REFORM FROM WITHIN

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ABSTRACT

We present a model of endogenous institutional change that rationalizes reforms that have taken place in the context of economic crisis and drastic political change. Most of the reforms have been initiated by powerholders, even though they have ended worse off relative to the status quo. The first point we make is that reform is the tool used by some powerful groups to limit the power of their political opponents. The second point is that groups with "common access" to the economy's resources find it individually rational to overappropriate resources. As a result the economy deteriorates. When the economy reaches a crisis conflict among groups erupts. Reform is the result of this conflict.

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1 Introduction

Several economic reforms like those of Chile and Mexico have taken place in the aftermath of economic crises. Furthermore, these reforms were introduced neither by voters nor by external forces. Rather, they were caused by conflicts among domestic powerholders. Such conflicts were reflected in drastic political changes: a military coup in Chile and the split of Mexico's ruling party. According to historical sociologists, the same holds true for the French Revolution and many of the great revolutions of the previous 500 years. Most revolutions have taken place in the aftermath of fiscal crises and have originated from an infight among the elite, not from mass revolts. Only after the elite's breakup had taken place did popular revolutions develop[1].

In this paper we concentrate on this type of reform, and address the following questions. Why is it that powerholders do not block such reforms, even though all or most of them end up worse-off than in the status quo? Why do such reforms happen in the aftermath of a crisis, and not during good times? Why do powerholders allow the economy to reach a state of crisis? In the empirical part of this paper we analyze how prevalent this type of reforms has been in the recent wave of trade liberalizations. We find that between 1970 and 1995, almost 80% of the trade reforms occurred during periods of either economic crisis or drastic political change. We also find that although the probability that a reform occurs in a particular country-year is 3%, this probability conditional on a crisis and a drastic political change is 60%.

In order to organize the discussion think of the economy as being composed of two sectors: the organized elite and the rest of the population. In the unreformed status quo, organized groups extract rents from the rest of the economy. "Economic reform" is a set

[1]We review the Chilean and Mexican experiences in section 4. The link between recent reforms, economic crisis and political struggle has been documented in several country studies. For instance, two regularities of the country studies in Bates and Krueger (1993) are that "Crisis is perhaps the more frequent stimulus to reform" (pp.452) and that "economic policy reform appears to emerge as a byproduct of political struggles" (pp.457). These regularities have also been found by Haggard and Kaufman (1995), Krueger (1993) and Nelson (1990) among others. For the historical episodes see Goldstone (1991), Scokpol (1979) and Tilly (1993).

of structural changes that eliminates the power of some or all of these groups. These changes need not enhance efficiency for the economy as a whole (as would be the case with privatization or trade liberalization). They can also consist of expropriations or a move towards protectionism.

We can classify the explanations for why reform occurs into two frameworks. In one, reform is imposed by forces external to the organized elite. We call this scenario "barbarians-at-the-gate." In the second framework, privileged groups themselves induce the reforms. We call this scenario "reform-from-within." A common barbarians-at-the-gate explanation is that a severe crisis leads voters to replace the current government and vote for reform. Another explanation is that during a crisis governments are forced to ask for assistance from multilateral institutions, and help comes under the condition that a reform is implemented. Although external factors are important, an explanation of reform based solely on them does not seem appropriate for cases such as the radical trade liberalizations that took place in Chile (1975) and Mexico (1985). Neither President de la Madrid nor General Pinochet faced pressure from voters or exporters to open up the economy and destroy a big part of the inefficient manufacturing sector[2]. In these cases, reform was induced by the powerful elites themselves[3].

Next, we consider the reform-from-within framework. One commonly used argument is that during a crisis, powerful groups decide to abandon the status quo because the situation is so bad that a majority of powerful groups expect to benefit from reform. This argument, however, does not fit well with the reforms we are trying to rationalize. These reforms do not take place in a smooth environment, but rather in the midst of a political

[2]Consumers and exporters are either unorganized, or weak in a closed economy.

[3]A popular explanation for the Mexican reform is that it took place in the aftermath of the debt crisis because the IMF forced Mexico to open as a precondition for lending it more money. Note, however, that the same pressure was faced by Brazil and Peru, yet neither liberalized in the 1980s. Like Brazil and Peru, Mexico could have declared a moratorium instead and followed with inward-looking policies. Mexico chose not to pursue this path. Although there is no question that the IMF and the World Bank have played important roles, "it would be a mistake to picture the process of policy reform as one where orthodox economic policies were externally imposed on unwilling policymakers." In fact, "more often than not, reform has had a significant home-grown component exceeding World Bank expectations and stipulations" (Rodrik (1996)).

turmoil, in which some or all powerful groups are displaced from power and suffer from substantial economic losses[4].

We present here a model of reform-from-within in which reform is the tool to limit the power of political opponents. We consider an economy where powerful groups with "common access" to the economy's resources find it individually rational to overappropriate resources. As a result, there is a deterioration of the economy. When the economy reaches a crisis, a conflict among powerful groups erupts. The result of this conflict is a reform that might leave all groups worse-off.

In our model, reform occurs if one or more groups unilaterally relinquish their privileges[5]. Any group that undertakes this action must reallocate its fixed assets. This entails costs for the group in question because it has to divert part of its assets to non-productive activities during the transition. The long term benefit is that the post-reform regime will be more favorable for this group than it would be otherwise. In equilibrium, the group (call it i) that introduces the change ends up worse off than in the status quo. Why would i induce reform then? It does either to prevent other groups from introducing changes that would harm i even more, or to neutralize the harmful effects of changes already introduced by other groups.

To illustrate this point, consider a group of protected producers who receive production subsidies and have the power to block or introduce trade liberalization. In the short run, trade liberalization is costly for these producers because their fixed assets must be reallocated. However, the institutions, such as trade agreements that develop over the long run, will weaken unions and statist groups. As a result, exporters will have the upper hand. As we discuss in section 4, the protected producers in Chile and Mexico supported trade liberalization to stop expropriations by labor and statist groups, respectively. It should be clear that protected producers would have preferred the status quo. However, the alternative to trade liberalization was not the status quo, but expropriation by rival

[4]The question arises as to why policy makers do not design schemes that provide compensation for the losers. The argument in Fernandez and Rodrik (1991) implies that this is due to a time inconsistency problem; once reforms are in place the majority will be against that redistribution. For a case of reform with no losers see Lau, et. al. (1997).

[5]For instance, protected producers can relinquish trade protection.

groups.

When the economy is doing well, every group finds that the short run diversion of resources to non-productive activities is more costly than the future benefits it might gain. Therefore, every group would be better off by not introducing a change to *neutralize* the changes introduced by others (i.e., becoming the Follower), than by introducing a change unilaterally (i.e., becoming the Leader). In these circumstances any reform is unanimously blocked by all groups, and rent-seeking flourishes. As the economy deteriorates, however, there is a fall in the opportunity cost of diverting productive factors to destroy the power of the rival groups. Thus, there is a point in time after which each group prefers to be the Leader instead of the Follower. Although every group would prefer to have a reform far in the future, given that the other groups would stay put forever, a preemptive reform takes place much earlier. This is when Leading becomes preferred to Following. That is, group i will introduce a reform to prevent other groups from introducing changes that will harm group i. As a result, all groups end up worse off.

Modelling this interdependence is, in principle, complicated. On the one hand, the timing of reform depends on the state of the economy. On the other hand, the state of the economy is a function of the powerful groups' past appropriative behavior, which in turn is a function of the expected reform date. In equilibrium, the appropriation policies and the reform date must be mutually consistent. A contribution of this paper is to present a dynamic game where this interdependence is explicitly taken into account.

We should recognize that the correct explanation for reform is a combination of the reform-from-within and barbarians-at-the-gate-views. Nonetheless, the model presented in this paper is useful because it introduces factors previously neglected in the study of reform. These factors include the role of crises, the intra-elite conflict, and the use of reform as a tool to limit the power of political opponents.

The structure of the paper is as follows. In the next section, we present a review of the literature. In section 3 we present the model. We characterize the reform and the non-reform equilibria, analyze the conditions under which all powerful groups lose from reform, and present an extension of the model where there is a bunching of reforms across countries. In section 4 we present case studies of Chile and Mexico. We also consider all

the countries that were closed in 1970, and analyze the extent to which trade reforms have taken place in a context of economic crisis and drastic political change. Lastly, in section 5 we present our conclusions.

2 Related Literature

Rodrick (1996) presents a survey of the literature on economic policy reform. In this section we comment on those papers which are most closely related to ours. Alesina and Drazen (1991) ask why conditions must deteriorate before groups reach a "*stabilization*" agreement stipulating the sacrifices each will make in order to reduce the fiscal deficit. Note that an essential difference between stabilization and reform is that in the former, groups do not forfeit their power to extract future transfers, while in the latter they do. To explain delays in stabilization, Alesina and Drazen use a war of attrition model, in which the game ends when one player concedes, but as long as the game continues both groups incur a cost. Each player wants the game to end as soon as possible, and prefers the other to concede first. Delays occur because players are uncertain about the costs to the other players. By waiting they induce the weaker player to concede first. We ask a different question. When will there be a breakdown of the unanimous blocking of *reforms* that destroy the power of some or all powerful groups? To address this question we use a preemption game. These games are used to analyze the introduction of a new good. Since such a move entails a cost, each firm would like to move as late as possible, provided other firms also wait. However, because introducing the product first gives a first mover advantage, each firm will find it optimal to preempt at some point in time. Therefore, there might be early adoption even if it is against the interest of the industry as a whole.

Alesina and Drazen's model is appropriate in analyzing cases where powerful groups stand to gain from a stabilization agreement where each has to make a sacrifice. Meanwhile, our model is appropriate to explain structural reforms that make some or all powerful groups worse off. A second difference is that asymmetric information plays an essential role in Alesina and Drazen's model, but plays no role in ours. Thus, their model applies to cases where the costs to each group of delaying the stabilization are not known by others.

In the absence of asymmetric information, their model implies immediate agreement.

Rodrik (1996) assumes that policymakers have agenda-setting power. Thus, they can attach structural reform to a stabilization package. The more severe a macroeconomic crisis, the greater the benefits of stabilization. Therefore, powerful groups will more likely accept the reform-stabilization package during a severe crisis. In contrast to Rodrik, we do not consider an autonomous policymaker with agenda-setting power. The applicability of each model to specific cases depends on the extent to which policymakers have autonomous power. When powerful groups have the ability to replace policymakers, they are not limited to simply take or leave the policymaker's offer.

Fernandez and Rodrick (1991) present a model where uncertainty regarding the probable winners and losers from reform leads to a bias towards the status quo. Thus, reforms that are known to benefit a majority might be rejected by voters. Dewatripont and Roland (1992) analyze the sustainability of a reform process.

Lastly, we comment on the contrast between our result and Rotemberg and Saloner's (1986) result that oligopolies behave more competitively during periods of high demand. They consider a trigger strategy equilibrium where collusive behavior is sustained by the threat of reversion to the Bertrand equilibrium in response to a price reduction by one firm. In their model, the rewards of a deviation increase during good times because the firm which undercuts its price can make higher short run profits. In contrast, in our model, the costs of destroying the power of the other group increase during good times.

2.1 Revolutions and State Breakdowns

Evidence concerning revolution and state breakdown, which can be seen as extreme varieties of reform, makes for a useful comparison. An empirical regularity found by historical sociologists is that revolutions do not start from the sudden increase in the power of revolutionary opposition external to the ruling elite, from peasants, from workers' insurrections, or from deep social changes such as class struggle. Rather, revolutions start with a breakdown of the elite[6]. It is only after intra-elite fighting erupts and the coercive power of the

[6]Or a conflict between the elites and the state if the latter is autonomous as stressed by Skocpol (1979).

state collapses that popular uprisings erupt and revolutionary leaders rise so long as there is popular discontent waiting in the wings[7]. Of course, popular uprising may erupt at any time. However, quoting Goldstone (1991): "I know of no popular rebellion that succeeded by itself without associated elite revolts or elite leadership in creating institutional change."[8]

An interesting link to this paper is that historically intra-elite infights and revolts have been concentrated during periods of fiscal crisis (Goldstone (1991)). The major state breakdowns during 1500-1650 (the English Revolution, the Fronde in France, the anti-Hapsburg Revolts in Catalonia, Italy and Bohemia, the uprisings in Ukraine and the Ottoman Empire, and the collapse of Ming rule in China) occurred during a time of a sharp rise in population growth (the end of the Black Death epidemic), which induced higher inflation and fiscal crisis. The same holds true for the revolts of the nineteenth century: the French Revolution, the Pugachev Revolt in Russia, the European revolutions of 1820-21, 1830 and 1848, the Greek and Balkan revolts, and the Taiping rebellion in China. In contrast, during the late seventeenth and most of the eighteenth centuries inflation was low, no fiscal crises occurred and no major state breakdown took place, despite the fact that this period was one of major wars among European countries.

It is worth noting that the Marxist view of the French Revolution as the result of a "class struggle" between the bourgeoisie and the nobility is discredited[9]. Recent research has shown that the bourgeoisie can barely be identified as a separate social force in the old regime, much less be held responsible for its downfall. In fact, the revolution leaders in Paris were drawn mainly from the nobility. The consensus now is that the origins of French Revolution lie in a severe fiscal crisis (Doyle (1980), Furet (1981) and Skocpol (1979)).

[7]Whether or not a revolutionary situation results in a revolutionary outcome depends on the organizational capacity of the rebellious groups.

[8]This view goes back to Plato: "All political changes originate in divisions of the actual governing power; a government which is united ... cannot be moved" (Republic, Book VII).

[9]Quoting Furet (1981) pp. 122: "The 'burgeois revoltuion' is a metaphysical monster that keeps unfolding a succesion of coils with which to strangle historical reality in order to turn it, sub specie aeternitatis, into a birthplace and an annunciation."

3 The Model

We present a dynamic game where it is individually rational for powerful groups to drive the economy to a fiscal crisis, and then fight each other. Reform is the outcome of such a fight, in which both groups end up worse-off. The model is related to three strands of literature. First, the conflict and insurrection literature, in which the equilibrium distribution of output and property depends on how each agent allocates its resources to production, offense, and defense. Second, preemption games in which each agent chooses a time at which to strike against its rivals. Third, the literature on accumulation under common access, in which all agents extract resources from a common pool[10].

We consider an economy in which two organized groups have the power to appropriate resources from the rest of the unorganized economy. These groups can be government agencies, strong unions, or big corporations. In order to concentrate on the preemption aspects of reform, we will not consider explicitly the unorganized sector of the economy. We simply assume that both groups have common access to a stock of fiscal assets $b(t)$ with a raw growth rate β. Thus,

$$\dot{b}(t) = \beta b(t) - g_1(t) - g_2(t) \tag{1}$$

where $g_i(t)$ is the appropriation of group i. To prevent a group from appropriating fiscal resources at an infinite rate, we assume that each group can choose $g_i(t)$ within the following bounds

$$0 \leq g_i(t) \leq \bar{g} b(t), \qquad 0 < \beta < \bar{g} < \infty \tag{2}$$

The upper bound $\bar{g}$ is not very restrictive. In particular, it allows groups to set their appropriation rate higher than the raw rate of growth of fiscal assets. We can identify $b(t)$ with stocks of natural resources, international reserves, or the fiscal base. And we can think of (1) as a stylized representation of what goes on in the countries where a small set of inefficient firms has the power to obtain subsidized inputs and soft loans.

[10]For conflict and insurection see Grossman (1991, 1994), and Grossman and Kim (1995). For Preemption games see Gilbert and Harris (1984) and Fudenberg and Tirole (1985), and for accumulation under common access see Benhabib and Radner (1992), Benhabib and Rustichini (1996), and Tornell and Velasco (1992).

Reform is a regime shift whereby one or both groups lose forever their power to appropriate fiscal assets. If reform has not taken place by time τ, group i can destroy group j's power by allocating a share $q_i \in [0,1]$ of its fiscal transfer to offensive activities for a period of length h, and by relinquishing part of its privileges. If group j does not undertake offensive activities starting at time τ, then at time $\tau + h$, group i becomes the Leader, and j becomes the Follower. At time $\tau + h$, the Leader gets a share $\theta \leq 1$ of existing fiscal assets, plus some other income it might derive from its productive activities in the reformed economy. We will denote the expected present value of this income by w. Starting at $\tau + h$, the Follower receives zero income for the infinite future. Alternatively, if group j matches group i's action at time τ, both groups lose their power starting at time $\tau + h$. Thus, at time $\tau + h$, neither group gets any fiscal transfer. Each group simply gets a payoff αw ($\alpha < 1$). We set $\alpha < 1$ to reflect the fact that if only one group moves, the post-reform regime will be more favorable to it than otherwise[11].

To motivate the formalization of reform consider a group of inefficient producers that enjoys production subsidies and protection. If they decide to relinquish protection, part of their assets must be reallocated and cannot be used in production. Thus, the producers must forgo part of their production subsidies during the transition period. In the model this short run cost is captured by the share q_i of its fiscal transfers that i allocates to offensive activities. In the long run, the producers' rivals will see their power diminished. As a result, in the post-reform regime, these producers might even obtain new privileges (and subsidies!). In addition, producers that adjust successfully will be able to compete in the reformed economy and derive income from their productive activities. These two benefits are captured in the model by $\theta b_{\tau+h}$ and w, respectively[12]. To close the model,

[11]This conflict technology is much simpler than the one considered in the conflict and insurrections literature. In that literature the bootie depends on the ratio of the attacker's offense resources to the victim's defense resources. In our setup the share of resources destined to offense is not a decision variable. A group either attacks, or does not. This simple setup allows us to concentrate on the dynamic aspects of reform.

[12]The independence of w from $b_{\tau+h}$ reflects the fact that if a protected producer were to become efficient, it would be able to sell its products in the world market. Thus, its production income would be independent of the state of the fiscal accounts.

we assume that groups have linear utility functions. Thus, the valuation function of each group is

$$\int_0^{\tau+h} Q_i(s)g_i(s)e^{-\delta s}ds + W_i(\tau+h)e^{-\delta(\tau+h)} \tag{3}$$

where $\tau = \min[\tau_i, \tau_j]$ is reform date, $Q_i(t)$ is the share of fiscal transfers that group i does not allocate to offense. Since either $\tau_s \leq \tau$ or $\tau_s = \infty$ for $s = i, j$, we have that $Q_i(t)$ is given by

$$Q_i(t) = \begin{cases} 1 - q_i(\tau_i, \tau_j) & t \in [\tau, \tau+h) \\ 1 & \text{otherwise} \end{cases} \qquad q_i(\tau_i, \tau_j) = \begin{cases} q^l & \text{if } \tau_i < \tau_j \\ q^m & \text{if } \tau_i = \tau_j \\ 0 & \text{if } \tau_i > \tau_j \end{cases} \tag{4}$$

Lastly, the value of the continuation game $W_i(\tau+h)$ is given by

$$W_i(\tau+h) = \begin{cases} w + \theta b_{\tau+h}, & \theta \in [0,1] \quad \text{if } \tau_i < \tau_j \\ \alpha w, & \alpha \in [0,1) \quad \text{if } \tau_i = \tau_j \\ 0 & \text{if } \tau_i > \tau_j \end{cases} \tag{5}$$

We will use Markov Perfect Equilibrium (MPE) as the solution concept. A strategy is Markov if it depends solely on the state of the economy. A pair of Markov strategies forms an MPE if they are best responses to each other for every realization of the state. In our model, a strategy consists of an appropriation policy and a rule specifying under which circumstances a group will start the attack. The state includes the stock of fiscal assets and the regime.

There are three possible paths that the economy can follow: a non-reform path and two reform paths. On the non-reform path, groups behave prudently, fiscal assets do not decline, and each group never finds it profitable to displace the other group. Along the reform paths fiscal appropriations are excessive. This leads to a fiscal crisis where it pays for a group to destroy the power of the other group. Along one reform path, both groups attack each other, while along the other path only one group is the attacker. Parameter values determine which paths are equilibrium outcomes. Reform equilibria exist for all parameter values, while non-reform equilibria exist only if β is in the interval $(\delta, 2\delta]$. In subsections 3.1 and 3.2 we characterize reform and non-reform equilibria, respectively.

3.1 Reform Equilibria

To find a reform MPE it is necessary to find a pair of appropriation policies and a pair of reform dates that are mutually consistent. In deriving a reform MPE one should keep in mind that there is an interdependence between appropriation policies and the reform date. On the one hand, appropriation policies depend on the reform date. On the other hand, the reform date depends on the stock of fiscal assets, which in turn is a function of the appropriation policies. We will defer the formal derivation of the equilibrium to the next subsection. Here we present an heuristic derivation of the reform date assuming that both groups set their appropriations at their maximum level $\overline{g}b_t$[13].

In deciding whether to attack at time τ, a group compares the value of the continuation game at time $\tau+h$, net of the fiscal transfers it will forgo during the time interval $[\tau, \tau+h)$, to the option value of waiting at τ. This option value depends on the strategy of the other group. For instance, if group j were to attack at τ, i's option value of waiting at τ would simply be the transfers that i would receive on $[\tau, \tau+h)$. In contrast, if group j were to set $\tau_j = \infty$, then i's value of waiting at τ would be the maximum over $T \geq \tau$ of the fiscal transfers it will receive during the time interval $[\tau, T+h)$ plus $[\theta b_{T+h} + w]e^{-\delta(T+h)}$. In general, group j will not set its τ_j equal to either τ or ∞. Rather, τ_j is the result of j's optimization taking into consideration i's strategy.

A simple way to derive τ_i and τ_j is to pose the problem as a preemption game. To do this we need to define the concepts of Leading, Following and Matching. Group i becomes the Leader at time τ, while j becomes the Follower if i attacks at τ and j does not. There is Matching at τ if both groups attack each other at time τ. Substituting $\overline{g}b_t$ in (3)-(5), and using the fact that the stock of fiscal assets is given by $b_s = b_t e^{(\beta-2\overline{g})(s-t)}$ we have that the payoffs are

$$F(\tau) = b_0\overline{g}\left[\int_0^{\tau} e^{-xs}ds + \int_{\tau}^{\tau+h} e^{-xs}ds\right] \tag{6}$$

[13]Lemma 2 states that in any reform MPE both groups set their appropriations at the maximum level $\overline{g}b_t$ on $[0, \tau+h)$, except the Leader, who might set $g_t^l = 0$ on a subinterval $[\tau, \tau+h')$ for some $h' \leq h$. A sufficient and necessary condition for the Leader to choose $\overline{g}b_t$ on $[\tau, \tau+h)$ is $\theta \leq 1 - q^l$.

$$M(\tau) = b_0\bar{g}\left[\int_0^{\tau} e^{-xs}ds + \int_{\tau}^{\tau+h} e^{-xs}ds[1-q^m]\right] + \alpha w e^{-\delta(\tau+h)} \quad (7)$$

$$L(\tau) = b_0\bar{g}\left[\int_0^{\tau} e^{-xs}ds + \int_{\tau}^{\tau+h} e^{-xs}ds[1-q^l]\right] + we^{-\delta(\tau+h)} + \theta b_0 e^{-x(\tau+h)} \quad (8)$$

$$x \equiv 2\bar{g} - \beta + \delta > 0 \quad (9)$$

Lemma 3 lists the properties of the payoff function in the general case. Figures 1 and 2 depict the two possible positions of the payoff functions when Following is preferred to Matching and to Leading at time 0. The F curve is increasing in the reform date because the Follower's value of the continuation game at $\tau + h$ is zero. Thus, the Follower prefers that reform will never occur even though fiscal transfers become smaller and smaller. The L curve either decreases, or it increases over an interval $[0, \hat{\tau}^l)$ and then declines. This is because the Leader faces the following trade-off. On the one hand, if it delays the reform date, the fiscal transfers lost on $[\tau, \tau + h)$ fall. On the other hand, the payoff it receives at $\tau + h$ also falls. A similar argument explains the shape of the M curve.

The intuition for the position of the L curve relative to the F curve is the following. The difference in the payoffs of Leading and Following is that the Leader incurs a fiscal loss during the period $[\tau, \tau + h)$ of $q^l \int_{\tau}^{\tau+h} \bar{g} b_s e^{-\delta s} ds$, but at $\tau + h$ the Leader obtains a share θ of fiscal assets and a payoff w derived from its productive activities in the reformed economy, while the Follower gets 0. Figures 1 and 2 depict the case in which at time 0 the present value of the fiscal loss is greater than that of the payoff that would be received at time h. Therefore, the F curve crosses the $y-$axis above the L curve. As τ increases the stock of fiscal assets falls. Thus, the loss associated with becoming the Leader falls. Since the payoff w is constant, there exists a reform date beyond which Leading becomes preferred to Following. The same argument applies to the relative positions of the M and F curves.

Either the L curve always lies above the M curve, or the M curve lies above the L curve for a finite period. The latter case occurs only if the share of fiscal transfers lost during the period $[0, h)$ is smaller under Matching (i.e., $q^m < q^l$). However, even in this case as the reform date increases and fiscal assets fall, the difference in fiscal transfers lost becomes smaller while the difference in the post-reform payoffs is bounded from below

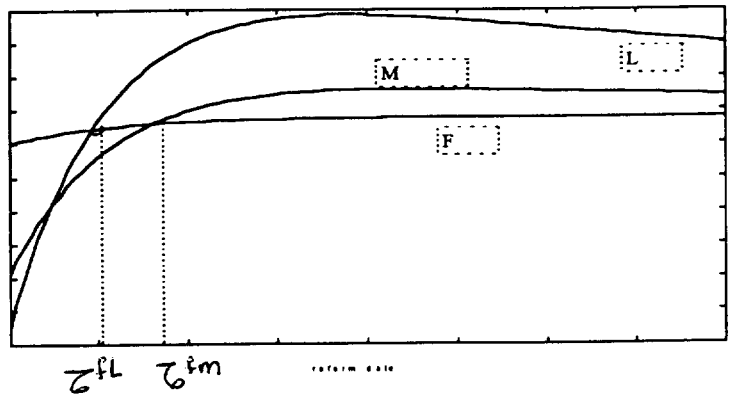

Figure 1:

because $[w - \alpha w]$ is constant. Thus, at some point the L curve must cross the M curve.

From the preceding discussion it follows that in order to determine the equilibrium reform dates we need only consider the two cases depicted in Figures 1 and 2[14]. In Figure 1 the L curve crosses the F curve (at τ^{fl}) before the M curve does (at τ^{fm}). In Figure 2 the M curve crosses the F curve before the L curve does. We consider each case in turn:

Case I. $\tau^{fl} < \tau^{fm}$ (Figure 1). First, it is a dominant strategy for group i not to attack before τ^{fl}. To see why, suppose that the other group sets $\tau_j \geq \tau^{fl}$. By attacking i gets $L(\tau_i)$, while by not attacking, i insures for itself at least $F(\tau^{fl}) > L(\tau_i)$. Now, suppose that group j sets $\tau_j < \tau^{lf}$. By attacking at the same time as j group i gets $M(\tau_j)$ which is less than the payoff of not attacking: $F(\tau_j)$. Second, the maximum a group can get is $L(\hat{\tau}^l)$. Thus, a group would like to attack at $\hat{\tau}^l$ if the other group does not attack earlier. Note, however, that if group i sets $\tau_i = \hat{\tau}^l$, group j will preempt and set $\tau_j = \hat{\tau}^l - \epsilon$. Since there are preemption opportunities for any switch date greater than τ^{fl}, it follows that in this case the unique equilibrium reform date is τ^{fl}. Furthermore, one group becomes the Leader and the other the Follower.

Case II. $\tau^{fl} \geq \tau^{fm}$ (Figure 2). First, using the same argument as before, it is straight-

[14]Figure 1 was generated with the following parameter values: $q^l = .7$, $q^m = .6$, $\bar{g} = .5$, $b_0 = 100$, $\delta = .1$, $\beta = .2$, $h = 4$, $w = 15$, $\alpha = .3$. Figure 2 was generated with the same parameter values except $q^m = .55$.

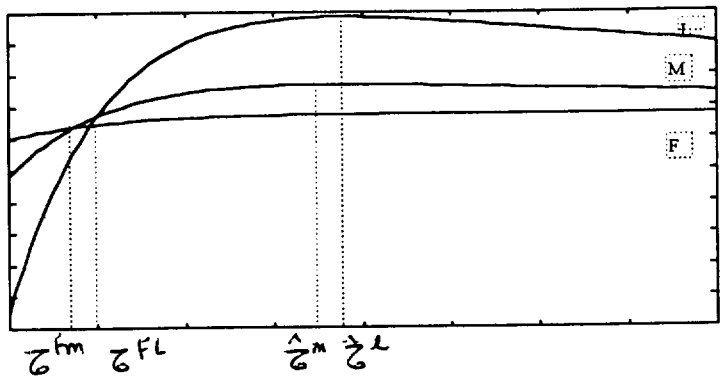

Figure 2:

forward to check that it is a dominant strategy not to attack before τ^{fm}. Second, if group j attacks at any τ in $[\tau^{fm}, \tau^{lm})$, i's best response is to attack. If group j does not attack, i's best response is not to attack. Third, for any $\tau \geq \tau^{lm}$ it is a dominant strategy to attack because the value of following is lower than the values of matching and of leading. It follows from these three observations that in this case there is a continuum of equilibrium joint-attack dates in the interval $[\tau^{fm}, \tau^{lm}]$[15].

The basic point is that if the stock of fiscal assets is decreasing in the status quo, at some point Leading must become preferred to Following. Reform must have taken place by that time because beyond that point it is a dominant strategy for each group to destroy the power of the other group. In case I only one group destroys the power of the other, while in case II both groups destroy the power of the other. Note that in both cases reform takes place when the stock of fiscal assets is sufficiently small. Thus, the net loss of fiscal transfers associated with destroying the power of the other group falls below the payoff that a group expects to get in the reformed economy. In this sense, fiscal crisis leads to reform.

So far we have assumed that groups set their appropriations at levels that are high enough to drive down the stock of fiscal assets. Next, we prove that groups will choose to do this even though they know that when fiscal assets fall below a certain level, reform

[15]In the borderline case in which $\tau^{fm} = \tau^{fl}$ it is also possible to have a leader-follower MPE.

will take place and both will end up worse off.

3.1.1 Equilibrium Appropriation

Here we derive the appropriation policies considering τ_i and τ_j as parameters. In the next subsection we will derive the equilibrium attack dates (τ_i, τ_j) and prove that the equilibria described above are the only ones which exist. Groups can choose from an infinite number of appropriation levels in the interval $[0, \overline{g}b_t]$. Lemma 1 is very handy because it implies that regardless of what the attack dates are, we need only consider three appropriation pairs in constructing an MPE.

Lemma 1 *Only three appropriation pairs can be part of an MPE: the maximal pair* $(\overline{g}b_t, \overline{g}b_t)$*, the minimal pair* $(0,0)$ *and one interior pair* $([\beta - \delta]b_t, [\beta - \delta]b_t)$.

The proof is in the appendix. Here we present the intuition. In an MPE group i takes as given j's appropriation policy. Thus, we can think of i as solving a standard savings problem in which the instantaneous rate of return received by i is the raw rate minus j's appropriation rate: $RoR_i = \beta - g_j(t)/b(t)$. First, since utility is linear, for i to choose an interior appropriation, it is necessary that RoR_i be equal to the discount rate δ. This can happen if and only if j sets $g_j(t) = [\beta - \delta]b_t$. Note, however, that for j to be willing to do this it is necessary that $RoR_j = \delta$. That is, $g_i(t) = [\beta - \delta]b_t$. It should be clear that no other pair that contains an interior policy can be an equilibrium pair. Second, the pair $(\overline{g}b_t, \overline{g}b_t)$ might be part of an MPE on some time interval because if j were to set $g_j(t) = \overline{g}b_t$, i would perceive a negative rate of return (by (2)). Since the discount rate δ is positive, i's best response would be to appropriate as much as possible on some time interval. Lastly, a similar argument shows that $(0,0)$ might belong to an MPE on some time interval, but $(0, \overline{g}b_t)$ does not.

An MPE is formed by a pair of attack dates (τ_i, τ_j) and sequence of appropriation pairs that are mutually consistent. In order to find the equilibrium appropriation sequences we will fix the reform date $\tau = \min(\tau_i, \tau_j)$, and check which sequences satisfy the transversality conditions. We consider first the time interval $[\tau, \tau + h)$. In this interval group i solves the following problem.

Problem 1 *During each instant on the interval* $[\tau, \tau+h)$ *choose an appropriation policy* $\{g_i(s)\}_{s=t}^{\tau+h}$ *and a terminal stock* $b(\tau+h)$ *to maximize* $\int_t^{\tau+h}[1-q_i]g_i(s)e^{-\delta(s-t)}ds + e^{-\delta(\tau+h-t)}W_i(\tau+h)$ *subject to (1), (2) and* $\{g_j(s)\}_{s=t}^{\tau+h}$. *Functions* q_i *and* W_i *are given by (4) and (5).*

First, consider the case in which there is matching (i.e., $\tau_i = \tau_j$). We show in the appendix that the unique MPE of the game in which each group solves Problem 1 is $\{\bar{g}b_t, \bar{g}b_t\}_{t=\tau}^{\tau+h}$. At time $\tau+h$ neither group receives any fiscal transfer. Thus, the instant before $\tau+h$ each group will try to appropriate as much as possible ($\bar{g}b_t$) regardless of what the other group does, and so on. By backwards induction we have that $g_i(t) = g_j(t) = \bar{g}b_t$ on $[\tau, \tau+h)$. Second, consider the follower ($\tau_f > \tau$). Since the follower will get nothing after $\tau+h$, the same argument implies that $g^f(t) = \bar{g}b_t$ on $[\tau, \tau+h)$. Lastly, consider the Leader. On the one hand, it has incentives to appropriate little because it will receive a share $\theta \leq 1$ of the stock of fiscal assets at $\tau+h$, and during $[\tau, \tau+h)$ it loses a share q^l of its transfer in fighting. On the other hand, the Leader has an incentive to appropriate at the maximum rate because it faces a negative rate of return (recall that the follower is appropriating at the maximum rate). We show in the appendix that the Leader will set $g^l(t) = \bar{g}b_t$ on $[\tau, \tau+h')$ and $g^l(t) = 0$ on $[\tau+h', \tau+h)$, where the constant h' is defined by

$$h' = \left\{\sup\ m \in [0,h]\ ,\ \text{s.t.}\ e^{x[h-m]} \geq \frac{\theta x - [1-q^l]\bar{g}}{[1-q^l][x-\bar{g}]}\right\} \tag{10}$$

Note that the right hand side of the inequality in (10) is one when $\theta = 1-q^l$, and is increasing in θ. Meanwhile, the left hand side equals one if $m = h$, and it is greater than one if $m < h$. Thus, $h' = h$ if and only if $\theta \leq 1-q^l$. That is, if the share of the stock of fiscal assets that the Leader will receive at $\tau+h$ is lower than the share of fiscal transfers it keeps during the fighting period, then the Leader will have no incentives to save and it will set $g^l(t) = \bar{g}b_t$ on $[\tau, \tau+h)$.

Next, we consider the time interval $[0, \tau)$. For a given (τ_i, τ_j), group i solves the following problem.

Problem 2 *During each instant on the interval* $[0, \tau)$ *choose an appropriation policy* $\{g_i(s)\}_{s=t}^{\tau}$ *and a terminal stock* $b(\tau)$ *to maximize* $\int_t^{\tau} g_i(s)e^{-\delta s}ds + e^{-\delta(\tau-t)}S_i(\tau)$ *subject*

to (1), (2) and $\{g_j(s)\}_{s=t}^{\tau}$. *Where* $S_i(\tau)$ *is given by*

$$S_i(\tau) = \begin{cases} [1-q^m][1-e^{-xh}]\frac{\bar{g}b_\tau}{x} + e^{-\delta h}\alpha w & \text{if } \tau_i = \tau_j \\ [1-q^l][1-e^{-xh'}]\frac{\bar{g}b_\tau}{x} + e^{-\delta h}[\theta b_\tau e^{[\beta-2\bar{g}]h'}e^{[\beta-\bar{g}][h-h']} + w] & \text{if } \tau_i < \tau_j \\ [1-e^{-xh}]\frac{\bar{g}b_\tau}{x} & \text{if } \tau_i > \tau_j \end{cases}$$

We show in the appendix that regardless of the values of τ_i and τ_j the unique MPE of the game in which each group solves problem 2 is $\{\bar{g}b_t, \bar{g}b_t\}_{s=0}^{\tau}$. In the Matching and Following cases this is for the same reason as the one described above. In the Leader's case although it will receive $\theta b_{\tau+h}$ at time $\tau + h$, the incentive to appropriate at the maximum rate dominates. This is because in addition to receiving a negative rate of return, $q^l = 0$ on $[0, \tau)$. For future reference we summarize these results in the following Lemma.

Lemma 2 *Along any reform MPE both groups set their appropriation equal to* $\bar{g}b_t$ *on* $[0, \tau)$. *On* $[\tau, \tau + h)$ *appropriation is given by*

$$g_i(t) = \begin{cases} 0 & \text{if } \tau_i < \tau_j \text{ and } t < \tau + h' \\ \bar{g}b_t & \text{otherwise} \end{cases}$$

where h' *is defined in (10). As a result, the stock of fiscal assets is strictly decreasing before reform takes place*

$$b_t^{ref} = b_0 e^{(\beta-2\bar{g})t} \qquad t \in [0, \tau)$$

This Lemma implies that regardless of the values of τ_i and τ_j the stock of fiscal assets is strictly decreasing on $[0, \tau)$, where $\tau = \min(\tau_i, \tau_j)$. As we saw earlier, this in turn implies that there exists a finite time when reform takes place.

3.1.2 Equilibrium Reform Time

Here we formalize the heuristic derivation presented earlier. To obtain the payoffs of Following, Leading and Matching in the general case we substitute in (3) the appropriation policies given in Lemma 2. These payoffs are given by (28)-(30) in the Appendix. Their properties are listed in the next Lemma.

Lemma 3. *Properties of the Payoff Functions.*

i. *$F(\tau)$ is increasing in τ.*

ii. *Either $L(\tau)$ is decreasing on $[0,\infty)$, or it is increasing on $[0,\hat{\tau}^l)$ and decreasing thereafter for some finite $\hat{\tau}^l$. The same is true for $M(\tau)$.*

iii. *Either $L(\tau) > F(\tau)$ for all $\tau \geq 0$ or there exists a unique $\hat{\tau}^{fl} < \infty$, such that $F(\hat{\tau}^{fl}) = L(\hat{\tau}^{fl})$, and $L(\tau) > (<) F(\tau)$ for $\tau > (<)\hat{\tau}^{fl}$. The same applies to $M(\tau)$ and $F(\tau)$.*

iv. $L'(\tau) > 0$ whenever $L(\tau) \leq F(\tau)$; $M'(\tau) > 0$ whenever $M(\tau) \leq F(\tau)$.

v. *Either $L(\tau) > M(\tau)$ for all $\tau \geq 0$ or there exists a unique $\hat{\tau}^{lm} < \infty$, such that $L(\hat{\tau}^{lm}) = M(\hat{\tau}^{lm})$ and $L(\tau) > (<) M(\tau)$ for all $\tau > (<)\hat{\tau}^{lm}$.*

vi. *$L(\tau)$ and $M(\tau)$ converge from above to $F(\infty)$ as $\tau \to \infty$.*

To simplify notation it will be useful to define τ^{fl} as the point where the $L(\tau)$ and $F(\tau)$ functions intersect, or as 0 if $L(\tau)$ is always greater than $F(\tau)$. We will do the same with τ^{fm} and τ^{lm}.

$$\tau^{fl} = \begin{cases} 0 & \text{if } L(0) \geq F(0) \\ \hat{\tau}^{fl} & \text{otherwise} \end{cases} \quad \tau^{fm} = \begin{cases} 0 & \text{if } M(0) \geq F(0) \\ \hat{\tau}^{fl} & \text{otherwise} \end{cases} \quad \tau^{lm} = \begin{cases} 0 & \text{if } L(0) \geq M(0) \\ \hat{\tau}^{lm} & \text{otherwise} \end{cases} \tag{11}$$

Recall that the type of reform equilibrium depends on whether the payoffs are as depicted in Figure 1 or 2. In the case where $\tau^{fl} < \tau^{fm}$ there exists the possibility that both groups will attack simultaneously at time τ^{fl}, each group thinking that the other group will not attack. Each group will regret making this mistake because $F(\tau^{fl}) = L(\tau^{fl}) > M(\tau^{fl})$. In order to avoid this mistake we will assume that group i can only attack at the beginning of each period (t^-), while group j can attack only at the end of each period (t^+). Furthermore, regime switches take place at the end of the period[16]. Note that if both groups attack during the same period, there is matching as specified in (5). It follows that the state has three elements: the stock of fiscal assets b, the regime $r = \{sq, m, lf\}$, and $n = \{0, 1\}$, which indicates whether group i has attacked.

[16]This assumption is also made by Gilbert and Harris (1984). We should note that it is not necessary for our results as Fudenberg and Tirole (1985) show. We make it because it greatly simplifies notation.

The next Proposition defines the equilibrium and off-equilibrium strategies that support the reform path. We will denote by ϕ the attack strategy: $\phi = 1$ means attack, while $\phi = 0$ means do not attack. Since strategies must be solely functions of the state in an MPE, we need to specify switching strategies in terms of the stock of fiscal assets, not in terms of time as we did above. Note, however, that our heuristic derivation is correct because along the equilibrium path $b(t)$ is strictly decreasing in t. Thus, there is a one-to-one mapping between $b(\tau)$ and τ.

Proposition 1 *There exists a reform MPE for all parameter values.*

i. *If $\tau^{fl} > \tau^{fm}$, there exist only matching MPEs. They are indexed by the switching stock of fiscal assets $b^* \in [b^{lm}, b^{fm}]$. The strategies are given by Lemma 2 and:*

$$\phi_i^m = \begin{cases} 1 & \text{if } b \leq b^* \text{ and } r = sq \\ 0 & \text{otherwise} \end{cases} \qquad \phi_j^m = \begin{cases} 1 & \text{if } b \leq b^*,\ r = sq, \text{ and } n = 1 \\ 0 & \text{otherwise} \end{cases}$$

ii. *If $\tau^{fl} < \tau^{fm}$, there exists only a Leader-Follower MPE. The strategies are given by Lemma 2 and:*

$$\phi_i^{fl} = \begin{cases} 1 & \text{if } b \leq b^{fl} \text{ and } r = sq \\ 0 & \text{otherwise} \end{cases} \qquad \phi_j^{fl} = \begin{cases} 1 & \text{if} \begin{cases} b \in (b^{fm}, b^{fl}], r = sq, \text{ and } n = 0 \\ b \leq b^{fm} \text{ and } r = sq \end{cases} \\ 0 & \text{otherwise} \end{cases}$$

iii. If $\tau^{fl} = \tau^{lm}$, there is a matching MPE and a Leader-follower MPE. The attack strategies are given by $\phi^m(b)$ replacing b^* by b^{fm}, and by $\phi^{fl}(b)$, respectively.

The proof is in the appendix.

3.2 Non-Reform Equilibria

In a non-reform MPE the status quo prevails forever and no group ever finds it profitable to destroy the power of the other group. Along this equilibrium each group maximizes $\int_t^\infty g_i(s)e^{-\delta s}ds$ subject to (1), (2), and $\tau = \infty$, taking as given the appropriation policy of the other group. If group i deviates at time t, it might become the Leader if group j

finds Following preferable to matching. Otherwise there is matching. From (28) and (30) we have that the payoff of a deviation is either

$$L^d(t) = e^{-\delta t}\left[b_t\left[\overline{g}[1-q^l]\frac{1-e^{-xh'}}{x} + \theta e^{(\overline{g}-x)h}e^{-\overline{g}h'}\right] + we^{-\delta h}\right], \text{ or} \tag{12}$$

$$M^d(t) = e^{-\delta t}\left[b_t\overline{g}[1-q^m]\frac{1-e^{-xh}}{x} + \alpha we^{-\delta h}\right] \tag{13}$$

Therefore, a non-reform MPE exists if and only if

$$\text{For all } t \geq 0, \qquad N(t) \geq D(t) = \begin{cases} L^d(t) & \text{if } M^d(t) < e^{-\delta t}b_t\overline{g}\frac{1-e^{-xh}}{x} \\ M^d(t) & \text{otherwise} \end{cases} \tag{14}$$

where $N(t) \equiv \int_t^\infty g^{nr}(s)e^{-\delta s}ds$ is the non-reform equilibrium payoff, and $e^{-\delta t}b_t\overline{g}\frac{1-e^{-xh}}{x}$ is the payoff of following when the deviation occurs. Proposition 2 defines the only class of appropriation policies that might satisfy (14), and it states the conditions under which (14) is satisfied. Note that in contrast to reform MPEs, appropriations cannot be maximal. Non-reform appropriation sequences must be interior along the entire path, or may have an initial subsequence of minimal appropriations followed by an interior appropriation subsequence.

Proposition 2 *There exist non-reform MPE's if and only if (i)* $b_0 \geq D(0)$ *and (ii)* $\delta < \beta \leq 2\delta$. *The equilibrium appropriation policies can only take the following form*

$$g^{nr}(b,T) = \begin{cases} 0 & \text{if } b < b_0e^{\beta T} \\ [\beta-\delta]b & \text{if } b \geq b_0e^{\beta T} \end{cases} \qquad \textit{for any } T \textit{ in } [0,\infty). \tag{15}$$

The proof is in the Appendix. Here we simply present the intuition. Condition (14) is satisfied if $N(0) \geq D(0)$ and if fiscal assets are non-decreasing. If fiscal assets are decreasing (14) is violated. To see this recall that fiscal transfers are bounded above by $\overline{g}b_t$. Thus, if $b(t)$ is strictly decreasing, fiscal appropriations will converge to zero. As a result the payoff of remaining in the non-reform equilibrium will converge to zero, while the payoff of deviating will converge to the value of post-reform profits ($e^{-\delta h}w$ or $e^{-\delta h}\alpha w$). This implies that there exists some finite time at which unilateral deviations become profitable.

Condition (i) in Proposition 2 imposes a lower bound on b_0 to rule out unilateral profitable deviations at time 0 (i.e., $N(0) \geq D(0)$). To see this replace (15) in $N(t) \equiv$

$\int_t^\infty g^{nr}(s)e^{-\delta s}ds$ and note that the minimum of $N(t)$ is obtained by setting $T = 0$. That is, $N(t) \geq e^{-\delta t}b(t)$. Condition $\beta \leq 2\delta$ insures that the interior appropriation sequence induces a non-decreasing stock of fiscal assets. This is because $b(s) = b(t)e^{(2\delta-\beta)(s-t)}$. Condition $\beta > \delta$ is necessary for transversality condition (31) to be satisfied.

To check that there are no other non-reform MPEs recall from Lemma 1 that only sequences formed by the interior appropriation pair, by the maximal pair, and by the minimal pair can form part of a MPE. The appropriation sequence $\{\overline{g}b(s), \overline{g}b(s)\}_{s=t}^{\infty}$ is ruled out because it induces a strictly declining path of fiscal assets ($b(t) = b(0)e^{(\beta-2\overline{g})t}$), and this violates condition (14). The sequence $\{0,0\}_{s=t}^{\infty}$ is ruled out because it violates the transversality condition. Note however that the sequence defined in Proposition 2: $\{0,0\}_{s=0}^{T}$ followed by $\{[\beta-\delta]b(t), [\beta-\delta]b(t)\}_{s=T}^{\infty}$ is an MPE. The reason is that fiscal assets are increasing on $[0,\infty)$, and the transversality condition is satisfied because appropriation is not zero on the entire horizon. Lastly, we show in the appendix that sequences of the form $\{\overline{g}b(s)\}_{s=0}^{T}$, $\{0\}_{s=T}^{T'}$, $\{[\beta-\delta]b_s\}_{s=T'}^{\infty}$; or $\{\overline{g}b(s)\}_{s=0}^{T}$, $\{[\beta-\delta]b_s\}_{s=T}^{\infty}$ cannot belong to a non-reform MPE.

3.3 Pareto-Inferior Reform

In this subsection we make precise the sense in which both groups might lose from reform. First, we compare payoffs under the reform and non-reform equilibria. Then we analyze whether delaying the reform date along the reform path makes both groups better-off.

Proposition 2 implies that at all times the payoff in a non-reform MPE ($N(t)$) is greater than the payoffs of Leading and Matching. Furthermore, since $N(t) \geq b(t) > F(t)$, we have that $N(t)$ is greater than the three possible payoffs that a group might get in a reform MPE for any reform date $\tau \geq 0$. Thus, if a non-reform MPE exists (i.e., $\beta \in (\delta, 2\delta]$), it Pareto-dominates any reform MPE. In other words, both groups would be better off by not overappropriating fiscal assets and not squandering resources trying to destroy the power of the other. However, in a reform MPE it is individually rational to drive down the economy to a state of fiscal crisis, even though both groups know that at that point they will fight each other.

Next, we take as given the existence of overappropriation in the reform equilibria, and

ask whether both groups would be better off if the reform date were moved forward in time. Consider first the Leader-follower equilibrium. There are two cases: (a)$L'(0) > 0$, and (b)$L'(0) \leq 0$. In case (a) reform occurs either at time 0 if $L(0) \geq F(0)$, or at a time $\hat{\tau}^{fl}$ when $L(\hat{\tau}^{fl}) = F(\hat{\tau}^{fl})$ if $L(0) < F(0)$. (as depicted in Figure 1). Since $L'(\tau) > 0$ whenever $L(\tau) \leq F(\tau)$ (by part (iv) of Lemma 3) we have that reform date $\hat{\tau}^{fl}$ is smaller than $\hat{\tau}^{l}$, the date at which $L(\tau)$ attains it maximum. Thus, in case (a) there exists a delay in reform that would make both groups better off. Consider case (b). Since $L'(0) \leq 0$ implies that $L(0) > F(0)$ (by part (iv) of Lemma 3), it follows that reform takes place at time 0. Furthermore, since $L(\tau)$ is decreasing on $[0, \infty)$, the Leader would be worse off if reform were delayed.

Consider next the matching equilibria. Recall that these equilibria exist only if $\tau^{fm} \leq \tau^{fl}$ as defined in (11). Again, there are two cases: (a)$M'(0) > 0$, and (b)$M'(0) \leq 0$. In case (a) reform might take place at any τ in $[\tau^{fm}, \tau^{lm}]$. Since $M'(\tau) > 0$ whenever $M(\tau) \leq F(\tau)$ (by part (iv) of Lemma 3), we have that in case (a) reform date τ^{fm} is smaller than $\hat{\tau}^{m}$, the date at which $M(\tau)$ attains its maximum. Thus, if the equilibrium reform date lies in the interval $[\tau^{fm}, \hat{\tau}^{m})$, there exist Pareto-improving delays in reform (as depicted in Figure 2). However, if $\hat{\tau}^{m} \leq \tau^{lm}$ and the reform date lies in $[\hat{\tau}^{m}, \tau^{lm}]$, any delay in reform would make both groups worse off. Consider case (b). Since $M'(0) \leq 0$ implies that $M(0) > F(0)$ (by part (iv) of Lemma 3), it follows that reform might take place at any τ in $[0, \tau^{lm}]$. Furthermore, since $M(\tau)$ is decreasing on $[0, \infty)$, any delay in reform would make both groups worse off. We summarize these results in the next Corollary.

Corollary 1. *From the powerful groups' perspective:*

i. *Non-reform equilibria Pareto-dominate reform equilibria.*

ii. *There exist Pareto-improving delays in reform in a Leader-Follower MPE if and only if reform does not occur at time 0.*

iii. *There exist Pareto-improving delays in reform in a matching MPE if and only if reform does not occur at time 0 and the reform date is smaller than* $\hat{\tau}^{m}$.

Notice that reform occurs at time 0 and that there are no Pareto-improving delays in

reform if the initial stock of fiscal assets b_0 or the attack period h are very small. Small b_0 corresponds to an initial "fiscal crisis". Small h means that destroying the power of the other group is not costly. Notice also that this Corollary applies to powerful groups, not the unmodeled rest of the economy. Arguably the sooner the reform, the better off the economy will be.

3.4 Bunching of Reforms

In policy circles, the point is made that reforms tend to occur in waves and across adjacent countries. Our model can generate bunching by introducing uncertainty in the following way. Suppose that groups in country i are uncertain as to what the present value of their profits in the post-reform regime (w_i) will be. Prior to reform w_i is a random variable with

$$w_i = \begin{cases} \bar{w} & \text{with probability } \pi \\ \underline{w} & \text{with probability } 1-\pi \end{cases}$$

This formalism captures the idea that it is not clear what the outcome of a deep structural change will be . For instance, take the case of a reform that consists of liberalizing trade and eliminating efficiency-reducing regulations. A protected firm will be able to reap the benefits of less regulation if it successfully shifts its product line. However, it faces the risk of having to exit the market if it is not able to compete against imports.

Let us consider the simplest case of n countries with perfectly correlated post-reform payoffs ($w_1 = w_2 = ... = w_n$), but with different initial stocks of fiscal assets. As long as reform has not taken place in any economy, powerful groups choose their appropriation policies and the reform date as described in section 3.1. The only difference is that they replace the present value of post-reform profits with its expected value $\tilde{w} = \pi\overline{w} + [1-\pi]\underline{w}$. As in (11), $\tilde{\tau}_i^{fl}$ is either 0 if $F_i(0) \leq L_i(0)$ or is given by $F_i(\tilde{\tau}_i^{fl}) = L_i(\tilde{\tau}_i^{fl})$. Analogous definitions apply to $\tilde{\tau}_i^{fm}$ and $\tilde{\tau}_i^{lm}$. Once reform takes place in one country, groups in all other countries solve Problem 1 by replacing $\tilde{w}$ with the realization of w. It follows from Proposition 1 that reform will take place in country i at time $\tilde{\tau}_i^{fl}$ if $\tilde{\tau}_i^{fl} < \tilde{\tau}_i^{fm}$, or at any $\tau \in [\tilde{\tau}_i^{fm}, \tilde{\tau}_i^{lm}]$ if $\tilde{\tau}_i^{fl} \geq \tilde{\tau}_i^{fm}$.

Suppose that at time t reform occurs in country 1, that $w_1 = \overline{w}$, and that no other

country has reformed yet. Since powerful groups in the other countries learn that post-reform profits are high, the values of leading and of matching increase.. As a result, the reform date in country i falls from $\tilde{\tau}_i^{fl}$ to $\overline{\tau}_i^{fl}$ (which is defined analogously to $\tilde{\tau}_i^{fl}$). It follows that in any country i where $\min(\overline{\tau}_i^{fl}, \overline{\tau}_i^{fm}) = 0$ reform might take place immediately. Bunching takes place as a result.

The point of this simple example is that reform in one country conveys information to other countries of what the profits of powerholders might be in a reformed economy. If this information leads powerholders in other countries to increase their expectations sufficiently, reforms in those countries may take place immediately.

4 Stylized Facts

In this section we analyze the extent to which trade reforms have taken place in the context of economic crisis and political struggle during the period 1970-1995. In subsection 4.1 we present case studies of Chile and Mexico, and in subsection 4.2 we present a quantitative analysis of all countries that were closed in 1970.

4.1 Mexico and Chile

Since the 1930s Mexican politics have been dominated by an official party (PRI)[17]. The creation of this party was the result of an agreement among powerful regional bosses in order to end the state of anarchy. These groups accepted corporatization in exchange for monopoly rights and fiscal privileges. Trade protection played a key role in the implementation of this strategy. Two major powerful groups formed in the manufacturing sector: the import-competing elite and the statist elite. The first was composed of private firms that were shielded from competition by high trade barriers and convoluted regulations. The second was formed by the managers of state owned enterprises, their unions and suppliers. Since the late sixties the need for reform was recognized. The executive attempted a fiscal reform in 1971 and a trade reform in 1979. However, powerful groups unanimously

[17]For an analysis of the Mexican reforms see Tornell (1995), and Tornell and Esquivel (1995).

blocked them[18]. This can be explained by the fact that there were enough fiscal resources to subsidize all groups (during the seventies significant oil reserves were discovered).

As fiscal transfers plummeted in the aftermath of the debt crisis, each powerful group tried to displace others and ensure for itself a greater share of the fiscal pie. The statist elite induced the expropriation of all private banks, which were a conduit of fiscal transfers to the private elite. Three months before he left office President Lopez Portillo announced this expropriation and the imposition of capital controls. There were fears that under President de la Madrid expropriations would continue and statism would increase. After all, he had been the Minister of Budget and Planning under Lopez Portillo. However, the opposite occurred. During his tenure three important policies were adopted: not to interrupt debt service to foreign banks, to open the economy by joining GATT in 1985, and to privatize state-owned enterprises.

The private elite did not oppose trade reform this time around, as it had done in the past. The argument of this paper is that the private elite's choice was not between trade reform and the status quo, but between trade reform and further expropriations. It supported reform as a way to weaken the statist elite and to stop further expropriations. First, trade liberalization would generate new groups of exporters and foreign investors. Since the potential cost of confronting powerful foreign firms would be high, it is unlikely that the statist elite would engage in further expropriations. Second, the international agreements signed by a country as part of trade liberalization impose limits on the extent of rent-generating measures that a government can implement, reducing the ability of the statist elite to obtain fiscal transfers.

Traditionally powerful groups lost from reform. The private elite incurred bankruptcy and adjustment costs. Because of reallocation, it also suffered from the loss of political power associated with the ownership of fixed factors in long established industries. The statist elite suffered from privatization. Furthermore, reform induced the formation of two new powerful groups: exporters and foreign investors. The economic reform triggered the most drastic political change that occurred in Mexico since the 1930s: the split of the

[18]Notice that although the President was bestowed with many formal powers, local groups did not yield all effective power to the center.

PRI. In 1988 some members of the statist elite, combined with the leftist parties to form the Partido de la Revolucion Democratica. As a result the PRI candidate (Mr. Salinas) almost lost the majority of the votes in the 1988 presidential elections, and in the 1997 elections the PRI lost Mexico City and the majority in Congress.

We turn next to the Chilean case. The conventional wisdom holds that trade reform took place in Chile because Pinochet was a tough dictator. A closer analysis reveals that causation runs in the opposite direction (see Frieden (1991), Valenzuela (1978) and Velasco (1994)). Previous to reform, the powerful groups in Chile were the unions, the import-competing elite and the landed elite. Unlike Mexico, in Chile it was not a drastic collapse in the terms of trade that induced a breakdown of the status quo, but rather a sharp increase in the number of unions. During Frei's administration new rural and urban dwellers unions were created, and the number of strikes increased dramatically in the late sixties. This trend accelerated during Allende's administration, during which many private firms were expropriated. The political change associated with reform was more drastic than that in Mexico. In 1973 there was a military coup that brought Mr. Pinochet to power. From our perspective the interesting point is that the trade reform introduced in 1975 destroyed a major part of the manufacturing sector, but did not generate any opposition from the private elite or the replacement of Pinochet as usually has occurred in the rest of Latin America[19]. The reason is that trade reform was the mechanism that would destroy the power of the unions. In fact, unionization fell from around 40% in 1973 to less than 15% in 1990[20].

Summing up, in Chile and Mexico trade reform was an unwanted outcome. It was the costly action undertaken by the private elite to stop the expropriations initiated by its rivals. In both countries powerful groups ended worse off than in the status quo.

[19]In fact, Chile was the only case, among the Latin American regimes of the time, that evolved into a personal dictatorship (Huntington (1991), ch. 3).

[20]This point is nicely put by Steppan (1985, pp.321): "The persistence of fear within the upper burgeoisie was an important element in the burgoisie's willingness to accept individual policies that hurt the upper class ... but were seen to be the necessary cost of protecting its overall interests. It is impossible to understand the passivity of the industrial faction of the burgoisie in Chile ... outside of the context of fear."

4.2 Trade Reform, Crisis and Political Change

We consider all the countries that were coded as closed in 1970 by Sachs and Warner (1995)[21]. Our sample consists of all country-years for which data is available in the World Development Indicators of the World Bank[22].

We apply the same criteria for reform, economic crisis and political struggle to all countries. This procedure might miss some reforms and crises because what constitutes a major change in one country might be considered normal in other countries. However, it has the advantage of not being subjective. In our benchmark case, a country has reformed by year t if: (i) it had eliminated trade barriers before t; and (ii) year t is the first year that its volume of trade over GDP ratio had increased by more than 7% relative to the previous year[23]. In Table 2 we vary the thresholds for increases in the volume of trade from 2% to 20%. We code the reform as taking place during the year that the policy change took place according to Sachs and Warner (1995). This criterion combines a policy measure and an outcome. We include the latter in order to be immune to the "obey, but do not accomplish" syndrome. That is, we eliminated from our sample countries that abolished visible trade barriers, but we did not eliminate other regulations that de facto impede trade. We included changes in trade policy in order to eliminate cases where the volume of trade increased for reasons unrelated to trade liberalization.

In our benchmark, a country experienced a crisis in year t if: (i) its inflation was higher than 40%, and it had increased by more than 125% with respect to the previous year, *or* (ii) its income per capita in current US Dollars declined more than 18% relative to the previous year. If for a given country our criterion indicates the existence of a crisis for a

[21]Sachs and Warner consider the 135 countries included in Summers and Heston with the exception of 24 countries for which adequate data is not available. These countries are: Afghanistan, Bahamas, Bahrain, Cape Verde, Comoros, Dominica, Fiji, Grenada, Iceland, Kuwait, Lesotho, Liberia, Malta, Oman, Panama, St. Lucia, St. Vincent, Seychelles, Solomon Islands, Saudi Arabia, Sudan, Suriname, Swaziland and United Arab Emirates.

[22]We do not consider countries that have experienced a split: Checoslovakia, USSR and Yugoslavia. It is not possible to include these countries because our criterion for trade reform is a big increase in the volume of trade, and reliable data for the succesor countries before the split is not available.

[23]Exports, imports and GDP are measeured at 1987 prices.

string of five years or less, we code the country as a having had a crisis in the first year of the string. In Table 2 we vary the thresholds for increases in inflation from 25% to 250%, and the thresholds for declines in income per-capita from -10% to -26%.

There are no direct measures of conflict among powerful groups. We measure this variable indirectly through an index of drastic political change. We should be aware that although drastic political change reflects political conflict, there might be instances of conflict which are not reflected in measurable political changes. This biases our results against finding any correlation between reform and political struggle. As we shall see below, we find quite a high correlation among these variables.

The drastic political change index is derived from the Polity III data base (see Gurr (1974), and Gurr and Jaggers (1995)). This data set contains information for almost all countries from 1800 to 1995. For each country-year it codes nine indicators of political authority patterns that include constraints on the chief executive, openness of executive recruitment, competitiveness of political participation, etc. Based on these indicators Gurr and Jaggers construct an autocracy index, a democracy index and a drastic political change index. According to Gurr and Jaggers there is a drastic political change in year t if the difference between the autocracy and democracy indexes changes by 3 points or more from year $t-1$ to year t[24]. This index captures situations in which there is political conflict and some groups are displaced from power, as opposed to formal changes in government that do not alter power relations. For instance, a military coup that simply replaces one head of state by another is not coded as a political change[25].

[24]We thank Barbara Geddes and Jeff Frieden for suggesting this index. It is worth noting that the Polity III autorcracy - democracy index is highly correlated with other indexes commonly used. For instance the correlation with the Bollen index is .89, and with the Freedom House political rights index is .92.

[25]To verify whether the Polity index does in fact capture instances of political fight we used the Europa Yearbook, which contains a summary of the political events for all countries. For each country-year we coded the following events: succesful military coup, transition from an authoritarian to a democratic regime and viceversa, split in the ruling party, transfer of power from a ruling party that has been in power for more than 10 years to new political parties, forced resignation of the head of state, suspension of rights, civil war, and end or begining of foreign occupation. Table A2 indicates with an E the country-years in which at least one of these events has taken place. It also reproduces the index of drastic political change of Table A1 (with the letter P). There are 84 Ps and 191 Es in Table A2. It is remarkable that 77

Table 1. The Benchmark Case

	Reform	No Reform	Total
P&C	15	10	25
~P&C	7	19	26
P&~C	5	25	30
~P&~C	7	1167	1174
Total	34	1221	1255
Chi-squared test stat		**411.20**	

Conditional Probabilities of Reform

P(R|P&C)	0.60
P(R|~P&C)	0.27
P(R|P&~C)	0.17
P(R|~P&~C)	0.01

R = Trade Reform
C = Economic Crisis
P = Drastic Political Change

The reform, crisis and political change indexes are shown in Table A1. One should be cautious in interpreting these indicators. They are only proxies, and the timing of the events they are meant to capture is not precisely measured. To overcome this problem, in our benchmark case we have coded a reform as having occurred in the context of a crisis (or political change) if both events took place within a five year window. In Table 2 we vary the window size from 3 to 7 years.

Table 1 summarizes Table A1. Out of 1255 country-years, there were 34 reforms, 51 crises, and 55 political changes. The unconditional probability of reform is only 2.7%. What is remarkable is that if we condition on the joint occurrence of a crisis and a political change, the probability of reform rises to 60%, while the probability of reform conditional on a crisis but no political change is only 27%. A Pearson's chi-squared test rejects the hypothesis that reforms are independent of fiscal crises and political changes at the 1% significance level. The test statistic associated with the null hypothesis is 411, which exceeds the 99th quantile of a chi-square random variable with three degrees of freedom (11.34)[26].

Table 2 shows that these results are robust to changes in the thresholds that define reform and crises. They also are robust to changes in the window between reform, crisis, and political change. Table 3 presents the list of countries that correspond to our benchmark case. It includes almost all the cases of trade liberalization mentioned in the literature. Among them are the most celebrated reforms of the 1970s: Indonesia and Chile. It also includes those often mentioned in the 1980s: Mexico and Bolivia, as well as recent ones like Poland, Peru, and Argentina. There are some countries that liberalized but did not experience a crisis according to our criterion. The reason is that although they experienced a crisis relative to their historical standards, the change in their crisis indexes pale

Ps are within no more that 3 years away from an E. This suggests that the index derived from the Polity III data set corresponds to our notion of political change. Moreover, Polity index uses a stricter criterion than the one we use (as expected): it aproximately selects a subset of the country-years for which there was a drastic political change according to our coding of the Europa Yearbook.

[26]As mentioned in the introduction, these results are corroborated in the case studies of recent reforms. For an earlier period Papageorgiu, Choksi and Michaely (1990) find that 7 out of the 13 cases of strong and fast reforms in the period 1945-1981 occured in the context of a change in political regime.

Table 2. Robustness

Varying the threshold for the increase in (exp+imp)/GDP

	2%	5%	6%	7%	8%	9%	12%
P(R | P & C)	0.60	0.60	0.60	0.60	0.60	0.58	0.42
P(R | ~P & C)	0.33	0.30	0.27	0.27	0.19	0.19	0.19
P(R | P & ~C)	0.19	0.19	0.17	0.17	0.10	0.07	0.07
P(R | ~P & ~C)	0.01	0.01	0.01	0.01	0.01	0.01	0.00

Varying the threshold for the increase in inflation

	25%	75%	100%	125%	150%	175%	250%
P(R | P & C)	0.52	0.54	0.56	0.60	0.58	0.58	0.64
P(R | ~P & C)	0.30	0.32	0.26	0.27	0.27	0.25	0.23
P(R | P & ~C)	0.17	0.19	0.18	0.17	0.19	0.19	0.18
P(R | ~P & ~C)	0.00	0.00	0.01	0.01	0.01	0.01	0.01

Varying the threshold for the fall in GNP per-capita in US

	-10%	-15%	-16%	-18%	-20%	-21%	-26%
P(R | P & C)	0.41	0.56	0.56	0.60	0.57	0.65	0.69
P(R | ~P & C)	0.29	0.30	0.29	0.27	0.30	0.29	0.40
P(R | P & ~C)	0.24	0.19	0.19	0.17	0.22	0.20	0.19
P(R | ~P & ~C)	0.00	0.00	0.01	0.01	0.01	0.01	0.01

Varying the window between reform, crisis and political change

	3 years	4 years	5 years	6 years	7 years
P(R | P & C)	0.47	0.57	0.60	0.62	0.72
P(R | ~P & C)	0.20	0.20	0.27	0.25	0.25
P(R | P & ~C)	0.15	0.10	0.17	0.17	0.19
P(R | ~P & ~C)	0.01	0.01	0.01	0.01	0.01

Table 3. Trade Reforms

	P and C	~P and C	P and ~C	~P and ~C
1	Bolivia (1985)	Argentina (1991)	El Salvador (1989)	Botswana (1979)
2	Bulgaria (1991)	Brazil (1991)	Hungary (1990)	Colombia (1986)
3	Chile (1976)	Costa Rica (1986)	Nepal (1991)	Ecuador (1991)
4	Ghana (1985)	Gambia (1985)	Tunisia (1989)	India (1994)
5	Guyana (1988)	Israel (1985)	Uruguay (1990)	Morocco (1984)
6	Guatemala (1988)	Jamaica (1985)		Sri Lanka (1991)
7	Indonesia (1970)	Kenya (1993)		Turkey (1989)
8	Mali (1988)			
9	Mexico (1986)			
10	Paraguay (1989)			
11	Peru (1991)			
12	Philippines (1988)			
13	Poland (1990)			
14	Uganda (1988)			
15	Zambia (1993)			

Note: Guinea (1986), Guinea-Bissau (1987), and Mauritania (1992) not included due to lack of data

in comparison with those of some African and Latin American countries[27].

Lastly, Table 4 presents Probit regressions in which the reform index is the dependent variable. In the benchmark regression we include three dummies. The first dummy is one

[27]Turkey is a celebrated case of a reform that took place in the midst of economic crisis and political change. However, Table 1 classifies Turkey as a case of reform with neither crisis nor political change. This is because according to the Sachs-Warner criterion, Turkey liberalized in 1989. In contrast, according to country studies Turkey initiated trade reform in the early 1980s (e.g. Krueger and Aktan (1992)). Moreover, our indices indicate that Turkey experienced crisis during 1983-85, a drastic political change in 1980, and a high increase in the volume of trade starting in 1983. Thus, if the reform date were changed from 1989 to the early 1980s, the above mentioned correlation would be obtained.

for the country-years in which there was a crisis but no political change, the second is one in cases where there was political change, but no crisis, and the third dummy is one if there was a crisis and political change. The coefficients on the three dummies are positive and significant at the 1% level in all equations. Furthermore, Wald tests indicate that the sum of the constant and the coefficients associated with crisis and political change are significantly different from zero at the 1% level. To check whether the reform index does not simply reflect extreme changes in the terms of trade we introduce a dummy for the country-years in which the terms of trade increase was among the top 1% (column 2) or 5% (column 3) in the period 1970-1995. To test whether the occurrence of reform was influenced by the fact that other countries implemented reform, we introduce continent dummies (columns 4-6) and decade dummies (columns 7 and 8). Only the 1990s dummy enters significantly.

5 Conclusions

Many economic reforms have taken place in a context of economic crisis and drastic political change. These reforms have reflected political struggle rather than social welfare maximization. We have presented a model that rationalizes this type of reform. The first point we make is that reform is the tool used by powerful groups to limit the power of their rivals. It is an unwanted outcome that harms most or all powerholders. The second point we make is that it is individually rational for groups, in the course of their rent-seeking, to drive the economy to a crisis; they behave voraciously even though they know that when a crisis occurs, there will be a conflict and a reform will take place.

In our model, each powerful group has the ability to initiate a reform by relinquishing its privileges. In equilibrium a group undertakes such an action either to prevent the other groups from introducing changes that would harm this group even more, or to neutralize the harmful effects of changes already introduced by the other groups. For instance, as we discussed in the case studies of Mexico and Chile, even though the protected producers disliked trade liberalization, they found that it was the best way to stop expropriations by labor and statist groups.

Table 4 Probit Regressions

Dependent Variable: Trade Reform

Variables	1	2	3	4	5	6	7	8
Constant	-2.5144	-2.5116	-2.5024	-2.3727	-2.5344	-2.5597	-2.4528	-2.7670
	0.1329	*0.1330*	*0.1334*	*0.1494*	*0.1508*	*0.1454*	*0.1575*	*0.1713*
C&-P	1.8992	1.8965	1.8873	1.9537	1.8959	1.9446	1.9415	1.9375
	0.2951	*0.2951*	*0.2953*	*0.3083*	*0.2956*	*0.3009*	*0.3089*	*0.3155*
~C&P	1.5469	1.5442	1.5577	1.5235	1.5455	1.5306	1.5402	1.5094
	0.3080	*0.3081*	*0.3054*	*0.3061*	*0.3082*	*0.3086*	*0.3082*	*0.3276*
C&P	2.7677	2.7650	2.7558	2.7162	2.7552	2.7832	2.7905	2.8871
	0.2863	*0.2864*	*0.2865*	*0.2871*	*0.2888*	*0.2881*	*0.2894*	*0.3082*
1 Percentile Change in ToT		-1.1248						
		7.5487						
5 Percentile Change in ToT			-3.5205					
			10.6734					
Africa & Middle East Dummy				-0.3729				
				0.2201				
Asia Dummy					0.0619			
					0.2087			
America Dummy						0.2570		
						0.2733		
1980s Dummy							-0.1401	
							0.2072	
1990s Dummy								1.1395
								0.2450

Note: Standard errors in italics

C: Economic Crisis, P: Political Change

Our model is consistent with the fact that democratic regimes are as likely to reform as authoritarian ones. This is because in our model, the decision to reform is made by neither majority voting nor government fiat. Reform occurs when there is a breakdown in the unanimous opposition by the powerholders.

Although we have used economic reform as the motivation, our model can be thought of as one of endogenous institutional change. It can be used to rationalize first, the changes induced by powerholders in some large organizations that harm most or all powerful groups, and second, the prevalence of inefficient practices that lead to the crisis that ignites such reforms. For instance, this model can be used to rationalize certain political transitions, or significant changes in big corporations which have been induced by neither shareholders nor outsiders.

6 Appendix

Proof of Lemma 1. To derive the necessary conditions for the dynamic game where each group solves Problem 1, we will restrict appropriation policies to be differentiable functions of the state. The Hamiltonian associated with group i's problem is

$$H_i = [1 - q_i]g_i e^{-\delta s} + \lambda[\beta b - g_i - \hat{g}_j(b)] + \overline{\mu}[\overline{g}b - g_i] + \underline{\mu}g_i \tag{16}$$

where $\hat{g}_j(b)$ is the equilibrium appropriation policy of group j. The first order conditions for group i are:

$$\frac{\partial H_i}{\partial g_i} = [1 - q_i]e^{-\delta s} - \lambda_i(s) - \overline{\mu}_i(s) + \underline{\mu}_i(s) = 0 \tag{17}$$

$$\dot{\lambda}_i(s) = -\frac{\partial H_i}{\partial b} = -\lambda_i(s)[\beta - \frac{\partial g_j(b(s))}{\partial b}] - \overline{\mu}_i(s)\overline{g} \tag{18}$$

$$0 = \overline{\mu}_i(s)[\overline{g}b(s) - g_i(s)], \quad 0 = \underline{\mu}_i(s)g_i(s), \quad \overline{\mu}_i(s),\ \underline{\mu}_i(s) \geq 0 \tag{19}$$

An analogous set of conditions applies to group j. A pair of appropriation policies is an MPE if and only if it satisfies the two sets of conditions (17)-(19), the second order conditions, and the transversality conditions, which vary from case to case. Lemma 1 selects the appropriation pairs that satisfy (17) and (18). We start by considering the case where each group sets its appropriation in the interior of the appropriation set. In

this case we have for the two groups $\overline{\mu} = \underline{\mu} = 0$ and $\lambda(t) = [1 - q_i]e^{-\delta t}$. Thus, (18) is simultaneously satisfied for both groups if and only if $g_i'(b) = g_j'(b) = \beta - \delta$. Integrating with respect to b and noting that $g_i(0) = 0$, we have that the unique interior appropriation pair that satisfies (17) and (18) is $([\beta - \delta]b(t), [\beta - \delta]b(t))$. Second, we show that the pairs $(\overline{g}b(t), \overline{g}b(t))$ and $(0,0)$ also satisfy (17) and (18). For the pair $(0,0)$ we have $\overline{\mu}_i = 0$, $\underline{\mu}_i(t) = \lambda_i(t) - [1 - q_i]e^{-\delta t}$ and $\lambda_i(t) = \lambda_i(0)e^{-\beta t}$. Thus, $\underline{\mu}_i(t) > 0$ for sufficiently large $\lambda_i(0)$. For the pair $(\overline{g}b(t), \overline{g}b(t))$ we have that $\lambda_i(t) = e^{[2\overline{g}-\beta]t}\left\{Y + \frac{[1-q_i]\overline{g}e^{-xt}}{x}\right\}$, where Y is a constant. Thus, $\overline{\mu}_i(t) = [1-q_i]e^{-\delta t} - \lambda_i(t)$ is positive if Y is sufficiently small. The values of $\lambda_i(0)$ and Y depend on the specific transversality condition. However, for Lemma 1 to hold, it is sufficient to show that (17) and (18) might be satisfied. Later on we might rule out these pairs on the grounds that they violate some transversality conditions. Lastly, it is straightforward to show that mixed pairs cannot be part of a MPE.‖

Proof of Lemma 2. Throughout this proof the differential equation $\dot{\lambda} = a\lambda - de^{-\delta t}$ will appear repeatedly. Its general solution is

$$\lambda(t) = e^{at}\left\{Y + \frac{de^{-[a+\delta]t}}{a+\delta}\right\} \tag{20}$$

where Y is an arbitrary constant. Only sequences formed by the three appropriation pairs listed in Lemma 1 can be part of an MPE. Of these sequences, only those that satisfy (19) and the relevant transversality condition are part of an MPE. Note that the second order conditions are satisfied in all cases because the Hamiltonian is concave in (b, g) and the scrap value functions are concave in b. We consider the matching and the Leader-follower cases in turn.

I. Matching $(\tau_i = \tau_j = \tau)$. We consider first the time interval $[\tau, \tau + h)$. The optimality conditions of a group are (17)-(19) and the transversality condition

$$\lambda(\tau + h) = e^{-\delta[\tau+h]}\frac{\partial S(\tau + h)}{\partial b} = 0 \tag{21}$$

First, we show that $\{\overline{g}b_t\}_{t=\tau}^{\tau+h}$ belongs a reform MPE. In this case $\underline{\mu}_t = 0$ and $\overline{\mu}_t = [1 - q_m]e^{-\delta t} - \lambda_t$ (by (17)) and $\dot{\lambda} = \lambda[2\overline{g} - \beta] - [1 - q_m]\overline{g}e^{-\delta t}$ (by (18)). To determine the constant Y in (20) we use $\lambda(\tau + h) = 0$ to get $Y = -\frac{[1-q_m]\overline{g}e^{-x[\tau+h]}}{x}$. It then follows that

$$\overline{\mu}_t = \frac{[1-q_m]e^{-\delta t}}{x}\left\{\overline{g} - \beta + \delta + \overline{g}e^{-x[t-\tau-h]}\right\}$$

Since $\overline{g} > \beta$, $\overline{\mu}_t > 0$. Thus, conditions (17)-(19) and (21) are satisfied. Hence, $\{\overline{g}b_t\}_{t=\tau}^{\tau+h}$ belongs to an MPE.

Second, we show that neither $\{[\beta - \delta]b_t\}_{t=\tau}^{\tau+h}$ nor $\{0\}_{t=\tau}^{\tau+h}$ belong to an MPE. For the interior appropriation sequence we have that $\underline{\mu}_t = 0 = \overline{\mu}_t$. Thus, $\lambda(t) = [1 - q^m]e^{-\delta t}$ (by (18)), which is inconsistent with transversality condition (21). For the minimal appropriation sequence we have that $\dot{\lambda} = -\lambda\beta$ and $\lambda(\tau + h) = \lambda(0)e^{-\beta(\tau+h)}$ (by (18)). Condition (21) then implies $\lambda(0) = 0$. Replacing this in (17), it follows that $\underline{\mu}_t = -[1 - q^m]e^{-\delta t} < 0$, which contradicts (19).

Third, without loss of generality, we just need to show that neither the sequence $\{[\beta - \delta]b_t\}_{t=\tau}^{z}$ followed by $\{\overline{g}b_t\}_{t=z}^{\tau+h}$, nor the sequence $\{0\}_{t=\tau}^{z}$, $\{\overline{g}b_t\}_{t=z}^{\tau+h}$ belong to an MPE for any $z \in (\tau, \tau + h)$. In this case the scrap value function at time z is $S(z) = \int_z^{\tau+h}[1 - q^m]\overline{g}b_z e^{[\beta-2\overline{g}-\delta][t-z]}dt + e^{-\delta[\tau+h-z]}\alpha w/\delta$. Thus,

$$\lambda(z) = e^{-\delta z}\frac{\partial S(z)}{\partial b} = e^{-\delta z}\frac{\overline{g}[1-q^m]}{x}[1 - e^{-x[\tau+h-z]}] \tag{22}$$

For the first sequence we have that $\lambda(t) = [1 - q^m]e^{-\delta[t-z]}$ on $[\tau, z]$, which contradicts (22). For the second sequence we have that $\underline{\mu}(z) = \lambda(z) - [1 - q^m]e^{-\delta t}$. Since $\beta < \overline{g}$, (22) implies that $\lambda(z) < [1 - q^m]e^{-\delta t}$. Thus, $\underline{\mu}(z) < 0$ violating (19).

Next, we consider the time interval $[0, \tau)$. The transversality condition is

$$\lambda(\tau) = e^{-\delta\tau}\frac{\partial S(\tau)}{\partial b} = e^{-\delta\tau}[1 - q^m][1 - e^{-x h}]\frac{\overline{g}}{x} \tag{23}$$

First, we show that $\{\overline{g}b_t\}_{t=0}^{\tau}$ belongs to an MPE. In this case $\overline{\mu}_t = e^{-\delta t} - \lambda_t$ (by (17)) and $\dot{\lambda} = \lambda[2\overline{g} - \beta] - \overline{g}e^{-\delta t}$ (by (18)). Thus, $\lambda(t)$ is given by (20) replacing a by $2\overline{g} - \beta$, and d by $[1 - q^m]\overline{g}$. To obtain the constant Y in (20) we use (23). It then follows that $\overline{\mu}_t = e^{-\delta t}\frac{x-\overline{g}}{x} - \frac{\overline{g}e^{-x\tau}e^{[2\overline{g}-\beta]t}}{x}\left\{[1 - q^m][1 - e^{-xh}] - 1\right\}$. Since $\overline{g} > \beta$ and $q^m < 1$, the term in braces is negative, and $\overline{\mu}_t > 0$ for all t in $[0, \tau)$. Thus, (19) and (23) are satisfied.

Second, we show that neither $\{[\beta - \delta]b_t\}_{t=0}^{\tau}$ nor $\{0\}_{t=0}^{\tau}$ belong to an MPE. For the interior appropriation sequence we have that $\underline{\mu}_t = 0 = \overline{\mu}_t$. Thus, $\lambda(t) = [1 - q^m]e^{-\delta t}$ (by (??) and (18)), which is inconsistent with transversality condition (23). The sequence $\{0\}_{t=0}^{\tau}$ does not belong to a reform MPE because it induces a strictly increasing stock of fiscal asset, while a necessary condition for a reform to take place is $b(\tau) < b(0)$.

Third, without loss of generality, we just need to show that neither the sequence $\{[\beta - \delta]b_t\}_{t=0}^{z}$ followed by $\{\overline{g}b_t\}_{t=z}^{\tau}$, nor the sequence $\{0\}_{t=0}^{z}$ $\{\overline{g}b_t\}_{t=z}^{\tau}$ belong to an MPE for any $z \in (0,\tau)$. In this case the scrap value function at time z is $S(z) = \int_z^\tau \overline{g}b_t e^{-x[t-z]}dt + e^{-\delta\tau}\int_\tau^{\tau+h}[1-q^m]\overline{g}b_t e^{-xh}dt + e^{-\delta[\tau+h-z]}\alpha w/\delta$. Thus,

$$\lambda(z) = e^{-\delta z}\frac{\overline{g}}{x}\left\{[1-e^{-x[\tau-z]}] + [1-q^m][1-e^{-xh}]e^{-x[\tau-z]}\right\} \tag{24}$$

For the first sequence we have that $\lambda(t) = e^{-\delta t}$ on $[0,z]$, which is inconsistent with (24). To rule out the second sequence note that since $\overline{g} > \beta$, $q^m < 1$, and $\tau > z$, we have that $e^{\delta z}\lambda(z) < 1$. Thus, $\underline{\mu}(z) = \lambda(z) - e^{-\delta z} < 0$ and condition (19) would be violated for any $z \in [0,\tau)$.

II. Leader-Follower case ($\tau_i \neq \tau_j$). The proof that the follower sets $g^f(t) = \overline{g}b_t$ on $[0,\tau+h)$ follows the same steps as in the matching case. Consider now the Leader's problem on $[\tau,\tau+h)$. The optimality conditions are (17)-(19) and

$$\lambda(\tau+h) = \theta e^{-\delta[\tau+h]} \tag{25}$$

Since $g^f(t) = \overline{g}b_t$, Lemma 1 implies that the Leader will not choose the interior appropriation. Let us then check whether $\{\overline{g}b_t\}_{t=\tau}^{\tau+h}$ is optimal. In this case $\underline{\mu}_t = 0$ and $\overline{\mu}_t = [1-q^l]e^{-\delta t} - \lambda_t$ (by (17)) and $\dot{\lambda} = \lambda[2\overline{g}-\beta] - [1-q^l]\overline{g}e^{-\delta t}$ (by (18)). The general solution to this differential equation is (20). To determine the constant Y in (20) we use (25) to get $Y = \left[\theta - \frac{[1-q^l]\overline{g}}{x}\right]e^{-x(\tau+h)}$. It then follows that

$$x\overline{\mu}_t = [1-q^l][x-\overline{g}]e^{-\delta t} - (x\theta - [1-q^l]\overline{g})e^{[x-\delta]t}e^{-x[\tau+h]}, \qquad t \in [\tau,\tau+h) \tag{26}$$

Since $\overline{\mu}_t$ is strictly decreasing in t, $\overline{\mu}_t \geq 0$ on the entire interval $[\tau,\tau+h)$ if and only if $\theta \leq 1-q^l$. If this condition is not satisfied, first order condition (19) is violated on some subinterval $[\tau+h',\tau+h)$, where $h' \in [0,h)$ is defined in (10). Therefore, the Leader will set $g_t^l = \overline{g}b_t$ on $[\tau,\tau+h')$ and $g_t^l = 0$ on $[\tau+h',\tau+h)$.

Next, we solve the Leader's problem on $[0,\tau)$. Consider first the extreme case $g^l(t) = 0$ on $[\tau,\tau+h)$. The scrap value function is $S(\tau) = e^{-\delta(\tau+h)}[\theta b_\tau e^{(\beta-\overline{g})h} + w]$ and $\lambda(\tau) = \theta e^{-\delta\tau}e^{(\overline{g}-x)h}$. First, we show that $g^l(t) = \overline{g}b_t$ on $[0,\tau)$ satisfies (19). Following the same steps as before we obtain $\underline{\mu}_t = 0$ and

$$x\overline{\mu}_t = [x-\overline{g}]e^{-\delta t} - [x\theta e^{(\overline{g}-x)h} - \overline{g}]e^{[x-\delta]t}e^{-x\tau}, \qquad t \in [0,\tau) \tag{27}$$

Note that $\overline{\mu}_t \geq 0$ if and only if $e^{x(\tau-t)} \geq \frac{x\theta e^{(\overline{g}-x)h}-\overline{g}}{x-\overline{g}}$. Since $x > \overline{g} > 0$ and $\theta \leq 1$ this is always true. Second, we show that $g^l(t) = 0$ is not optimal for any t on $[0,\tau)$. In this case $\underline{\mu}_t = \lambda_t - e^{-\delta t}$ and $\dot{\lambda}_t = \lambda_t[\overline{g} - \beta]$. Thus, $\lambda_t = \lambda_\tau e^{[\overline{g}-\beta][t-\tau]}$ and $\underline{\mu}_t = [\theta e^{(\overline{g}-x)(\tau+h)}e^{(\beta-\overline{g})t} - 1]e^{-\delta t}$. Since $\beta < \overline{g} < x$, $\underline{\mu}_t < 0$ for all t on $[0,\tau)$. Therefore, if $g^l(t) = 0$ on $[\tau, \tau+h)$ the unique solution for the Leader's problem is $\{\overline{g}b_t\}_{t=0}^{\tau}$. In the less extreme cases where $g^l(t)$ is $\overline{g}b_t$ on $[\tau, \tau+h')$ and 0 on $[\tau+h', \tau+h)$ we have that λ_τ is smaller. Thus, if $g_t^l = \overline{g}b_t$, $\overline{\mu}_t > 0$; and if $g_t^l = 0$, $\underline{\mu}_t < 0$. Therefore, the Leader will unambiguously choose $\{\overline{g}b_t\}_{t=0}^{\tau}$. ‖

Proof of Lemma 3. In the general case the payoffs are given by

$$L(\tau) = \overline{g}b_0\left[\frac{1-e^{-x\tau}}{x} + (1-q^l)e^{-x\tau}\frac{1-e^{-xh'}}{x}\right] + e^{-x\tau}\theta b_0 e^{(\overline{g}-x)h}e^{-\overline{g}h'} + e^{-\delta(\tau+h)}w \quad (28)$$

$$F(\tau) = \overline{g}b_0\left[\frac{1-e^{-x\tau}}{x} + e^{-x\tau}\frac{1-e^{-xh'}}{x} + e^{-x(\tau+h')}\frac{1-e^{(\overline{g}-x)(h-h')}}{x-\overline{g}}\right] \quad (29)$$

$$M(\tau) = \overline{g}b_0\left[\frac{1-e^{-x\tau}}{x} + (1-q^m)e^{-x\tau}\frac{1-e^{-xh}}{x}\right] + e^{-\delta(\tau+h)}\alpha w \quad (30)$$

Parts (i) and (vi) are straightforward. To prove part (ii) note that $L'(\tau) = Ae^{-x\tau} - Be^{-\delta\tau}$, where $A = b_0\left[\overline{g}q^l(1-e^{-xh'}) + \overline{g}e^{-xh'} - x\theta e^{(\overline{g}-x)h}e^{-\overline{g}h'}\right]$ and $B = \delta w e^{-\delta h} > 0$. There are three cases to consider. First, $A \leq 0$. Trivially $L'(\tau) < 0$ for all τ. Second, $0 < A \leq B$. Since $x > \delta$, $Ae^{-x\tau} < Be^{-\delta\tau}$. Thus, $L'(\tau) < 0$ for all τ. Lastly, $A > B$. Since $x > \delta$, $L''(\tau) < -xL'(\tau) < 0$. Thus, $L'(\tau)$ falls until $L(\tau)$ reaches its maximum at some date $\hat{\tau}^l$. Therefore $L'(\tau)$ is positive for $\tau < \hat{\tau}^l$, and negative for $\tau > \hat{\tau}^l$. To prove (iii) note that $L(\tau) - F(\tau) = Ce^{-x\tau} + De^{-\delta\tau}$, where $C = b_0[-\overline{g}q^l e^{-x\tau}(1-e^{-xh'}) - \overline{g}xe^{-x(\tau+h')}\frac{1-e^{(\overline{g}-x)(h-h')}}{x-\overline{g}} + e^{-x\tau}x\theta b_0 e^{(\overline{g}-x)h}e^{-\overline{g}h'}]$ and $D = xe^{-\delta h}w > 0$. There are three cases two consider. First, $C \geq 0$. Trivially $L(\tau) > F(\tau)$ for all τ. Second, $C < 0$ and $-C < D$. Since $x > \delta$, $-Ce^{-x\tau} < De^{-\delta\tau}$. Thus, $L(\tau) > F(\tau)$ for all τ. Lastly, $C < 0$ and $-C \geq D$. Since $x > \delta$, $L'(\tau) - F'(\tau) > -x[L(\tau) - F(\tau)] \geq 0$. In this case $L(0) \leq F(0)$. Thus, as long as $L(\tau) \leq F(\tau)$, $L(\tau)' > F'(\tau)$. Therefore, there exists a unique reform date when both functions cross. Part (iv) is a corollary to (i) and (iii). Since $L'(\tau) - F'(\tau) > -x[L(\tau) - F(\tau)]$, we have that $L(\tau) \leq F(\tau)$ implies $L'(\tau) > F'(\tau)$. Furthermore, since $F'(\tau) > 0$ by (i), $L(\tau) \leq F(\tau)$ implies $L'(\tau) > 0$. Lastly, to prove (v) note that $M(\tau) - L(\tau) = Ee^{-x\tau} - Ge^{-\delta\tau}$, where $E = \overline{g}b_0\left[(1-q^m)\frac{1-e^{-xh}}{x} - (1-q^l)\frac{1-e^{-xh'}}{x}\right] - \theta b_0 e^{(\overline{g}-x)h}e^{-\overline{g}h'}$ and $G = e^{-\delta h}[1-\alpha]w > 0$. The rest of the proof follows the same steps as (iii).

Proof of Proposition 1. Consider the case $\tau^{fl} < \tau^{fm}$, which corresponds to Figure 1. To check that $\phi^{fl}(b)$ is a best response to itself, note first that it is a dominant strategy not to preempt before b hits b^{fl}. For any $b'' > b^{fl}$, by attacking, a group gets either $M(\tau(b''))$ or $L(\tau(b''))$ depending on whether or not the other group attacks. By not attacking, a group can insure for itself at least $F(\tau(b^{fl})) > F(\tau(b'')) > \max[L(\tau(b'')), M(\tau(b''))]$. Second, consider $b = b^{fl}$. If group i attacks at $\tau(b^{fl})^-$ it gets $L(\tau(b^{fl}))$; if not, then j will attack at $\tau(b^{fl})^+$, and i will get $F(\tau(b^{fl}))$. Since $L(\tau(b^{fl})) = F(\tau(b^{fl}))$, group i has no incentives to deviate from ϕ^{fl}. Since $M(\tau(b^{fl})) < F(\tau(b^{fl}))$, it is optimal for j not to attack at $\tau(b^{fl})$. Third, we consider what happens off the equilibrium path. For $b \in (b^{fm}, b^{fl})$, Lemma 3 implies that $L(\tau(b)) > F(\tau(b)) > M(\tau(b))$. Thus, if there has not been a reform yet, the group whose turn it is to move will incur the costs of becoming the Leader. For $b \leq b^{fm}$ we have that $L(\tau(b)) > M(\tau(b)) \geq F(\tau(b))$. Thus, if there has not been a attack yet, both groups will incur the costs of destroying the power of the other.

To show that there are no other equilibria in this case, suppose that the attacking strategy instructs groups to attack when b hits $b' < b^{fl}$. The payoff to j would be $\max[F(\tau(b')), M(\tau(b'))]$. By preempting at $\tau(b') - \varepsilon$, group j could get $L(\tau(b') - \varepsilon)$ which is greater than $\max[F(\tau(b')), M(\tau(b'))]$ by Lemma 3. Thus, reform cannot occur for any $b < b^{fl}$. To show that reform cannot occur for any $b > b^{fl}$ recall that it is a dominant strategy not to incur any cost for any $b > b^{fl}$. Hence, we conclude that if $\tau^{fl} \leq \tau^{fm}$, an attack can only occur when b hits b^{fl}. Using the same argument, it is straightforward to show that in the case $\tau^{fl} > \tau^{fm}$ the strategy ϕ^m is a best response to itself, and that there are no other reform equilibria.‖

Proof of Proposition 2. In a non-reform equilibrium the first order conditions of a group are (17)-(19), and the transversality condition is

$$\lim_{s \to \infty} \lambda_s b_s = 0 \tag{31}$$

To find the non-reform MPEs, we just need to consider sequences that contain the interior, minimal and maximal appropriation pairs, and check whether they satisfy (14), (19), and (31). First, we show that the sequence $\{0,0\}_{s=t}^{T}$ followed by $\{[\beta - \delta]b_s, [\beta - \delta]b_s\}_{s=T}^{\infty}$, for any $T \in [0, \infty)$, satisfies (19) and (31) if and only if $\delta < \beta$. The second subsequence satisfies

(19) because $\underline{\mu}(t) = \overline{\mu}(t) = 0$ for all t. Since $\lambda(t) = e^{-\delta t}$ and $b(t) = b(0)e^{(2\delta-\beta)t}$, (31) is satisfied if and only if $\beta > \delta$. The payoff of the continuation game at time T is $e^{-\delta z}b(T)$. Thus, the transversality condition at time T is $\lambda(T) = \frac{\partial e^{-\delta z}b(T)}{\partial b} = e^{-\delta T}$. It follows that on $[0,T)$ $\lambda(t) = e^{(\beta-\delta)T}e^{-\beta t}$ and $\underline{\mu}(t) = e^{(\beta-\delta)T}e^{-\beta t} - e^{-\delta t}$, which is positive if and only if $\beta \geq \delta$. Thus, $\{0\}_{s=t}^{T}$ satisfies (19) if and only if $\beta \geq \delta$. Second, we show that (14) is satisfied if and only if (i) $b(0) \geq D(0)$ and (ii) $\beta \leq 2\delta$. Since the payoff to each group is $N(t) = b(t)e^{\beta(T-t)}e^{-\delta T}$, $N(0) \geq b(0)$. Thus, if (i) is satisfied, there are no unilateral profitable deviations at time 0. Furthermore, $b(t) > b(0)$ and $N(0) \geq D(0)$ imply that $N(t) > D(t)$. Since $b(t)$ is increasing when $\beta \leq 2\delta$, conditions (i) and (ii) are sufficient for (14). To show that they are necessary note that if (i) were violated, there would be a deviation at time 0. If $\beta < 2\delta$, $b(t)$ would be strictly declining. Hence, (14) must be violated.

Third, we show that the appropriation sequences $\{0\}_{s=t}^{\infty}$ and $\{\overline{g}b(s)\}_{s=t}^{\infty}$ do not belong to a non-reform MPE. In the first case $b(t) = b(0)e^{\beta t}$, $\lambda(t) = \lambda(0)e^{-\beta t}$ and $\underline{\mu}(t) = \lambda(t) - e^{-\delta t}$. Thus, (31) is violated because $\lambda(t)b(t) = \lambda(0)b(0) \neq 0$. In the second case $b(t)$ is strictly decreasing ($b(t) = b(0)e^{(\beta-2\overline{g})t}$). Thus, (14) must be violated. Fourth, we show that $\{\overline{g}b(s)\}_{s=t}^{T}$ followed by $\{[\beta-\delta]b_s\}_{s=T}^{\infty}$ for any $T \geq 0$ cannot belong to an non-reform MPE. The costate variable $\lambda(t)$ on $[0,T)$ is given by (20). To derive the constant Y we use the transversality condition $\lambda(T) = e^{-\delta T}$. It follows that $Y = \left[1 - \frac{\overline{g}}{x}\right] e^{-xT}$. Consequently, $\overline{\mu}(t) = e^{-\delta t} - \lambda(t) = \left[1 - \frac{\overline{g}}{x}\right]\left[1 - e^{[x](t-T]}\right] e^{-\delta t}$. Since $x > \overline{g}$ and $t < T$, $\overline{\mu}(t) < 0$. Thus, (19) is violated. Lastly, using the same argument we can rule out the remaining possibility: $\{\overline{g}b(s)\}_{s=0}^{T}$, $\{0\}_{s=T}^{T'}$, $\{[\beta-\delta]b_s\}_{s=T'}^{\infty}$. ‖

6.1 Data Appendix

Our data set contains 76 countries for the period 1965-1995. In order to construct the reform and crisis indexes we used the World Development Indicators CD-ROM (1997) for the period 1970–1995, and the STARS CD-ROM for 1965-1970. The International Financial Statistics were used to obtain missing data for: Botswana, Central Africa Republic, Ethiopia, Mali, Myanmar, Tanzania, Tunisia and Uganda. For the political change index we use the Polity III index of abrupt political change. If in this index there is a sequence

of high-numbered cells (no smaller than 3 in absolute value) separated by no more than two low-numbered or empty cells, we code the political change as taking place only during the year with the biggest change in absolute value.

We used a counting algorithm that (i) allows us to count the number of reforms, crises and political changes independently of each other, and that (ii) does not count a crisis or a political change twice. First, we place an R in the country-years where a reform has taken place. We just allow reform in a given country to take place once. Second, we place a C and/or P in the cell that contains R, if there was a crisis and/or political change within a 5-year window from the reform. Third, we proceed backwards and merge the remaining Ps and Cs using the same rule, and counting each P and C only once. Fourth, in countries where there has been no reform, we merge the Ps and Cs using the same rule starting in 1991. We did not count crises nor political changes that occurred during the period 1992-1995 because given the long lags in policy implementation, we should not expect a trade reform to take place before 1995. Also, we did not count the crises that are followed by missing observations of the reform index, nor reforms that were preceded by missing observations of the crises index.

After merging the indexes, we construct a reform series by stacking each country's indexes. The element that corresponds to country i and year j is equal to one if the corresponding cell contains an R during year j; it is zero otherwise. We construct crisis and political change series in the same way. Using these series we perform chi-square independence tests and run probit regressions.

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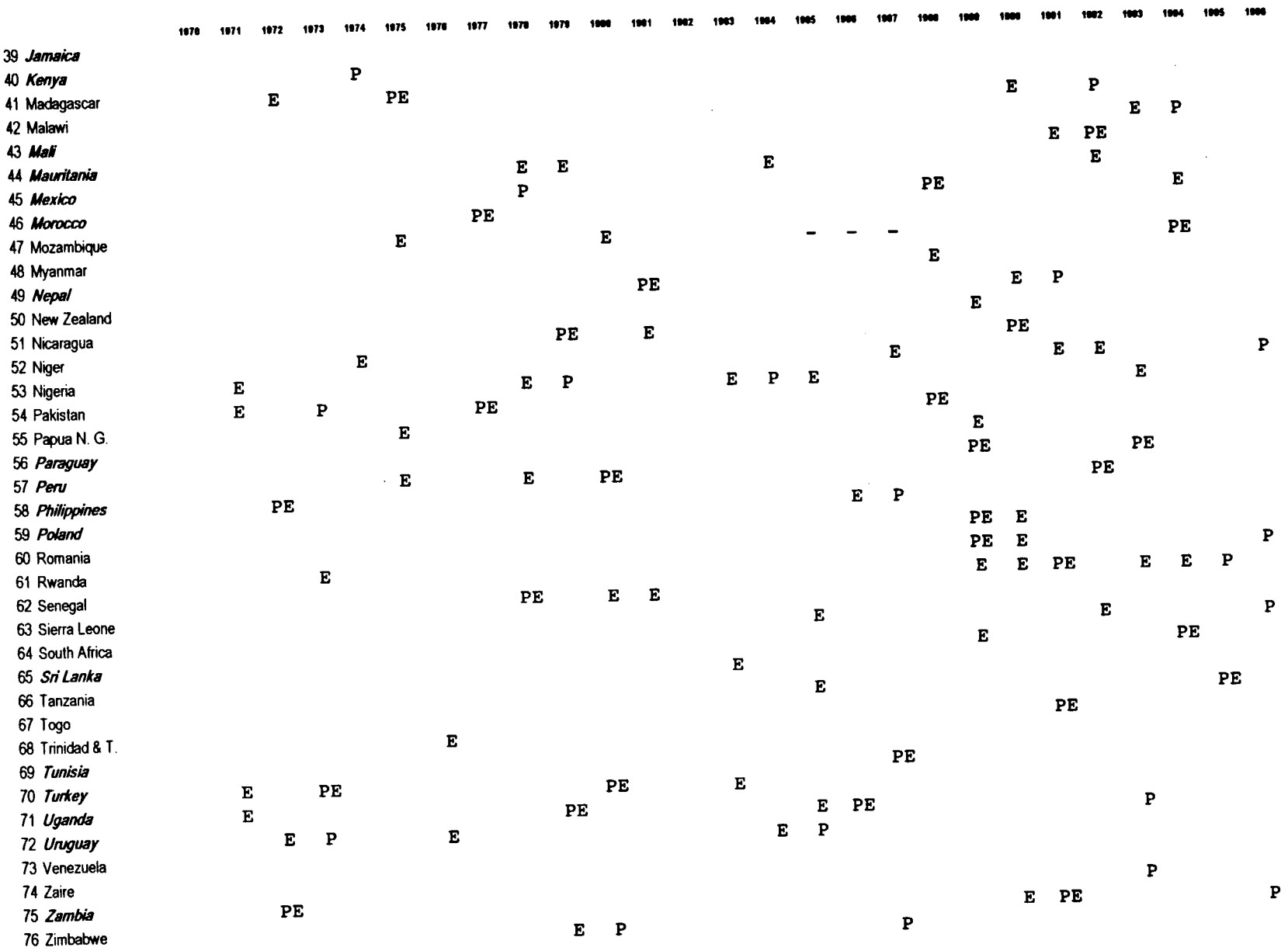
Table A1. Indexes of Reform (R), Economic Crisis (C) and Drastic Political Change (P)

		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	Albania	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P	–	–	–	–	P
2	Algeria	–																									P	
3	*Argentina*						C	P							P					C			R					
4	Bangladesh	–	–	C		P								P									P					
5	Benin	–	–	–	–	–	–	–	–	–	–	–	–	–	C	–	–	–	–	–	–	–	P	–	–		–	
6	*Bolivia*											C		PC		C	R											
7	*Botswana*										R															–	–	
8	*Brazil*					P											P			C		C	R	C				
9	*Bulgaria*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	PC	R	–	–	–	–	
10	Burkina Faso											P			C													
11	Burundi																							P				P
12	Cameroon																							–		C		
13	C. African R.														C										P	–	–	
14	Chad	–	–	–	–	–	–	–	–	P	–	–	–	–	–	–	P											P
15	*Chile*			C	P		C	R							C							P						
16	China	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–									
17	*Colombia*																	R										
18	Congo																						P			C	–	
19	*Costa Rica*												C					R										
20	Cote d'Ivoire														C											C		
21	Dominican Rep									P						C				C								
22	*Ecuador*										P				C								R					
23	Egypt																											
24	*El Salvador*										P					P					R							
25	Ethiopia					P																	P	C				
26	Gabon									C												P				C		
27	*Gambia*														C		R	C								C		
28	*Ghana*			P									PC		C		R						P				C	
29	*Guatemala*			–		P											P			R		C					–	P
30	*Guinea*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	R	–	–	–	–	–	–	–	–	–	
31	*Guinea-B.*	–	–	–	–	–	–	–	–	–	–	C	–	–	–	–	–	–	R	–						P	C	
32	*Guyana*											P		C						R	C			P	–	–	–	
33	Haiti																							PC				
34	Honduras													P								C						
35	*Hungary*	–	–	–	–	–	–	–	–													PR						
36	*India*																									R		
37	*Indonesia*	R																										
38	*Israel*															C	R											
39	*Jamaica*																C				R		C			–	–	
40	*Kenya*					P																			CR			
41	Madagascar						P																	P				
42	Malawi	–	–	–	–	–	–	–	–	–	–	–	–													PC	–	
43	*Mali*														C					R				P	–	–	–	
44	*Mauritania*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–						R		–	–	
45	*Mexico*									P					C			R		P							C	
46	*Morocco*								P							R												
47	Mozambique	–	–	–	–	–	–	–	–	–	–	–	–	–	C	–	–	–	–	C						P		
48	Myanmar																											
49	*Nepal*												P										PR					

		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
50	New Zealand										P			C		C						P					
51	Nicaragua																	C						C				P
52	Niger										P					P												
53	Nigeria				P				P											P								
54	Pakistan																										–	
55	Papua N. G.	–	–	–	–	–	–	–									C				PR				P			
56	*Paraguay*											P			C					C			R	P				
57	*Peru*			P												C			P	R								
58	*Philippines*																				PC	R						
59	*Poland*	–	–	–	–	–	–	–	–	–	–	–	–	C														
60	Romania	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P	–	–	–	–	–	–	P
61	Rwanda																						P			C	P	
62	Senegal									P																		
63	Sierra Leone														C								C					P
64	South Africa																									P		
65	*Sri Lanka*																						R					
66	Tanzania															C		C						C			P	
67	Togo														C								P		C	–	–	
68	Trinidad & T																	C										
69	*Tunisia*																		P		R							
70	*Turkey*			C	P							P									R							
71	*Uganda*	–	–	–	–	–	–	–	–	–	P	–	C		C			P	C	R	C		C		P			
72	*Uruguay*			C	P										C		P					R						
73	Venezuela																				C							
74	Zaire							C								C							C		P	C		
75	*Zambia*			P											C			C			C		P		R			P
76	Zimbabwe											P							P									
	Specifications																											
	R: dXMY by 7%																											
	dinflation by 125%																											
	dper capita GNP$ by -18%																											
	Inflation Cutoff: 40%																											
	5 year window																											

Table A2. Indexes of Drastic Political Change: Polity III index (P), Europa Yearbook Index (E)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1 Albania																E						PE	E				P
2 Algeria																				E			E	E		P	
3 *Argentina*							PE						E	PE													
4 Bangladesh		E	E		P	E			E				PE								E	PE					
5 Benin			E																		E	P					
6 *Bolivia*		E							E		E	E	PE														
7 *Botswana*																											
8 *Brazil*					P										E	P											
9 *Bulgaria*																				E	PE						
10 Burkina Faso					E						PE		E	E				E				E					
11 Burundi							E											E					P	E			P
12 Cameroon																											
13 C. African R.										E		E												PE			
14 Chad						E			PE		E		E	E		P	E	E		E	E	E	E				P
15 *Chile*				PE																E	P						
16 China											E																
17 *Colombia*																											
18 Congo																						PE					
19 *Costa Rica*																											
20 Cote d'Ivoire																								E			
21 Dominican Rep									PE																		
22 *Ecuador*	E		E				E	E		P																	
23 Egypt																											
24 *El Salvador*										PE		E	E	E	P						E				E		
25 Ethiopia					PE								E	E	E	E	E	E	E	E	E	P				E	
26 Gabon																					PE						
27 *Gambia*																									PE		
28 *Ghana*			PE						E			PE										P	E				
29 *Guatemala*					P								E			PE								E		E	P
30 *Guinea*															E									E			
31 *Guinea-B.*				E							E											E	E		P		
32 *Guyana*											PE												PE				
33 Haiti																	E	E	E		E	E	P		E		
34 Honduras			E			E			E				P		E		E										
35 *Hungary*																				E	P						
36 *India*																					E						
37 *Indonesia*																											
38 *Israel*				E																							


1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
39 Jamaica
40 Kenya
41 Madagascar
42 Malawi
43 Mali
44 Mauritania
45 Mexico
46 Morocco
47 Mozambique
48 Myanmar
49 Nepal
50 New Zealand
51 Nicaragua
52 Niger
53 Nigeria
54 Pakistan
55 Papua N. G.
56 Paraguay
57 Peru
58 Philippines
59 Poland
60 Romania
61 Rwanda
62 Senegal
63 Sierra Leone
64 South Africa
65 Sri Lanka
66 Tanzania
67 Togo
68 Trinidad & T.
69 Tunisia
70 Turkey
71 Uganda
72 Uruguay
73 Venezuela
74 Zaire
75 Zambia
76 Zimbabwe