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UNDER PERSISTENT TAX UNCERTAINTY**

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Optimal Institutions Under Persistent Tax Uncertainty

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Various economic models ignore the complexity of green field investment and do not assign a fundamental role to institutional uncertainty on the decision making of capital expenditures. These assumptions can be applicable to developed nations, but do not certainly fit into emerging economies. We found that countries with greater volatility in taxation invest less on average. In the Argentine case, this country is among the 1/8 highest tax volatility and lowest investment economies in a sample of ninety nations. Here we explore a tool kit to analyze policies and institutional arrangements to improve pareto optimal outcome.

JEL codes: E, C7, H2

1. Introduction

Institutions comprise a set of rules that private corporations must comply at the time of allocating resources. At aggregate level, market economies have to accumulate physical assets for securing the growth of output and employment, two critical elements for their endurance.² Equity providers and lenders require that the rate of return on the capital expenditures (capex) be higher than the cost of capital creating economic value. Firms assigned to managers this task. They extract profits from a given technological asset (know-how) offsetting risks.

¹ Victor Peirone. Draft version only for academic purposes. Please, send any comment or suggestion to: vpeirone@hotmail.com. Any mistake or fault is on my own. The author's viewpoints do not necessarily represent the position of the Universidad del Cema.

² This is particularly relevant in emerging economies where the poor stocks of physical resources and the lack of infrastructure diverge from developed nations. Please, see Elias (1977,1992). Blomstrom (1996) has a contending view on this matter.

Additional to political rules, new entrepreneurs impinge a creative destruction dynamic among technologies. Any given financial, intangible or physical asset return depends upon a previous market entry option. The decision of creating a new asset (green field projects) is one of the most challenging entrepreneurial assessments because it entails to confront five uncertainties or risks at the same time. This decision diverges from portfolio allocations or acquisitions choices that tackle with some of these risks, but not all simultaneously. The green field picture worsens because exit options in physical asset markets are very limited due to the specificity and irreversibility³ of the resources.³

Risks		Investments		
		Green Field	Brown Field	Portfolio
Idiosyncratic	Construction	√	X	X
	Operational	√	√	√
Macroeconomic	Entry (λ)	√	X	X
	Operational (τ)	√	√	√
	Exit	√	√	X

Source: the author, √ = yes X = no

Macroeconomic theory was originally concerned on why firms invest or how they finance its decisions.⁴ The initial works focused on the cost of capital (interest rate) or the replacement cost of the assets (Tobin's q). Then, thanks to some empirical studies, interest shifted towards how firms finance their capex (financial accelerator). In the nineties, the upsurge of FDI motivated researches on cross-border investments. Auerbach and Hassett (1993) and Klein and Rosenberg (1994) show using data from the Bureau of Economic Analysis (BEA) that between 1980 and 1991 more than 60 per cent of the overall inward FDI in the US per year were in the form of acquisitions; this share increased particularly in the late 1980s and early 1990s to far more than 80 per cent of the total. Calderon, Loayza and Servén (2004) found that more than 50% of the net inflows to Latin America between 1995-2001 were M&A.

Several economic models do not assign a fundamental role to taxes or market entry

³ Please, see Bernanke (1983).

⁴ Please, see Samuelson, Tobin & Fazzari.

rules into the decision making of capital formation. They assume to some extent that agents are indifferent to governmental measures or that investment decisions are neutral to regime changes. This assumption can be certainly useful in well-developed and rule-based nations, but it does not fit in most emerging markets. The issue gains relevance in countries where those policies are split into federal and regional levels.

The academic split between micro and macro does not help to show a comprehensive approach on this issue. The micro models take policies as exogenous and macroeconomic representations do not specify the interaction between policies and individual choices.

Here we develop an analytical toolkit to explain the interaction between policies and capex's decisions, particularly green field ones. We intend to identify how the introduction of new institutions can help to improve the Pareto optimal outcomes. This model allows to isolate critical macro factors to define an optimal set of policies.⁵ The risks faced by investors are defined as stylized facts of two policies. First, market entry ones that limit how many competitors participate in each market and, second, taxation that determines the net return on investments. The main question underlying our analysis is trying to define the optimal institutional arrangement to set of market entry policies under tax uncertainty. Additionally, we perform some regressions with a panel data from 90 countries in order to foster further empirical research.

Let's start our journey.

⁵ Please, see Acemoglu (2005) and Peirone (2014). Acemoglu proposed tax discretionary policies and holdup as the main obstacle to investment decisions. Peirone found in a GARCH regression of the Argentine case that tax changes increase investment volatility and that tax volatility results in lower investment levels among nations.

2. A Basic Model

There is a population of infinite horizon risk neutral agent's I . They have a discount factor of $\beta < 1$. As in the canonical model c denotes the consumption of the agent j at the time t and E is the expectations operator conditional on the information available at time t . The expected utility of agent j at the time 0 is given by:

$$U_0^j = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t c_t^j \quad (1)$$

Agents can be split into three groups. The first there are workers l who supply their labor inelastically and consume. The elites θ are the second. They hold the political power and are split into two, the urban θ_{eu} and the regional ones θ_{er} . And third, middle classes those who manage the firms. They group at firm's sm where a unique non-storable final good y is made. Elites and middle classes have access to the capital k and the production opportunities of the final good y through a technology with the following production function:

$$y_t^j = \frac{1}{1-\alpha} (A_t^j) (k_t^j)^{1-\alpha} (l_t^j)^\alpha \quad (2)$$

We adopt the Cobb Douglas where l is labor and k capital. Capital fully depreciates after use. A denotes the productivity of the elites and the middle classes. Productivities differ because the groups are engaged in different activities, or they have different talents.

Population chooses two governments, one urban and other regional, among the members of the elites. Regional elites control some specific asset (arable lands, logistic hubs, minerals, oils, renewable energies, etc.). Urban elites have to deal with demographic pressures.

Governments set the policies by defining the basic rules under which investment

decisions have to be taken. The two relevant institutions for any investor are the market entry rules (defined here as λ) and the taxation system (here τ). They work as the transmission mechanism from the elites to those who allocate capital expenditures.

The quantity of suppliers $n\lambda$ in a given market will depend upon the market entry rules λ . They are defined by the regional government and the existing firms.⁶ The elites and middle classes allocate the existing capital and hire the labor to produce. The number of companies are defined as follows.

$$n_{\lambda} = \frac{(K^{1-\alpha} + L^{\alpha})}{K(1-\lambda)} \quad (4)$$

Government regulates the property rights, the registration procedures, the enforcement of contracts and the minimum acceptable standards to operate. The existing firms define the prevailing technology within industries, its functions of production and optimal investment size $i\lambda$. Firms decide to invest capital i and to hire people l . A lower λ means more stringent market rules, that is to say fewer competitors within the market. Contrarily, a higher λ allows further competition among suppliers. Firms decide their capex in line with the technology controlled by them. Firms operating in competitive markets are compelled to keep their capital expenditures in line optimal capital investment $i\lambda$ to protect their market share.

$$i_{\lambda} = \frac{(K^{1-\alpha} + L^{\alpha})}{n_{\lambda}} \quad (5)$$

Economic Equilibrium

The economic equilibrium of this economy characterizes for certain amount of companies $n\lambda$. They hire l workers, negotiate wages w and invest i . Tax level are set for all producers. Firms choose their investment and employment optimally and labor market clears. Each producer takes wages and taxes as given and maximizes net

⁶ Please, see Williamson (1973) and Caves (1977).

profits.

$$Y_t = n_\lambda (l.w + i) (1 - \tau) \tag{6}$$

Tax Uncertainty & Holdup Problem

At this stage tax τ is introduced.⁷ Urban government decides a sort of corporate tax. They want to capture a share of the profits. The average profit of the firms net of taxes remains as follows.

Taxation rate and its stability are political signals from the urban elite to the middle class that manages firm S. The tax τ defines the net return on the invested capital.

$$u_\lambda = \frac{cd - (K^{1-\alpha} + L^\alpha)}{n_\lambda} (1 - \tau) \tag{7}$$

Elites can either pursue two possible stances when implementing its policies: one, they embrace a strong commitment avoiding any deviation from its original policies, a fixed rule, or two, they adopt a discretionary non-rule. Here we consider that urban elites, due to demographic pressures, persistently show lack of commitment to stable taxation introducing holdup problem. If the lack of commitment to taxation or expropriation risk happen after investment were materialized, the revenues generated by the investments can be ex post captured by the elites. These types of holdup problems are likely to arise when key investments are long-term, so various policies will change after capital goods are sunk. Companies facing holdup problems automatically stop investing. Therefore, economy performs below its potential. The persistence of the tax uncertainty derives in higher macro volatility.

How can be improved the optimal social outcome under tax uncertainty? From the analytical point of view, four institutional arrangements can be defined (A, B, C and D). Most economic models assume full commitment to policies by the elites (A). Let's

⁷ Taxation here is considered independently of the transferences made from the government to the firms. The main assumption underlying this is that governments tend to avoid redistributive policies.

adopt a different perspective. Given the purpose of this work, we will focus on the analysis of C and D options (those alternatives where the urban elites do not commit to tax stability).

Scenarios	Policies	
	λ	τ
A	rule	rule
B	non-rule	rule
C	non-rule	non-rule
D	rule	non-rule

The sequence of decisions and policies are as follows. First, firms decide to produce the good y by entering the market. At that time, they comply with market entry rules imposed by regional government. Second, urban government sets taxes.

Every technology has an optimal capex amount $i\lambda$ that is known by the managers of the firms. The potential entrants are assumed to know the predominant $i\lambda$ for its technology. Upon paying a (non-recoverable) entry fee they sink its asset in a given market and decide expanding, contracting or exiting their businesses. Regional government does not know $i\lambda$ and can opt for a ruled based market entry regime or not. This policy limits the number of firms $n\lambda$ under which they obtain profits $u\lambda$.

In the case C, the regional elite is not committed to maintain λ over time. Under this condition, any firm that enters the market first has an advantage upon its followers. They can invest above $i\lambda$ and therefore obtaining a monopolistic rent in excess of $u\lambda$. Late entrants confront a higher entry fee due to a double barrier. They are blocked by a monopolistic firm and face hold up risk from tax discretion by urban elites. In an economy managed by elites with no commitment to market entry and taxation rules, the number of supplying participants will shrink, and the level of investment will converge to the minimum technologically feasible.

Under the scenario D, government sets a market entry rule λ . The elite is committed to secure an equal opportunity venue to all market participants consistently over time. Firms entering the market will decide capex according to their technological

knowledge. The number of firms and their capex will converge to the prevailing technological $i\lambda$. After entering in a competitive market, firms confront tax uncertainty by the urban elites and stop investing.

The following table summarizes the expected investment I and contracting I decisions from the firms and the corresponding aggregate outcome Y for every scenario.

Economic outcomes vary under the different scenarios $Y_D > Y_C$. The lack of commitment of the elites define the poor capex allocated and its corresponding economic performance. Regional and urban governments should jointly design a new institutional arrangement that allows them to engage in credible commitments and distribute the gains $G = Y_D - Y_C$. The resulting institution may act as a mechanism to solve disputes between the elites and a single negotiation window for the firms, particularly those investing in green field projects helping to improve their risk assessment.

Decisions	Scenarios		
	C	<	D
I	I_C	<	I_D
i	i_C	<	i_D
Y	Y_C	<	Y_D

3. Regressions with Macro Data

A panel data for 90 countries, between 1997 and 2017, was used for our estimates.⁸

⁸ The sample includes: Albania, Argentina, Armenia, Austria, Bahrain, Bangladesh, Belize, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Cambodia, Canada, Chile, Comoros, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Egypt, Estonia, Ethiopia, Finland, France, Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Korea, Latvia, Lithuania, Madagascar, Malawi, Malta, Mauritius, Mexico, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Russia, Rwanda, Serbia, Sierra Leone, Slovenia, South Africa, South Sudan, Spain, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Sudan, Sweden, Switzerland, Syria, Tajikistan, Thailand, The Bahamas, The Gambia, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Venezuela and Vietnam. Note about exclusions: big economies like the US, China, Germany, Indonesia and Brazil were excluded. Other economies rich in natural resources like Iran, Arab Emirates, Nigeria, etc. were also excluded.

The data was extracted from two different databases from IMF and WB.⁹ The regression estimates include the following variables:

$$SD\tau = (I, L, FDI, S)_{\mu}$$

7)

SD τ = Standard Deviation of Tax Revenues on GDP

I = Average Investment on GDP

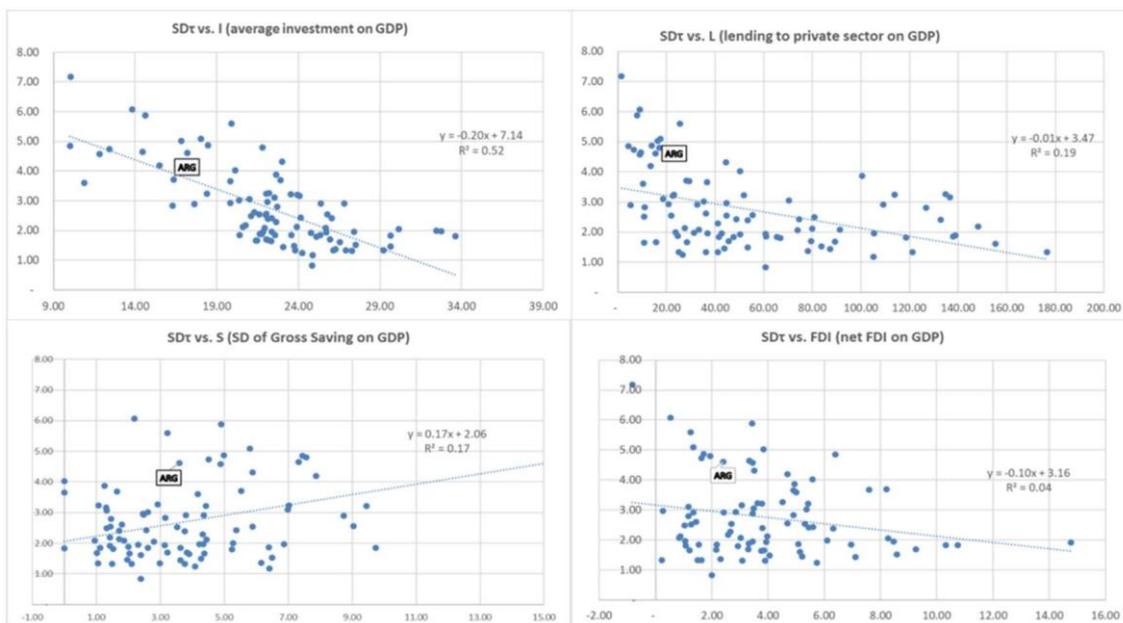
L = Lending on Private Sector on GDP

S = Saving on GDP

FDI = Net FDI on GDP

Descriptive Statistics of Panel Data				
	Mean	SD	Min	Max
Dependent Variable				
SD τ	2.41652	1.29618	0.82990	7.18060
Independent Variables				
I	22.34733	4.71382	10.01580	33.62994
L	43.23043	41.98594	1.48522	176.46654
S	3.63121	3.09025	0.95629	20.09162
FDI	3.45869	2.67439	0.82817	14.77498

⁹ IMF, World Economic Outlook & World Bank, World Development Indicators.



Economies with higher tax instability show lower capital formation on average, higher saving instability and less financial intermediation.

4. Conclusions

Institutions matter. Their instability can modify aggregate outcomes. This is more evident in emerging economies with uncertain taxation. Demographic pressures restrain the commitment of urban elites to stable rules. This fact leaves the regional ones with two alternatives. They may set a discretionary market entry frame that ends in a monopolistic protectorate, low investment and YC poor aggregate performance. Or, they may jointly design a new institutional arrangement to attract new investors enhancing competition with YD aggregate outcome. Regional and urban governments should engage building new institutions and more credible policies allowing them to distribute the gains $G = YD - YC$. The green field resources sank by competing firms will derive in further job opportunities improving the pareto optimal result.

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