

**FOREIGN RISK – DOMESTIC PROBLEM:
CAPITAL ALLOCATION AND FIRM PERFORMANCE
UNDER POLITICAL INSTABILITY***

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SUPPLEMENTARY APPENDIXES

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Appendix A: Proofs.

This Appendix lists mathematical proofs.

The $\dot{q}_{t+1} - \dot{q}_t = 0$ isocline slopes downward.

This follows from the fact that $\frac{\partial \dot{q}_t}{\partial K_t} < 0$. To show this, multiply both sides of (9) by $1 + r$ and note that, in equilibrium,

$\dot{q}_t = \dot{q}_{t+1}$. Then,

$$\dot{q}_t = \frac{1}{1+r} E_t \left[A_{t+1} F'_K(K_{t+1}, N_{t+1}) + \frac{b}{2} \left(\frac{I_{t+1}}{K_{t+1}} \right)^2 + \dot{q}_{t+1} \right], \quad (\text{A1})$$

$$\dot{q}_t = \left(\frac{1}{r} \right) \left(E_t A_{t+1} F'_K(K_{t+1}, N_{t+1}) + \frac{b}{2} \left(\frac{I_{t+j}}{K_{t+j}} \right)^2 \right), \quad (\text{A2})$$

$$\frac{\partial \dot{q}_t}{\partial K_t} = \left(\frac{1}{r} \right) \left(E_t A_{t+1} F'_{KK}(K_{t+1}, N_{t+1}) - \frac{b}{2} \left(\frac{I_{t+j}}{K_{t+j}} \right)^3 \right) < 0. \quad (\text{A3})$$

Q.E.D.

Proof of Proposition 1: Marginal q in period e is,

$$\dot{q}_e = E_e \sum_{j=1}^{\infty} \left(\frac{1}{1+r} \right)^j \left(A_{e+j} F'_K(K_{e+j}, N_{e+j})(1-ug) + \frac{1}{b} \left(\frac{I_{e+j}}{K_{e+j}} \right)^2 \right). \quad (\text{A4})$$

Marginal q in election period e is a decreasing function of instability u for $g > 0$ (worse business environment) and an increasing function of u for $g < 0$ (better business environment),

$$\frac{\partial \dot{q}_e}{\partial u} = E_e \sum_{j=1}^{\infty} \left(\frac{1}{1+r} \right)^j \left(-g A_{e+j} F'_K(K_{e+j}, N_{e+j}) + \frac{1}{b} \left(\frac{I_{e+j}}{K_{e+j}} \right)^2 \right) < 0. \quad (\text{A5})$$

Moreover,

$$\frac{\partial \dot{q}_e}{\partial u \partial g} = E_e \sum_{j=1}^{\infty} \left(\frac{1}{1+r} \right)^j \left(-A_{e+j} F'_K(K_{e+j}, N_{e+j}) + \frac{1}{b} \left(\frac{I_{e+j}}{K_{e+j}} \right)^2 \right) < 0. \quad (\text{A6})$$

According to (A6), for $g > 0$, investment in period e would decrease, and capital stock would decrease because $I_e / K_e < 0$ if $\dot{q}_e < 1$. The reverse is true for $g < 0$ because $I_e / K_e > 0$ if $\dot{q}_e > 1$.

Q.E.D.

Proof of Proposition 2: To prove it, we first need to derive the envelope theorem for Lagrangian. Using the notations for our model, consider a general problem

$$V = \max F(K, N, u), \quad (\text{A7})$$

subject to

$$h(K, N, u) = 0. \quad (\text{A8})$$

We show that the derivative of equilibrium value at optimal parameter values K^* and N^* is just a partial derivative of Lagrangian, that is,

$$\frac{dV}{du} = \frac{\partial L(K^*(u), N^*(u), u)}{\partial u} = \frac{\partial F(K^*(u), N^*(u), u)}{\partial u} - \dot{q} \frac{\partial h(K^*(u), N^*(u), u)}{\partial u}. \quad (\text{A9})$$

We define Lagrangian as

$$L = F(K, N, u) - \dot{q} h(K, N, u). \quad (\text{A10})$$

The first-order conditions are

$$\frac{\partial F}{\partial K} - \dot{q} \frac{\partial h}{\partial K} = 0, \quad (\text{A11})$$

$$\frac{\partial F}{\partial N} - \dot{q} \frac{\partial h}{\partial N} = 0. \quad (\text{A12})$$

Then

$$\frac{dV}{du} = \frac{\partial F}{\partial K} \frac{dK}{du} + \frac{\partial F}{\partial N} \frac{dN}{du} + \frac{dF}{du} \quad \text{and} \quad (\text{A13})$$

$$\frac{dV}{du} = \dot{q} \left(\frac{dh}{dK} \frac{dK}{du} + \frac{dh}{dN} \frac{dN}{du} \right) + \frac{dF}{du}. \quad (\text{A14})$$

Note that

$$h(K^*(u), N^*(u), u) = 0. \quad (\text{A15})$$

Then

$$\frac{\partial h}{\partial K} \frac{\partial K}{\partial u} + \frac{\partial h}{\partial N} \frac{\partial N}{\partial u} + \frac{\partial h}{\partial u} = 0, \quad (\text{A16})$$

$$\frac{dV}{du} = -\dot{q} \frac{\partial h}{\partial u} + \frac{\partial F}{\partial u} = \frac{\partial L(K^*(u), N^*(u), u)}{\partial u}. \quad (\text{A17})$$

For the case of $g > 0$, we can use the envelope theorem and show that

$$\frac{dV_e}{du} = \frac{\partial L(K^*(u), N^*(u), u)}{\partial u} = -gA_e F(K_e, N_e) < 0. \quad (\text{A18})$$

We defined TFP as $TFP_t = Y_t / F(K_t, N_t)$. It follows that since, in period e , output drops from AF to $AF(1 - gu)$, $TFP_e = A(1 - ug)$, which is lower than A . Since the policy shock improves output, TFP in period e , $A(1 - ug)$, is larger for $g < 0$.

Q.E.D.

Appendix B: Marginal q and Non-Linear Estimation of Optimal Level.

B1. Marginal q

Durnev et al. (2004) show that marginal q is the estimate of marginal project's profitability index. Due to declining marginal returns on investment, capital is invested till the incremental value of a project is equal to its cost, implying an optimal level of marginal q equal to 1. Durnev et al. (2004) define marginal q (denoted as \hat{q}) as the ratio of the change in the market value of a firm V due to an unexpected unit increase in its stock of capital goods K , which equals the expectation of profitability index,

$$\hat{q} = \frac{\Delta V}{\Delta K} = \frac{1}{C} E \left[\sum_{t=1}^{\infty} \frac{cf_t}{(1+r)^t} \right] = 1 + \frac{E[NPV]}{C} = E[PI] \quad . \quad (B1)$$

In (B1), all capital spending is aggregated into a project with the set-up cost C , cf is total cash flow, r is the discount rate, and E represents investor expectations. It is optimal to invest in projects with positive NPV , that is, when profitability index PI is greater than 1. Therefore, ignoring taxes and other complications, firms invest up to the point when marginal q equals 1. Thus, the greater the distance between marginal q and 1, the worse the quality of capital allocation is, and marginal q greater (lower) than 1 indicates under-investment (over-investment).

Marginal q can be expressed as

$$\hat{q}_{j,t} = \frac{V_{j,t} - V_{j,t-1}(1 + \hat{r}_{j,t} - \hat{d}_{j,t})}{A_{j,t} - A_{j,t-1}(1 + \hat{g}_{j,t} - \hat{\delta}_{j,t})} \quad , \quad (B2)$$

where $V_{j,t}$ and $A_{j,t}$ are the market value and stock of capital goods of firm j in period t , and $\hat{r}_{j,t}$ is the expected return from owning firm j . Variables $\hat{d}_{j,t}$ and $\hat{\delta}_{j,t}$ represent disbursements to investors and expected depreciation of capital goods, respectively. Rewriting (B2) and normalizing by $A_{j,t-1}$ we obtain

$$\frac{V_{j,t}^i - V_{j,t-1}^i}{A_{j,t-1}^i} = -\hat{q}_{j,t}(g_{j,t} - \delta_{j,t}) + \hat{q}_{j,t} \frac{A_{j,t}^i - A_{j,t-1}^i}{A_{j,t-1}^i} - \xi_{j,t} \frac{D_{j,t-1}^i}{A_{j,t-1}^i} + r_{j,t} \frac{V_{j,t-1}^i}{A_{j,t-1}^i} \quad , \quad (B3)$$

where i denotes industries a firm j belongs to. We estimate $V_{j,t}$ and $A_{j,t}$ for firm j in period t as:

$$V_{j,t} = P_t(CS_{j,t} + PS_{j,t} + LTD_{j,t} + SD_{j,t} - STA_{j,t}) \quad (B4)$$

$$A_{j,t} = K_{j,t} + INV_{j,t} \quad , \quad (B5)$$

where CS is the market value of shares outstanding; PS is the estimated market value of preferred shares; LTD is the estimated market value of long-term debt; SD is the book value of short-term debt; STA is the book value of short-term assets; P is inflation adjustment using the GDP deflator; K is the estimated value of plant, property, and equipment; and INV is the estimated market value of inventories. The market value of long-term debt is estimated as the value of a 15-year bond issued at par using book values of debt. The stock of capital goods is estimated recursively in (B5) using the market value of inventories and data on property, plant, and equipment assuming 10% depreciation rate. We refer to Appendix A in Durnev et al. (2004) for further details. Variable D in (B3) is dividends for common shares plus repurchases of common shares plus interest expenses. Variables V and A are winsorized at 1% and 99% levels.

B2. Non-Linear Estimation of Optimal Level for Marginal q

We relax the assumption of the optimal level h being equal to 1 and estimate

$$|\hat{q}_i - h| = b'Z_i + u_i \quad , \quad (B6)$$

where Z_i represents the list of independent variables. Using non-linear least squares, the optimal level h and regression coefficients are estimated simultaneously. Equation (B6) is equivalent to

$$\hat{q}_i^2 = -h^2 + 2h\hat{q}_i + (b'Z_i + u_i)^2 \quad . \quad (B7)$$

In the nonlinear least squares estimation, the following function is minimized with respect to b :

$$Q_i(b) = \frac{1}{I} \sum_{i=1}^I [y_i - f(x_i; b)]^2 \quad , \quad (B8)$$

where $y_i = \hat{q}_i^2$ and $f(x_i; b) = -h^2 + 2h\hat{q}_i + (b'Z_i)^2$.

Appendix C: Election Data.

Table C1: Political System, Party Orientation, and Elections.

This table lists the type of a political system (presidential or parliamentary), the chief executive's party orientation during the sample period (left, right, or center), and years of the elections of the chief executive based on the World Bank Database of Political Institutions. We cross-check the election data with data reported by International Institute for Democracy and Electoral Assistance, Center on Democratic Performance, Journal of Democracy, Elections around the World, Election Guide, The CIA World Factbook, the PARLINE Database on National Parliaments, and Keesing's Record of World Events. The political system is classified as presidential when (i) the chief executive is not elected or (ii) presidents are elected directly or by an electoral college in the event there is no prime minister. In systems with both a prime minister and a president, exact classification depends on the veto power of the president and the power of the president to appoint a prime minister and dissolve parliament. Systems in which the legislature elects the chief executive are classified as parliamentary. Election year is the year of presidential election for presidential systems and of parliamentary elections for parliamentary systems. Party orientation is determined according to the party of chief executive using the following rule: right for parties that are defined as conservative, Christian-Democratic, or right-wing; left for parties that are defined as communist, socialist, social-democratic, or left-wing; center for parties that can be best described as centrist. "NA" appears for cases when the exact party orientation cannot be determined. Refer to Beck et al. (2010) for further details. The sample beginning years for every country correspond to the availability of return series. Notes: *Pakistan had a parliamentary system until 1999. In 1999, the system changed to presidential after a military coup d'état.

Country	System	Party type	Year	Country	System	Party type	Year	Country	System	Party type	Year
Argentina	Presidential	1997-1999:R	-	Chile	Presidential	1997-2000:R	-	France	Parliamentary	1997:R	-
		2000-2001:C	1999			2001-2005:R	2000			1998-2002:L	1997
		2002-2003:R	-			2006-2006:R	2005			2003-2006:R	2002
Australia	Parliamentary	2004-2006:L	2003	China	NA	1997-2006:L	-	Germany	Parliamentary	1997-1998:R	-
		1997-1998:R	-	Colombia	Presidential	1997-1998:C	-			1999-2002:L	1998
		1999-2001:R	1998			1999-2002:R	1998	2003-2005:L	2002		
		2002-2004:R	2001			2003-2006:NA	2002	2006-2006:R	2005		
Austria	Parliamentary	2005-2006:R	2004	Czech Rep.	Parliamentary	1997-1998:R	-	Greece	Parliamentary	1997-2000:L	-
		1997-1999:L	-			1999-2002:L	1998			2001-2004:L	2000
		2000-2002:R	1999			2003-2006:L	2002	2005-2006:R	2004		
Belgium	Parliamentary	2003-2006:R	2002	Denmark	Parliamentary	1997-1998:L	-	Hungary	Parliamentary	1997-1998:R	-
		1997-1999:R	-			1999-2001:L	1998			1999-2002:L	1998
		2000-2003:R	1999			2002-2005:R	2001	2003-2006:L	2002		
Brazil	Presidential	2004-2006:R	2003			2006-2006:R	2005	India	Parliamentary	1997-1999:L	1998
		1997-1998:L	-	Egypt	Parliamentary	1997-2000:NA	-			2000-2004:R	1999
		1999-2002:L	1998			2001-2005:NA	2000	2005-2006:L	2004		
Canada	Parliamentary	2003-2006:L	2002			2006-2006:NA	2005	Indonesia	Parliamentary	1997:NA	1997
		1997:L	-	Finland	Parliamentary	1997-1999:L	1995			1998-1999:NA	1999
		1998-2000:L	1997			2000-2003:L	1999	2000-2004:NA	2004		
		2001-2004:L	2000			2004-2006:C	2003	Ireland	Parliamentary	1997:R	-
2005-2006:L	2004					1998-2002:C	1997				
								2003-2006:C	2002		

Table C1 continued.

Country	System	Party type	Year	Country	System	Party type	Year	Country	System	Party type	Year
Israel	Parliamentary	1997-1999:R	-	Pakistan	Parliamentary*	1997:L	-	Sri Lanka	Presidential	1997-1999:L	-
		2000-2001:R	1999			1998-2006:NA	1997			2000-2005:L	1999
		2002-2006:R	2001			1997-2000:R	-			2006-2006:NA	2005
Italy	Parliamentary	1997-2001:C	-	Peru	Presidential	2001-2001:R	2000	Sweden	Parliamentary	1997-1998:L	-
		2002-2006:R	2001			2002-2006:C	2001			1999-2002:L	1998
Japan	Parliamentary	1997-2000:R	-	Philippines	Presidential	1997-1998:C	-	Switzerland	Parliamentary	2003-2006:L	2002
		2001-2003:R	2000			1999-2004:C	1998			1997-1999:NA	-
		2004-2005:R	2003			2005-2006:C	2004			2000-2003:NA	1999
Luxembourg	Parliamentary	1997-1999:C	-	Poland	Parliamentary	1997: NA	-	Taiwan	Parliamentary	2004-2006:NA	2003
		2000-2004:C	1999			1998-2001: NA	1997			1997-2000:R	-
		2005-2006:C	2004			2002-2004: NA	2001			2001-2004:R	2000
Malaysia	Parliamentary	1997-1999:NA	-	Portugal	Parliamentary	2005-2006: NA	2005	Thailand	Parliamentary	2005-2006:R	2004
		2000-2004:NA	1999			1997-1999:L	-			1997-2001:R	-
		2005-2006:NA	2004			2000-2002:L	1999			2002-2005:NA	2001
Mexico	Presidential	1997:L	-	Russia	Presidential	2003-2005:R	2002	Turkey	Parliamentary	2006-2006:NA	2005
		1998-2000:L	1997			2006-2006:L	2005			1997-1999:R	-
		2001-2006:R	2000			1997-2000:NA	-			2000-2002:L	1999
Morocco	NA	1997-2006:NA	-			2001-2004:NA	2000			2003-2006:NA	2002
Netherlands	Parliamentary	1997-1998:L	-	Singapore	Parliamentary	2005-2006:NA	2004	UK	Parliamentary	1997:R	-
		1999-2002:L	1998			1997:NA	-			1998-2001:L	1997
		2003-2003:L	2002			1998-2001:NA	1997			2002-2005:L	2001
		2004-2006:R	2003			2002-2006:NA	2001			2006-2006:L	2005
New Zealand	Parliamentary	1997-1999:R	-	South Africa	Parliamentary	1997-1999:L	-	U.S.	Presidential	1997-2000:L	-
		2000-2002:L	1999			2000-2004:L	1999			2001-2004:R	2000
		2003-2005:L	2002			2005-2006:L	2004			2005-2006:R	2004
		2006-2006:L	2005			1997-2000:C	-			1997-1998:NA	-
Norway	Parliamentary	1997:L	-	South Korea	Presidential	2001-2006:C	2000	Venezuela	Presidential	1999-2000:NA	1998
		1998-2001:R	1997			1997-2000:R	2000			2001-2006:NA	2000
		2002-2005:R	2001			2001-2004:R	2004			1997-2000:NA	-
		2006-2006:L	2005			2005-2006:L	-			2001-2006:NA	2002
				Spain	Parliamentary			Zimbabwe	Presidential		

Table C2: Classification of Electoral Timing.

This table presents the classification of elections according to electoral timing. The countries are classified as having flexible electoral timing if the national leader or legislative body has the option to call an election before the regularly scheduled date. An election is classified as ‘called’ if it took place more than three months before the regularly scheduled date. A variety of additional data sources was consulted, such as International Institute for Democracy and Electoral Assistance, Center on Democratic Performance, Journal of Democracy, Elections around the World, Election Guide, The CIA World Factbook, the PARLINE Database on National Parliaments, and Keesing’s Record of World Events. Notes: * 1999 Indonesian election is classified as ‘called’ even though Indonesia is classified as having fixed election timing. It was an irregular election following the fall of Suharto administration; ** the 2001 Peruvian election is classified as ‘called’ as it was an irregular election following the fall of Fujimori administration.

Country	Election	electoral timing	Called election	Country	Election	Electoral timing	Called election	Country	Election	Electoral timing	Called election
Argentina	1999	Fixed	No	Finland	1999	Flexible	No	Luxembourg	2004	Fixed	No
Argentina	2003	Fixed	No	Finland	2003	Flexible	No	Malaysia	1999	Flexible	Yes
Australia	1998	Flexible	Yes	France	1997	Fixed	No	Malaysia	2004	Flexible	No
Australia	2001	Flexible	No	France	2002	Fixed	No	Mexico	1997	Fixed	No
Australia	2004	Flexible	No	Germany	1998	Flexible	No	Mexico	2000	Fixed	No
Austria	1999	Flexible	No	Germany	2002	Flexible	No	Netherlands	1998	Flexible	No
Austria	2002	Flexible	Yes	Germany	2005	Flexible	Yes	Netherlands	2002	Flexible	No
Belgium	1999	Flexible	Yes	Greece	2000	Flexible	Yes	Netherlands	2003	Flexible	Yes
Belgium	2003	Flexible	No	Greece	2004	Flexible	No	New Zealand	1999	Flexible	No
Brazil	1998	Fixed	No	Hungary	1998	Fixed	No	New Zealand	2002	Flexible	No
Brazil	2002	Fixed	No	Hungary	2002	Fixed	No	New Zealand	2005	Flexible	No
Canada	1997	Flexible	Yes	India	1998	Flexible	Yes	Norway	1997	Fixed	No
Canada	2000	Flexible	Yes	India	1999	Flexible	Yes	Norway	2001	Fixed	No
Canada	2004	Flexible	Yes	India	2004	Flexible	Yes	Norway	2005	Fixed	No
Chile	2000	Fixed	No	Indonesia	1997	Fixed	No	Pakistan	1997	Flexible	Yes
Chile	2005	Fixed	No	Indonesia*	1999	Fixed	Yes	Peru	1995	Fixed	No
Colombia	1998	Fixed	No	Indonesia	2004	Fixed	No	Peru	2000	Fixed	No
Colombia	2002	Fixed	No	Ireland	1997	Flexible	Yes	Peru**	2001	Fixed	Yes
Czech Rep	1998	Flexible	No	Ireland	2002	Flexible	No	Philippines	1998	Fixed	No
Czech Rep	2002	Flexible	No	Israel	1999	Flexible	Yes	Philippines	2004	Fixed	No
Denmark	1998	Flexible	No	Israel	2001	Flexible	Yes	Poland	1997	Flexible	No
Denmark	2001	Flexible	Yes	Italy	2001	Flexible	No	Poland	2001	Flexible	No
Denmark	2005	Flexible	Yes	Japan	2000	Flexible	Yes	Poland	2005	Flexible	No
Egypt	2000	Fixed	No	Japan	2003	Flexible	Yes	Portugal	1999	Flexible	No
Egypt	2005	Fixed	No	Luxembourg	1999	Fixed	No	Portugal	2002	Flexible	Yes

Table C2 continued.

Country	Election	Electoral timing	Called election	Country	Election	Electoral timing	Called election
Portugal	2005	Flexible	Yes	Switzerland	2003	Fixed	No
Russia	2000	Fixed	No	Taiwan	2000	Fixed	No
Russia	2004	Fixed	No	Taiwan	2004	Fixed	No
Singapore	1997	Flexible	No	Thailand	2001	Flexible	No
Singapore	2001	Flexible	Yes	Thailand	2005	Flexible	No
S. Africa	1999	Flexible	No	Turkey	1999	Flexible	Yes
S. Africa	2004	Flexible	No	Turkey	2002	Flexible	Yes
S. Korea	2000	Fixed	No	UK	1997	Flexible	No
Spain	2000	Flexible	No	UK	2001	Flexible	Yes
Spain	2004	Flexible	No	UK	2005	Flexible	Yes
Sri Lanka	1999	Flexible	Yes	U.S.	2000	Fixed	No
Sri Lanka	2005	Flexible	No	U.S.	2004	Fixed	No
Sweden	1998	Fixed	No	Venezuela	1998	Fixed	No
Sweden	2002	Fixed	No	Venezuela	2000	Fixed	No
Switzerland	1999	Fixed	No	Zimbabwe	2002	Fixed	No