \Psi) = G^{-1}\left[1 - \frac{\tilde{K}' - (1-\delta)K}{\kappa}\right]$.

7. Check if $\hat{\tilde{q}}(\theta, K)$ is sufficiently close to $\tilde{q}(\theta, K)$ at all (θ, K) on the grid. If yes, a solution has been found. If not, update the guess for $\tilde{q}(\theta, K)$ and iterate on steps 2-7 until convergence.

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