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THE NEW MODERNIZATION THEORY:
A POLITICO-ECONOMIC THEORY OF TRANSITION

By

Prateek Goorha

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Approved:	Date:
W J Booth	March 13, 2003
Jan Lee Ray	March 13, 2003
Kathryn B. Anderson	March 13, 2003
Bradley L. Palmquist	March 13, 2003
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To My Wife Tatiana

&

For Valini and Anisha

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PREFACE

Background

Modernization theory suggests that democracy emerges endogenously as countries progress in their economic status – as measured by indicator variables such as income per head, gross income and the standard battery of infrastructure and education type variables that distinguish a developed country from a developing one. It is easy to see the charm in modernization theory and why it is every researcher's dream come true for it is able to identify and endogenize a relevant variable of interest providing a powerful causal explanation. We know, of course, that this rarely occurs in the study of social concepts where nothing ever has straightforward explanations, and the world is riddled with complex interactions and causal heterogeneity. In fact, if Seymour Martin Lipset is attributed the credit of developing modernization theory, he himself did not mean it to be a *complete* explanation in this sense. (Lipset, 1959) He allowed for exogenous events having affects, and, also, quite clearly made the distinction between an explanation for democratization versus consolidation of the democratic regime thereafter.

Since 1959 much has been learnt regarding democratization (or, generally, political regime transition) and economic growth and development that either gently questions or even seriously impinges on the validity of modernization theory. Quite crucially, Przeworski and Limongi (1997) have famously suggested that democratization is instead exogenous to economic development and that, even so, the relationship between the probability of democratization (or the fall of a dictatorship regime) in per capita income is curvilinear. So while there does appear to be a strong relationship between the incidence of democracy and economic income, the reason this relationship appears primary is because democracies are simply more likely to survive as per capita income progresses. As modernization theory would have it, development therefore does

not seem to be of first-order significance. Democracy as a political organizational metastructure necessary to manage a society made increasingly complex through development is not the only explanation. Alternative explanations for the observed relationship abound.

On the question of whether this reasoning conclusively eradicates the notion of endogenous democratization, some doubt might still linger especially when one notes the continuing debate over identifying sources of growth in the economic growth and development literature. For successful growth, everything from human capital and infrastructure to geography and demography has been identified as being crucial. A feeble consensus has indeed developed for a basic set of factors, but, obviously, not close to a final list of factors has emerged yet. If this is the case, it seems green to refuse an endogenous explanation for democratization as a possibility. Recently, Easterly and Levine (2002) have argued that the most important factor in explaining economic development appears to be stable institutions and that good geography and good climate are only intervening variables. They go so far as to suggest that it is not even the policies that the country adopts that matters as much as the stability of institutions. If good policies matter, for them it is through these stable institutions. If then, the formation of stable institutions is uncorrelated with political regime, then growth might be equally likely in democracies and non-democracies. However, if the formation of stable institutions rests on factors that are relevant independent variables in explaining the democratization process, then an endogenous explanation for regime change would in fact exist.

In this project I am not trying to single-handedly revive modernization theory back to the leading explanation for democratization through development. Rather I am proffering some reasons why we cannot entirely ignore an endogenous explanation for democratization altogether simply because we have strong empirical evidence, which suggests that there exist

exceptions to the simple linear process of democratization through economic growth that modernization theory suggests.

Generally, here I am suggesting the pivotal role of credibility capital that helps to tie in the economic and political spheres in a single process that then allows parametric changes to have tractable effects. Start from the premise that in order to pull off successful economic reform, credibility capital is required by potential investors in the politicians. Credibility can be accumulated in a number of ways as I shall elaborate on below, but the fact that politicians can build up credibility capital slowly, for lack of a better term, proceduralizes political and economic change. That stable institutions are the most important factor for growth is unsurprising if the hallmark of stable institutions is that they are credibly committed to their own future and are thus not likely to renege on their contractual obligations to the detriment of those that seek their assistance. Think of banks or insurance firms that depend on continued business from their customers and thus must credibly commit on being viable long-term operations. Even their buildings signal this message via thick columns that represent stability and skyscrapers that represent wealth and permanence.

As we are accustomed to understanding it, political regime transition is a staccato process. Switching from an authoritarian regime to a democratic regime in pure form requires Herculean changes in all aspects of social, political and economic life. I find this even more incredulous than the notion that a firm traded on the stock exchange is worth four times as much if its stock price quadruples overnight when its fundamentals remain essentially unchanged. I am of course not alone in feeling uncomfortable about this as is evidenced by the large literature on the subtypes of regimes and the analyses of regimes in transition. However, modernization theory clearly implies this and, if for no other reason than for this alone, it deserves more careful attention and even skepticism.

Why Credibility?

The emphasis on credibility is therefore in no small measure also a means of critically assessing the development and aftermath of that very climacteric event, which causes a shift in political regime and thus makes the entire process much smoother in our understanding. And this emphasis on credibility is not new nor is it unfounded. Scholars in development economics have long recognized its importance as a tool to enable economic reform. In macroeconomic growth theory and political science it has been studied in relation to central bank independence and stabilization and, relatedly, in comparative politics it has been considered crucial in wage bargaining. Credible commitments to party platforms has been a well studied issue in political science in relation to everything from roll-call voting behavior to convergence properties in multidimensional spatial voting models. In international relations, credible commitments have been studied in relation to deterrence theory and the ability of political actors to make agreements at the international level in a two-level game with non-trivial national politics.

Here I simply step back and look at the larger picture and find that the concepts of credible commitments (and the accumulation of credibility capital in a dynamic setting) indeed provides a convenient piece of the puzzle that gives a picture of political and economic transitions.

Maintaining some minimum credibility level by the politician can be seen as a threat point for revolt by the population or constituency, which in turn, has been related to recent theories of politico-economic transition like Acemoglu and Robinson (2001). In this project a manageable application of this point is shown in Chapter Three in relation to federalism in Russia. There I emphasize that the amorphous nature of credibility capital accumulation can be studied more rigorously if we recognize that credibility capital is a public good with all of its inherent

traditional problems of joint supply and individual demand. I also show in Chapter Two that analyzes political motivation, how it might be plausible that economic growth and a lucrative private sector can automatically generate a political sector that has more honest and credible politicians. These two applications, I hope will convince the reader that credibility is indeed a pervasive concept in economic and political life, and, moreover, has immediate ramifications on economic growth. It should then be less of a concern that it plays an important role in my thinking of politico-economic transition later on.

Here note that I realize that the simple concept of credibility is not panacea for a complete revision of the old modernization theory. In the economic analysis of convergence in economic income across countries as well as in the development economics literature, it has been suggested how countries can fail to converge even in the long run to the group of developed countries with higher income. A stable equilibrium can result with countries stuck with low income through political leaders that lack enough credibility to pull off a successful reform in an open economy where capital seeks its best risk-adjusted reward in the global economy. But a credibility-based explanation does not clearly suggest how the leader decides to undertake reform in the first place and build up credibility. I provide little hard theory and evidence here by way of an explanation for sorting out when a political leader suddenly decides or is persuaded to start accumulating more credibility. My explanation for this initial stage is couched in the evolutionary game theoretic model I employ, which assumes that a political leader can improve his or her long term fitness by learning that it pays to remain closer to the median voter's desired position. The politician – better seen as having infinite life or a party for that matter – even learns the approximate position he should locate himself in on the issue space to remain competitive or successful. Doing so automatically awards him with credibility. However, I cannot count out the

affects of exogenous events such as an IMF imposed reform package on the ailing autarkic (and possibly autocratic) country in increasing the responsiveness of the political elite in the first place.

Yet I am certain that I have not convinced many of my readers that credibility is of first-order significance to a new modernization theory of political regime transition and economic growth. The intangible nature of the concept naturally instigates raised eyebrows. To open the reader's mind to the possibility of revisiting modernization theory from this different perspective I wish to introduce the idea of a weightless economy.

Credibility Capital is Weightless too

The "weightless economy" is a recent construct invented to bring the explanans of economic growth theory into the information age. It is an especially well-networked economy based on knowledge capital composed of weightless factors such as information technology, intellectual capital, electronic information and the like. While some authors, e.g. Shapiro and Varian (1998) argue that the information economy is not unique in that it is in fact governed by standard economic theory dealing with physical capital, the weightless economy concept is nevertheless useful in recognizing the distinct impact that largely invisible products have on the shape and size of an economy. The weightless economy is less bounded by culture and boundary and is becoming a larger part of the total size of economies – from the US to India. Quah (1998)

All products of the weightless economy are "knowledge products" that, in a not very abstract sense, can be represented as bit strings. So it is in the weightless economy where the intangible, though perhaps most crucial factor in economic growth, knowledge capital has maximum effect. Similarly, it is my view that credibility capital too is an integral part of the weightless economy. It is weightless just as much as is knowledge capital and is, in essence, unbound by culture. And larger economies are considered to be more credible too. Also if we allow knowledge capital to be

the principal economic input into the weightless economy, it is credibility capital that is the principal political input. For without institutions that employ their credibility capital in guaranteeing ownership of the knowledge product and subsequent right to the income stream it produces, the weightless economy would fail to grow. If a weightless economy can grow independently of physical economies, it would thrive in North Korea and Cuba to the same extent as it does in the US or Germany. Credibility capital determines political risk and risk in any form dictates where capital (in any form) is employed.

Some Stylized facts

Which Empirical Patterns?

Before we proceed, it would be instructive to first get a picture of the empirical patterns that need explaining. By empirical patterns I am referring to a simple illustration of the data concerning economic growth and development and political regime transition. I will return to this aspect in more detail below in a chapter that explicitly discusses the literature in the field of economic growth that deals with the analysis of whether or not the data on countries display any convergence in economic income per capita over time.

Here, note that I believe that a theoretical contribution to the politico-economic transitions literature ought to address established facts – empirical or theoretical – at two levels. The first, which can be labeled "macro evidence", would deal, in more abstract terms, with empirical patterns and theoretical contributions that relate to economic income and development and political regime transitions across countries and time. The second, would then deal with theory and evidence at a lower level of aggregation, or "micro evidence", and would concern, for instance, process mechanisms of transitions of political regimes or covariates of economic income.

Long Term Dynamics

In this introduction, I would like to present a finding that has been one of the key motivations for this project from the start. This is the established finding of non-convergence in economic income on the one hand, and a concomitant finding related to political regime transitions on the other.

The theory of convergence in economic income is hotly debated in economics. It is surely interesting to know that the long-term growth path of the economic income of each and every country in the world, after controlling for some identifiable factors, is unique. The policy implications of such research are of course enormous. However, in a series of articles Professor Danny Quah of the London School of Economics (1993 and 1996) suggests why the extant data does not necessarily support this notion of convergence. His argument is that convergence in the sense of a collapse of the cross-sectional distribution of all countries' economic incomes is a statistical artifact arising from drawing temporal conclusions from cross-sectional data. It might well be that the data is suggesting a replication of a stationary distribution instead. In fact, in a cross-sectional regression of growth in income during the period of time in the dataset on initial income and a constant, the coefficient on the earlier time period will always be less negative. Since this is true even if variance actually increases over time, a negative coefficient cannot possibly imply, in any meaningful sense, eventual convergence of incomes.

Quah instead uses Markov transition probabilities to study the dynamics of income distributions over time for the world and finds that there seems to be a divergence instead. Two groups of countries seem to be forming in the limit. One group of high-income countries and another of low-income countries. The middle of the distribution seems to be vanishing. This is an interesting result. As I discuss in Chapter Four below, scholars in the field of economic

development have recognized this in terms of countries not being able to make credible commitments to reform and being stuck with an underperforming economy. Rodrik (1992) even speaks about two equilibria that can result with some governments being able to reform their economies by credibly signaling their intention of doing so to investors while others either not being able to signal their intention of committing to reforms or reversing reforms altogether. The concept of time-consistency among politicians is, in this sense, also therefore related to this idea.

However, note that we can study political regimes in a similar fashion. We simply have a different terminology for this. At the risk of waving my hands a little here, instead of convergence, we like to call it the "End of History" and, recognizing a replicating stationary distribution, we have found waves of democracy. This is also some convincing evidence that leads me to believe that a similar dynamic is in operation with polities as with economies. Using the Polity III dataset for political regime classification, I have computed Markov transition probabilities for political regimes. Tables one and two in the appendix present those results. The interpretation is simple with the row values representing the initial level of democracy in the cross-section and the columns representing the final levels. Table one uses democracy scores alone while table two employs the usual net democracy measure by subtracting autocratic scores from the democratic scores for a given country.

Looking at both tables, the first aspect that is striking is the relative inertia in regime transition. None of the off-diagonal probabilities are near as close to the shaded diagonal probabilities, which represent an absence of change in the regime. Table One presents transition probabilities for the entire Polity dataset including countries for which the length of observations is rather small and also those that no longer exist. This might cause some bias even if the direction of the bias itself might be unclear. The second table presents the augmented institutional democracy

score and includes 44 countries for which a particularly long time period exists. I take that to be greater than 140 years.

More important is the observation that there is evidence of nonconvergence similar to what has been found with respect to economic income of countries by economic growth theorists. Note in table one that countries that start below a democracy score of six appear to be slightly more likely to turn less democratic at the end of the series and for countries that start with a higher score tend to achieve even higher levels of democracy. This result is rather counterintuitive and we have a tendency to dismiss it, if nothing else, than simply on the small size of the probability of this happening. However, this finding appears to be rather robust.

Table Two reports results for countries only with longer data series in hope that convergence to higher democracy levels might be a longer-term dynamic. There are 44 countries from nearly all regions of the world each with more than 140 years of observations. Indications of nonconvergence in political regime still exist. Nevertheless since the table itself estimates some 361 values we could perhaps doubt the efficiency of the results. Therefore finally, in Figure One in the appendix, I present simple histograms that plot the Polity democracy scores for countries. Again we find a strong indication of nonconvergence, especially if we compare the pre-War to the post-War graph.

This concomitant nonconvergence dynamic especially in a steady state equilibrium sense for political regimes and economic income is not explicitly explained by any current theory of political transition and development in political science. This is a significant problem. Yet, I believe that this is not as large a lacuna as it might seem because we do indeed have the necessary elements in the extant literature and all that is needed is a proper synthesis. I will provide this in the form of my theory of politico-economic transitions in Chapter Five.

In Chapter One, however, I start by elaborating on the components of the evolutionary theory of transition I present in this project. Here I outline most of the micro evidence that needs to be incorporated by the theory. Robust findings relating to democratization are almost as few as there are findings relating to economic growth. There is therefore no excuse for any theory of politico-economic transition to not be able to provide an explanation for them.

Consider a popular basis for some proposed theories of political transition, namely that there exists a relationship (that is now almost universally modeled as simultaneous) between lower levels of democracy and higher levels of income inequality, but that one does not cause the other and that the relationship is spurious and that the intervening variable is socioeconomic development. (see Bollen and Jackman, 1985 for example) But surely to argue that political regimes have little to do directly with a demographic variable as important as income equality cannot be justifiable, especially when it is granted almost unanimously by transition scholars in political science that class power is a variable of first-order importance. This problem is recognized by Acemoglu and Robinson (2001), but they end up with a theory that has almost a separate dynamic for explaining parametric transitions to democracies in terms of inherent threat constraints in non-democracies and to non-democracies in terms of distributional conflicts in democracies. The problem is of course the lack of a simple unified theoretical construct that merges economic and political transitions. In this project I provide this construct and what results are the first steps towards a revised Modernization Theory.

CHAPTER I

THE NEW MODERNIZATION THEORY: A THEORY OF POLITICO-ECONOMIC TRANSITIONS

Introduction

The intent of this chapter is to provide a primer for this project. The project itself seeks to make a contribution to the literature on modernization as defined by its two major dimensions – regime change (or democratization) and economic growth (or economic reform). It does so by providing an overarching theoretical frame for, if not a unified theory of, politico-economic transitions with specific emphasis on explaining a number facts simultaneously that have been established in political science and economics and are routinely ignored by most analyses in either field alone.[1] By not assuming these facts within the theory's structure itself, the theory I propose can legitimately claim to use these established observations in the economic growth and economic reform literatures and in the democratization and modernization literatures as benchmarks for its validity. While this vastly simplifies my task in that the theory has a number of general hypotheses that have been rigorously tested before, the arduous nature of my task lies in the fact that, first, the new theory of modernization (which henceforth I call a theory of politico-economic transitions) must incorporate all these observations seamlessly and in an intuitive manner and, second, I must devise a test for the degree of model fit.

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[1] Notable exceptions to this include research done in the relatively unknown "Italian School" of political economics. See Persson and Tabellini (2000) and Acemoglu and Robinson (2001) for notable examples. In political science this kind of new modernization "theory" has been missing though an ingenious if loose example is Quinn and Woolley (2001). I call this example a loose one since it bases the theory on a new assumption instead (namely the preference of voters for stable economic growth that incumbents in democracies can deliver), rather than explaining the extant established facts.

The theory to be presented generally deals with the idea of credibility as collectable capital much like physical capital or perhaps even more like knowledge capital, also known as "weightless" capital. I will note how credibility can mean different things for the political game relevant for regime change and for the economic game relevant for economic growth through reform. This is a key distinction and I will return to it below. Nevertheless, the robustness of the importance of credibility will be rigorously established for both aspects of modernization in separate chapters – one on the political game and one on the economic reform game – since it plays a major role in the general theory on politico-economic transitions I intend to present. The general theory itself uses an evolutionary game-theoretic approach with rational learning strategies substituted for genetic functions that determine the chances of survival for a country in transition. A caveat is in order early on. The "evolutionary" logic employed is simply a formal construct that proves to be very adept at explaining several established facts and has little or nothing to do with a deterministic biological evolution where some countries are seen as destined to greatness and others to mediocrity.

I first turn to where I can see this project making a significant marginal contribution to the extant research.

The State of the Modernization Literature

Mainwaring once said that the study of democratization is a growth industry and Przeworski and Limongi (1997) aver that no other topic is as important to its subfield within political science as regime transition is to comparative politics. Therefore, it is only a befitting fact that fully

seventeen political science journals have had special editions and symposia related to this topic since 1990 alone.[2]

There is good reason for this flattering attention. The study of democratization is inextricably linked with a concomitant emphasis on the relevance of economic growth defined broadly as improvements in socioeconomic conditions across groups at the subnational level and also economic income at both the national and the international levels. The irrevocable nature of the link between regime change and economic growth – that we have suspected since the 1950s – has led us to invent the concept of modernization. While very often democratization and economic transition or growth are studied in isolation, the underlying connection between the two is either assumed or implied. The rapid "dual transitions" of many post-Soviet countries in the late 1980s and the 1990s has renewed interest in this link and, generally, in the study of modernization.[3]

Przeworski and Limongi (1997) argue that modernization is an explanation that endogenizes democratization in economic development as Lipset's seminal work in the late 1950s and early 1960s had suggested. If this is true, then even if we see democracies emerging because of wars, decolonization, death of dictators, etc. democracies should be systematically more likely to survive in economically advanced countries, and die off in poorer nations.[4] Przeworski et. al. (2000), in my view, conclusively establish this as an empirical fact. Modernization, is now not a pure-form deterministic theory as before, but a probabilistic one instead – dictatorships that

[2] Notable are Comparative Political Studies (2000), Comparative Politics (1997), American Journal of Sociology (1996), and World Politics (1991). Its relevance is also attested by the fact that there are journals that specialize in this issue alone like the Journal of Democracy, Democratization, and Demokratizatsiya – The Journal of Post-Soviet Democratization.

[3] See, as a few examples, Bova (1991), Sachs and Lipton (1992), Nelson (1993), Duch (1995), Diamond and Plattner (1995), Haggard and Kaufman (1995), and Frye and Shleifer (1997).

[4] Note that the literature is largely silent on the interesting question of relatedness between the time it takes a new democracy to falter and the time it takes for it to develop enough to sustain democracy indicating the lacuna that exists between the economic and political aspects of modernization theory.

develop economically for a time long enough for all modernizing forces to have effect will be more likely to become democratic. The authors note that from 1950-1990, the probability increased for a non-democratic regime to transit to a democratic one till it reached a level of development estimated by $6,000 per capita income. Above that transition became less likely. The relationship appeared to be quasi-linear, just as Huntington (1968) had predicted.

This is a fascinating observation, one that a theory of politico-economic transitions must answer. In fact, Geddes (1999) suggests further that 20 years of democratization studies have yielded three major conclusions – that poverty is the best predictor of transitions to democracy, that relatively there is more relevance of economic crises in authoritarian regimes for regime stability and, finally, that there is an absence of other generalizations.

First, in general, it has been noted that poverty is the best predictor of transitions to authoritarian regimes from democracy (see for example Londregan and Poole (1990, 1996)) and so the argument is that since developed economies raise general standards of living, this is why there exists a correlation between development and democracy. This is not a simple restatement of the Przeworski and Limongi (1997) finding even if it might appear thus at first pass, for they suggest that the economic income dimension of modernization correlates with the incidence of democracy and that this relationship is nonlinear. Geddes argues that this does not negate earlier modernization theories (including Lipset (1959) and Moore (1966)), which aver that there is a fundamental transition process and that countries transform into democracies. She suggests, that given Przeworski's and Limongi's observations on modernization as an exogenous and probabilistic process, the transitions-process studies become important for the mass of countries that are not at the extrema of the income distribution – because only then would marginal impact of identified factors be at its highest. Second, she observes that we know that economic crises cause transitions in authoritarian regimes as well as pressurizes incumbents in democracies. The

institutional mechanisms for dealing with dismal economic performance in democracies allow it to be more resilient in times of economic hardship than non-democratic economies. Finally, third, she admits that there are few other generalizations that have not been contradicted – for instance Rustow's (1970) and O'Donnell et. al.'s (1986) charge that all authoritarian transitions start from a split in the existing regime, the importance of elite-based over mass-based democratization efforts including therefore the role of elite pacts, etc. are all confirmed by one group and go unsupported by another, viz. Latin America versus much of post-Soviet and African countries.

Bunce (2000) has recently rescued the elite-based approach generalization by suggesting that it is conditioned on the tacit role of public sentiment in influencing the manner in which compromise is made and also by allowing the role of bounded generalizations (or spatially-bounded generalizations). In Bunce (2001) she also argues that with some confidence one can claim that democratization and economic reform are, in her words, "highly interactive".

Finally, the role of socioeconomics and demography has also been revitalized in the study of modernization. Lipset (1959) had argued that democratic tolerance norms are required for democracy and that a reciprocal relationship that fosters free participation is vital. Huber, Rueschemeyer, and Stephens (1993) reaffirm its importance and suggest a more nuanced analysis based on the role of the state, the impact of transnational entities, but most importantly relative class power, which directly dictates the degree of political participation.[5] Shin (1994) masterfully reviews the extensive literature and also suggests that a commitment to democracy is one of the most crucial components for successful democratization. It appears that there is widespread

[5] The impact here of class power and systematic analyses of revolutions conducted by mass groups dictated by factors affecting their relationship with the state is of special significance. Skocpol (1979) and Tilly and Tilly (1981) are almost too significant in this regard to be relegated to this note.

agreement on the relevance of committed political participation for democratization and thus any politico-economic transition theory should include it logically.

Recently, Przeworski, Alvarez, et. al. (2000) made the observation that authoritarian regimes have a higher population growth rate than do democracies and thus lower per capita income. In my view, their most convincing explanation of this fact is borrowed from Becker, Murphy and Tamura (1990) who suggest that in countries with higher human-capital acquiring resources, it makes sense to invest more resources into fewer children and emphasize quality over quantity since human capital is accumulated with increasing returns.[9] A theoretical framework that lends some intuitive understanding as to why demographics are important in politico-economic transitions simply does not exist.

My intention in this overview of the state of affairs of democratization (and modernization more generally) is to do two things. First, to suggest that there is indeed a lack of an acceptable theoretical frame – much less a unified theory – that ties together observations that have been carefully developed over many years of research on democratization and still more on modernization. Second, it is to suggest that there does exist a minimum set of observations that must be explained simultaneously by any proposed theory of regime transitions. This set has four major established observations. First, that there exists a relationship between economic income growth and regime change – either democratization or the establishment of an authoritarian regime. Second, the relationship between economic reform or economic crises and differential regime stability. Third, the importance of bargaining – mostly at the elite level – in engendering democratization and enabling economic transition. Finally, observations on demographics, class power and collective actions, which specifically include the rigorously tested observation that

[9] Note that their puzzling over democratization and economic development continues since this explanation uses and does not explain their carefully formulated observation that the occurrence of democracies is correlated with higher economic income.

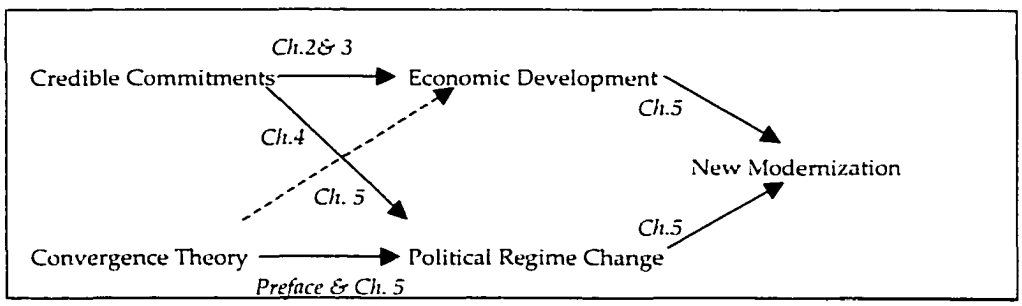
non-democracies have higher population growth rates and democracies are generally characterized by higher human capital and more urbanization.

Format of the Project

The impetus of my model derives from Przeworski and Limongi's (1997) criticism of most recent studies of modernization that seek to draw a connection between political regime and economic development, namely that they sort on regime. By sorting a given set of countries by their political regime and then comparing relative economic performance such studies are either unable to draw any causal connection between regime and economic development or do so unreliably if not altogether erroneously. Therefore what I need is a mechanism to endogenize one of my variables so that I am left with the extra degree of freedom I need to model a reliable theory of politico-economic transitions. I rely on two (related) concepts to achieve this – credibility and convergence theory – both of which are closely related to regime transition and economic growth.[7]

It is vital that I establish these links to a reasonable degree before I present my theory of politico-economic transitions, since I will employ them in its construction. The format of my dissertation project is therefore rather simple as figure one shows below.

FIGURE ONE: DISSERTATION CHAPTER FORMAT



[7] To the statistically minded, these can be seen as instruments for my model.

In Chapters Two and Three of the project I will relate how credible commitments are important for economic development. I adopt two approaches. In Chapter Two I analyze the motivations behind an individual wanting to become a politician. We will see why credible politicians – i.e. those that live *for* and not *off* politics - can lead to higher levels of economic development for a reason quote unrelated to the political economy of reform – that of the allocation of talent in a two-sector economy. The role of parties and democracies, simply in the form of multipartyism, in creating credible politicians will also be introduced. A second, better understood dynamic also exists for suggesting why credibility is important to economic reform. There is a vast literature that deals explicitly with the connection between the economic development and the protection of private property rights from Buchanan (1975) to North (1981, 1990). Research on the more direct connection of credibility to economic reform burgeoned in the 1990s, perhaps due to the wave of dual transitions and failed transitions in Asia, Latin America and Eastern Europe. (See Rodrik (1989), Dixit (1992, 1993) and Rapaczynski (1996). I present below, in figure two, a chronology that represents their viewpoint. As is perhaps evident, credibility (credible commitments) is used in this literature in the sense of the quality of the signal by the reforming government to consumers and investors that its reform measures will not be reversed once it regains liquidity. If a consumer or investor does not believe the signal, then she is likely to engage in cautious behaviors like intertemporal substitution of consumption, investing in liquid assets, resorting to capital flight and so on, all of which are liable to prolong the transition process and destabilize the economy even further.

Therefore, in Chapter Three I am interested in developing this literature for a new modernization theory by looking at it from the perspective of a political game of contribution to credibility capital, which in turn is accumulable, but like a public good, suffers from the tragedy

of the commons. In order to make the political nature of the game more apparent and the idea of free riding off accumulated credibility capital more obvious, I intend to conduct this analysis at the subnational level by looking at the role of credible commitments to reform by federal units in the Russian Federation. Using bilateral international trade data with one entity as a federal unit and other variables that stand in as proxies for the level of reform the federal unit has achieved, I will also test whether credible commitments are successful in producing economic development for the region.

FIGURE TWO: A CHRONOLOGY OF CREDIBLE AND 'INCREDIBLE' REFORM

1. Exogenous event causes adverse Terms of Trade shock in a closed/import-substitution economy

2. Hard currency reserves start drying up as the high closed-economy exchange rate is artificially supported by the government

3. High inflation sets in as demand for local currency falls due to an acceleration in the rate of seigniorage requirement

4. As conditions for bailouts price liberalization, rule of law and the protection of private property rights, fiscal austerity, privatization, etc. are advocated as part of economic reform and increased participation, representation, fair elections may also be advocated as part of political reform

5. Economy is suddenly opened under conditions of high and variable inflation and news of government unwillingly following the advise of foreign lenders

6. This leads -
6a/8c. To successful reform relatively quickly which sets in motion the forces of further democratization legitimized by economic growth
or
6b. To intertemporal substitution of consumption since government cannot credibly commit to sustained reform
and
To investment in highly liquid assets and capital flight

7. This increases the likelihood for even worse economic performance in the short term

8a. Credibility of activists against economic reform and democratization increases and failed transitions can result
or
8b. A perverse equilibrium results (such as partial economic reform with oligarchy) where neither side can claim clear legitimacy and prolonged transitions can result at least for the shorter term

Based then on this type of analysis, as I outlined before in the Preface, in Chapter Four I intend to discuss two things. First, that this chronology predicts a sort of separating equilibria. We have a set of countries that successfully reform and are presumably rewarded with high growth rates and (we hope) eventually democratize. We also have a set of countries trapped in a vicious cycle of low or even negative growth rates and are unable (or unwilling) to reform or presumably democratize. This is in agreement with the observation in the economic growth literature that convergence of all countries to the same high-income democracy prototype does not happen unconditionally (the conditions being related to successful economic reform and its socioeconomic affects) and also with the convergence club literature which suggests that, in the limit, two convergence clubs – one high income and one low income – will form in the world with all middle-income countries joining either one of those clubs.

Second, in this chapter then, I will review the literature on convergence theory and assess what the econometric debates have been to analyze it, for this has recently become a very contentious and interesting topic and has been completely ignored by democratization theorists who conduct similar analyses but replace economic development with indices of democratization. I also incorporate a relatively new dataset on state credibility (Henisz (2000)), as measured by the state of the judicial system in analyzing what are the factors that appear to affect the rate of convergence in economic income.

In my view, the role of accumulated credibility or credible commitments as a vital component of successful economic reform is mostly accepted and makes intuitive sense since governments that lack credibility can be labeled insincere reformers even if their intentions are more honorable than just to liberalize to fill their coffers. However, the role of credibility for democratization has of course been artificially imposed in this schematic through its role as instrumental in successful

economic reform. This still does not answer why credibility is directly relevant for democratization. In Chapter Five, therefore, I turn to this link.

Let us start from the observation that divergence from the median voter's preferred outcome is obtained (like Alesina and Rosenthal (1995) argue for instance) if there exists value in making credible commitments to party-defined bliss points (which are simply the points in the issue space where an entity maximizes its utility) different from that of the median voter's. The dilemma is then obvious if politicians should make credible commitments, which is – assuming certain regularity conditions hold – reconciling convergence to the median voter (and its coterminous social welfare maximizing attributes) with the value inherent in divergent outcomes (i.e. rewarding politicians that make credible commitments to party platforms).

Further note that there are, as Przeworski and Limongi (1997) have noted before, two distinct median voters - one relevant for the political game and one for the economic. There is an incompatibility between market based 'voting' done by economic agents using the resources they own to derive their 'weights' compared to state-backed voting by citizens where weights are likely much different (and theoretically more equal). The median voter therefore for 'capitalist' or market-based transactions is not the same as the one in a 'democratic' universal suffrage political regime.

What is interesting however is that a "theory of evolution" for political groups like parties can be created that reconciles these two median voters within the same game and in the process also rewards the divergent outcomes that produce credible commitments. The political groups induce public spiritedness among their followers (a process some have dubbed creating a "warm-glow effect" in explaining why people vote and also in location theory) by providing broad-based public goods. The public nature of these goods causes parametric shifts towards the median voter

from both sides albeit possibly at different rates depending on a number of factors.[8] For example from Perrson and Tabellini's (2000) work one can argue that plurality rule and small district size produces this faster than large districts and PR. We can however preclude the inevitable homogenization by a single group this process will suggest (in the style of a non-democratic single-party regime on a virtuous cycle) by introducing diminishing marginal utility to the public good it provides. This prevents a natural (though obviously not an "imposed") extinction of other parties. The process uses Buchanan's optimal group size theory to allow other groups to capitalize on the opportunity as well provided their public good package is of a different type. We can also allow this package to differ, and consequently enable an expansion of the optimal group size, by allowing provision of specific selective incentives to identifiable allied interest groups (subsidies, transfers, pollution licenses, etc.).[9] This allows the group to delay the point of inflexion on its aggregate provided utility surface and these special interests become important to this extent.[10] The schematic in figure three below summarizes this example.

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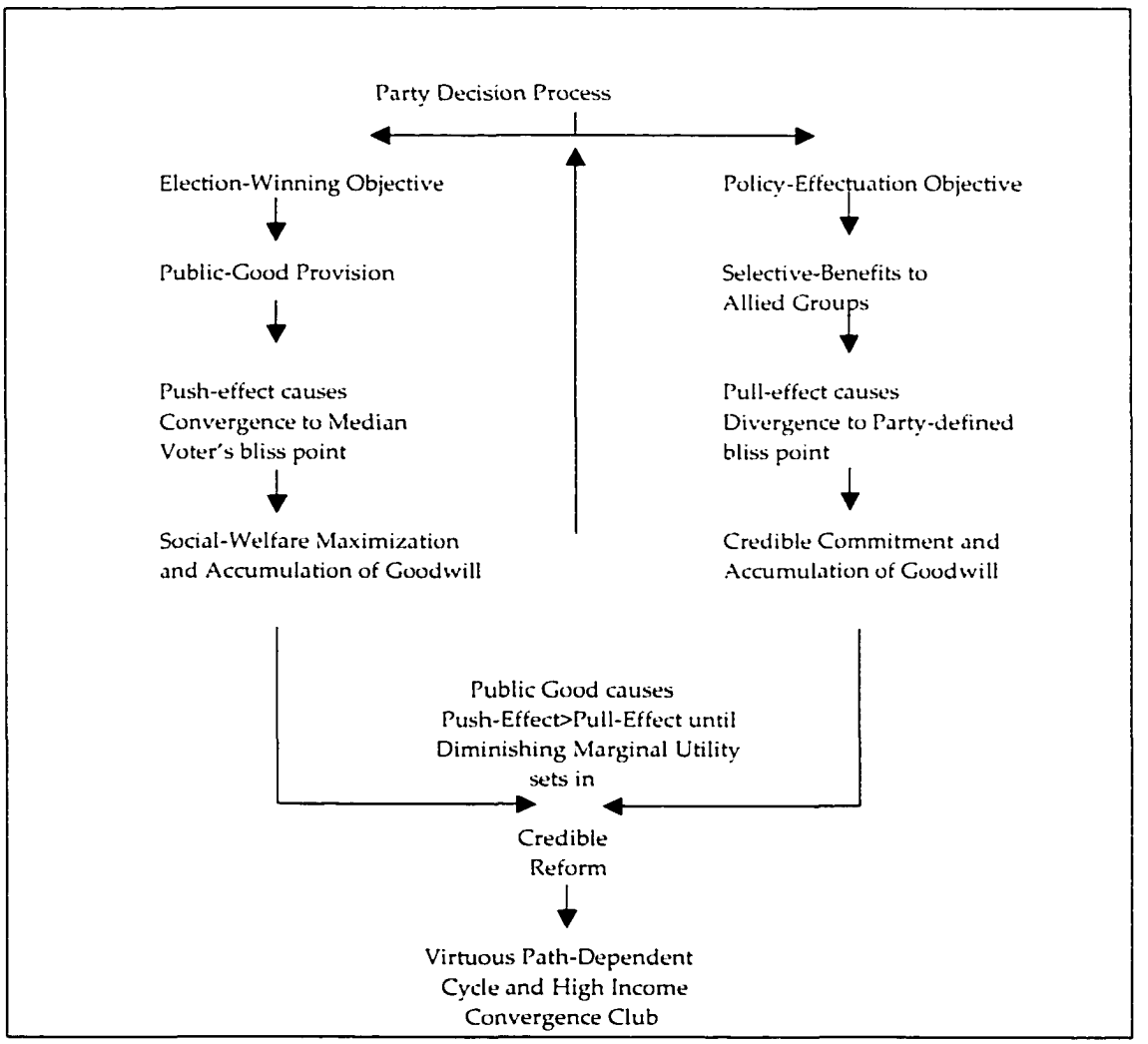
[8] The type of public good is of course of obvious importance in the analysis. Schultz (1996), for example, discusses a situation of two parties attempting to provide public goods that may or may not be desired to the same extent by the electorate. Using a model of Bayesian updating along the equilibrium path, he suggests that non-revealing equilibria (concerning true costs) result when there are parties with polarized preferences and revealing-equilibria obtain when at least one party's preferences coincide with the median voter's.

[9] It is illustrative to note that Acemoglu and Robinson (2001) suggest that political transitions and the subsequent stability of the regime depends crucially on the degree of asset equality among the electorate. Through their emphasis on mass revolution and elite reaction, they find that consolidated democracies have more asset equality, which causes fiscal stability, and less incentive for a dissatisfied electorate to tip the boat.

[10] It is interesting that McFaul (2001) asserts that party development depends more proximately on the institutional choices made by relevant political players. He also notes in conjunction with party development in Russia that the party system in Russia is yet not in equilibrium and a more stable party system may develop provided some institutional changes are made. The theory I provide here explains his suggestions rather well. Institutional choices would determine the rates of convergence to the median voter

FIGURE THREE: SIMPLIFIED SCHEMATIC REPRESENTATION OF THE PROPOSED MODEL



This process also provides a tractable understanding for the endogenization of the median voter position itself like mobilization theory suggests. Although it is perhaps overly simplified we have now a unified explanation couched in social choice theory that employs public good

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by the political group and also the degree to which it can make selective incentives to allied interest groups. It is no surprise then that political agents should be interested in the specific institutions chosen during transition so that they have more direct control over the degree to which rates of convergence can be manipulated.

provision by political parties to provide an explanation for credible commitments and convergence to the median voter's bliss point in stochastic steady state.

Finally in Chapter Five, I put everything together and attempt to construct a new theory of politico-economic transitions using an evolutionary game-theoretic approach. To review then, for this chapter, the following observations will provide the impetus. As will be suggested in chapter two, it is now commonly acknowledged that convergence in economic income of all countries to the same high-income group of homogenous countries will not happen unconditionally no matter how much time we allow the laggards to catch up.[11] We know in addition that, *ceteris paribus*, we can expect two groups of countries to form in the limit – one high-income group and one low-income group – with any middle-income groups simply disappearing. We also know through common sense and experience buttressed by formalized logic that economic growth is closely related to sensible and credible economic policy. It is an established truth – to the degree that major international institutions base their very existence on it – that certain policies cause dismal economic performance and yet others are correlated with better performance. There even seems to be some consensus that these policies are self-reinforcing and hence countries that adhere to one set of policies or the other are lumped together in the so-called vicious-cycle or virtuous-cycle. In this literature, an inordinate amount of emphasis is placed on credible commitments and much has been written about it. Credibility can be studied in numerous ways. If it is a public good that one can free ride off of and accumulate, then all the well-known problems of public-good provision are immediately relevant and we are in familiar territory. A point of interest here is that the accumulation of credibility is a process. The net result is interesting in that one might have credibility or no credibility with the concept of having some

[11] Of course, another way of saying this is that we have some idea as to what some of the relevant variables might be for increasing a country's national income.

credibility becoming less relevant in the limit or in a steady-state equilibrium, where having no credibility is a Nash equilibrium in the transition game just like the low-income group or the vicious-cycle members. What is more is that I will argue that having no credibility or belonging to a low-income group can be seen, *ceteris paribus*, as a stable evolutionary strategy. This characterization of credibility makes it a pivotal element of the story and links the political and the economic in a manner that reduces necessity of the term "dual transition". The problem now is to be more explicit about where the credibility is coming from – providing a sort of credibility capital production function for the political sector of the unified economy and consequently how it is being accumulated.

Here, I suggest that the theory of evolutionary games is of fundamental importance and I provide an example of an evolutionary game that produces the credibility I seek and conforms to a number of established facts about politico-economic transitions. In an evolutionary game, at the start of time, we would have in the world a homogenous group of 'animals' or phenotypes – countries in our case. A natural genetic function then determines the relative fitness of an animal defined quite simply as the rate of change in overall population representation of the animal group. In the case of countries and credibility in particular, we are interested in assessing learning strategies instead of the genetic function, which in effect provides for an estimation of relative fitness over time. This can be achieved by looking at the role of credibility capital in spatial voting models and the degree to which political entities like parties, which tend to exist across a variety regime types, internalize it in their strategy of playing a political game.

Concluding Remarks

The purpose of this project is to provide a causally connected theory between the mechanics of the political regime and the resulting economic income of a state. It proposes a logically

consistent and valid causal explanation for the interplay between democracy and economic growth in a general equilibrium framework thus devising a unified theory for politico-economic transition in the process. To achieve this, I introduce evolutionary game theory. The reason for doing so is that it provides a very convenient and simple way of looking at the dynamics of the system and neatly incorporates the political processes we are interested in with the economic outcomes that are observed.

While I intend to propose a new modernization theory in this project, its value can only be judged by how well it addresses the source of those rigorously tested observations that we have established over the years concerning democratization. While it is premature to address that fully at this stage, let me suggest how I foresee my project accomplishing that task.

The evolutionary approach I adopt to developing a new modernization theory must explicitly take into account the relative fitness of each group involved in the game. In this manner it must address what affects the quality and quantity of the group since that in turn determines their respective strengths. The observations about poverty, class strength and demographics in general are therefore relevant. The risk dominance criteria of evolutionary stable strategies in such games, which relates to the notion of how risky a transition from one state is seen when compared to the chance that a perverse outcome might result instead, directly address the notion of path dependence or inertia in political regime change and therefore provides an intuitive explanation for the observations on convergence in economic income. When each convergence club is seen as a Nash equilibrium, the idea of risk dominance also provides an explanation for why negotiated transition through elite bargaining becomes important since this is an effective method of reducing the risk dominance of the present undesirable outcome.

Above all, my proposed theory is intuitive. It is easy to see the logic of learning strategies substituting for genetics in an evolutionary game of politico-economic transitions. By a

Lakatosian criterion of evaluation, I humbly submit that it is better than or at least supercedes any rival theory that currently exists.

CHAPTER II

THE AFFECT OF CREDIBILITY ON THE MOTIVATIONS OF POLITICIANS

Introduction

The question of movement of skilled labor across sectors within an economy is interesting in many dimensions. It is also germane to a broad range of issues pertaining to economic growth and public policy. Consider, for example, whether there is reason for concern if there is a significant diversion of skilled labor to a particular sector. For instance, in Murphy, Shleifer, and Vishny (1991) the level of talent has implications for growth and development in the sector and consequently the economy as a whole. The topic of rent and revenue seeking in economics and political science has underpinnings in this broader issue of talent allocation. Should we be more concerned if a sector primarily engages in what Bhagwati aptly calls DUP (pronounced 'dupe') or directly unproductive activities? These are resource-consuming activities that have no direct and apparent benefits for the society. A more specific question is - What are the motivations that drive an individual to participate in one sector over another (when such a choice can be made ex ante)?

In this chapter, I use the concept of mobile skilled labor in a general equilibrium framework to develop a theory on the motivation of political actors that, in my view, deserves more attention than it gets in political science. The model uses Max Weber's idea of living *for* or living *off* the political sector as a broad substantive basis. The distinction is that the former involves a love of politics while the latter adopts politics simply as a source of income.

This chapter takes the following approach. It develops a formal model for the behavior of private and political agents. Then, building on previously accomplished work; it augments the

framework of the formal model. Thereafter, some empirical evidence is presented. However, as will be seen, the evidence, though strong, is not overwhelming.

Background

Although I shall discuss the saliency of the topic of this project again at the end I would like to mention a few of the more obvious contributions such a research endeavor can make.

First, the importance of analyzing the political and private sectors of an economy together has recently become an important topic in political economy. This is a significant motivation for this project. To comprehend why this is an important issue, consider Bhagwati's taxonomy of governments. He suggests that the economist's emphasis on a *puppet-government* that simply voices the economist's concerns is erroneous at times when there are pressure groups that can cause endogenization of policy. It is perhaps no wonder why jokes abound on economists hardly ever predicting correctly. Although this approach is conducive to economic analysis, it has scant external validity. A *self-willed* government, on the other hand, has its own objective function and constraints, and behaves in much the way any other utility-maximizing individual would. This approach too is restrictive and may allow perverse policy recommendations that make the government better off in isolation. Finally, a *clearinghouse government*, which is simply an arena where pressure groups and representative politicians battle it out over a policy is perhaps a more realistic approach and may even have more tractable real-world implications. The reason this is so is that it realizes that "the overall system must be solved for endogenous policy change and for final welfare impact for parametric changes that can occur now *either* in the economic *or* equally in the political side of the overall, augmented system." (emphasis original)

Second, understanding the motivations of politicians is important for the discipline of political science in addition to economics. The actions of politicians in *both* the private and the political

sectors are important in understanding a wide range of issues in all the sub-fields of political science. The Americanist wishes to know how a politician will behave on the margin, given his or her constraints have been altered – be it a House Member running for the Senate or the President seeking re-election. The Comparativist wishes to know how a politician behaves under different political regimes or why he or she prefers a particular policy. Answers to these questions can be applied to understand why India is considered an outlier as far as democracies are concerned or why some African politicians are among the most corrupt in the world. The International Relations scholar is plagued by the problem of explaining how politicians behaved under various crises – what motivated a declaration of war or even what motivated a trade treaty or visit from the Head of a State. It is apparent that a better comprehension of the motivations of politicians and the interplay between the private and political sectors, domestically or internationally, will allow analyses that are more rigorous in all quarters of political science.

Third, with no reliable understanding of the needs and wants of politicians we can not possibly give helpful advise about how the political sector should organize itself or how it should interact with the private sector.

I therefore propose to begin with an internally valid and easily extendable approach to the problem. For this purpose, I employ a formal model that identifies a certain framework that will be used as a starting point for the project. Thereafter, I test the generalizability of the model by using aggregate level data to test a few implications of the model. However, in order to rigorously test the reliability of the model a more thorough research endeavor is needed. This chapter aspires to present only a very broad overview of the problem. It does not seek to design a theory that is unconditionally applicable, but rather it seeks to begin such an endeavor by laying out a possible approach to the problem.

This chapter tackles an important question for political scientists – what motivates politicians and why do they become politicians. These questions have interested political scientists for a long time. Three classic works of what I consider the most interesting approaches are outlined below.

James Q. Wilson, in his *Bureaucracy: What Government Agencies Do and Why They Do it?*, struggles with the idea of a coherent 'organization theory' for US public bureaucracies, which he believes, does not exist. His analysis is based on variational adjustments made by public sector officials. He allows them to assume various incentives like managing their own workloads, gaining the favor of their peers and seniors and realizing their own convictions. He also allows some officials to be primarily loyal to their private sector patrons. This is a richer analysis where political motivation lies on a large spectrum of possible incentives. However, Wilson differentiates his public officials primarily among three main groups, which he calls operators, managers, and executives, and suggests how various combinations of incentives motivate them.

In *Inside Bureaucracy*, Downs formulates a system of differentiating between his 'self–interested' and 'rational utility–maximizing' politicians. He has five types that differ in the amount of, what he calls 'mixed motivations' and 'pure self–interest', the latter of which can be understood as career loyalty rather than loyalty to the party or to politics. The approach that Downs adopts is to develop a model to describe the nature of bureaucratic organization and he uses politicians merely as 'economic agents'. This, in my viewpoint, downplays the interactions that occur between politicians. An interesting part of Downs' theory, however, is that since publicly provided goods are free or cheap, their demand is inevitably greater than the supply and that politicians must therefore use non–monetary instruments to curb demand. This is an interesting perspective that can exonerate a politician from being necessarily corrupt whenever she charges a price that is above marginal cost.

In an entirely different and interesting approach to political motivation, Joseph Schlesinger, in his *Ambition and Politics: Political Careers in the United States*, develops the 'ambition theory of politics'. He suggests that political ambitions take shape according to two different influences – the politician's career ambitions *ex ante* and the resources provided to the politician *ex post*, or in his words the 'size and structure of the opportunity set'. This simple way of analyzing political motivation then allows the politician sufficient flexibility from the party and explains why political motivations themselves can change over time.

The approach I take in this chapter draws a lot from these three remarkable works in analyzing political motivation. I primarily take Down's method of analyzing politicians as rational actors, but I also allow politicians to make marginal decisions on how they want to shape their careers. This makes political sector employment an endogenous process largely controlled by the 'politician'. I let politicians interact with different factions of the private sector in a way somewhat similar to Wilson's approach.

In addition, I involve the concept of human capital to analyze the type or 'quality' of politicians that chose to enter the political sector. This idea, to my knowledge, has not been seriously explored before by political scientists.

A Formal Model

Let us assume at the outset that all political actors can be characterized as any other rational agent and therefore a politician always seeks to maximize his or her utility. Therefore, a politician has complete and transitive preferences and prefers more to less of a normal good. Consider then the following model.

Assume a world with two sectors. Let us call one sector the private sector and the other one the political sector.[1] All agents in this world are employed by either of the two sectors. Agents have the following utility functions,

$$1. \qquad U_i = U_i(\mathbf{X}_1, X_2, L, \mathbf{m}_j),$$

where $\mathbf{X}_1$ is a vector of normal goods produced in the private sector, X_2 is the normal good provided through the political sector, L is leisure time and **m** is a vector of other factors and the subscript j = 1 for the private sector and 2 for the political sector.

If the actor is employed in the private sector, his net income depends on whether he is an 'entrepreneur' or an 'employee'. There are an incomparably larger number of workers or employees than there are entrepreneurs. In fact, I assume that there are as many businessmen as there are elements in $\mathbf{X}_1$.[2] The net income here is the disposable income adjusted for level of effort. If the individual is an entrepreneur, net earnings are given by,

$$2. \qquad Y_1^b = P^1.f(HC_i^b, \bar{HC}^e, K) - (E_i^\alpha + rK + w^1.\sum_{i=1}^{N}(HC_i/HC_1^{max})^\rho),$$

where the superscripts b and e stand for businessman (or the entrepreneur) and employee respectively. HC is the ith actor's human capital, K is physical capital, E is effort expended with an exponent α that it strictly greater than 1 and r is the rental rate of capital. w^1 is the highest possible wage in the private sector and $\rho \geq 1$. N is the total work force in this firm.

In addition, let,

$$3. \qquad E = (HC_i/HC_1^{max})^\circ,$$

---

[1] I do not want to call this sector the public sector since there is essentially no production in this sector. I also do not want to call it the government sector since that generally connotes a wider range of activities that are not of interest in this chapter.

[2] As will be apparent, this is strictly speaking not true since the political sector good, X_2 is not physically produced in the political sector. This detail however, has no real implications for the model.

where E is the ratio of the actor's human capital relative to the highest level of human capital in the sector. $-1<\varphi<0$ - note that this results from the argument that L appears positively in U_i, and E is the residual from the total available time unit once L is subtracted.

It follows that if the actor is an employee he earns,

$$4. \qquad Y_{1^e} = w^1.(HC_i^e/HC_1^{max})^{\rho} - E_1^{\alpha} \text{ or from 3.}$$

$$Y_1 = w^1.(E^{\rho,\Phi}) - E_1^{\alpha}$$

If the actor is employed in the public sector, his net income similarly depends on whether he is an entrepreneur or an employee. The distinction here - if not a strict dissimilarity - is that an employee is hierarchically and authoritatively below the entrepreneur. In fact, more explicitly, I assume that the 'businessman' or senior politician is appointed or formally 'elected'. Therefore, I aggregate to only two levels of organization.[3]

If the actor is an entrepreneur, or highest-ranking politician, on the net he can earn,

$$5. \qquad Y_{2^b} = w^2 + \kappa(P_{L.SL}) + \tau(P_{ILC.SILC}) - (E_2^{\alpha} + Q^b - B),$$

where w^2 is the official or government salary, and is assumed independent of HC_i. κ and τ are fractions weakly bounded between 0 and 1, and $\kappa < \tau$. Again, E is effort expended with an exponent that it strictly greater than 1. The remaining arguments, including Q and B, will shortly be discussed at length below.

Further let,

$$6. \qquad E = (HC_i/HC_2^{max})^{\varphi},$$

Note, that in 6, the effort is dependent on the maximum level of human capital in this sector only. Now, if the political actor is an employee or lower level functionary in the political sector, he earns,

$$7. \qquad Y_{2^e} = u^2 + (1 - \tau)(P_{ILC.SILC}) + (P_{IL.SIL}) - (E_2^{\alpha} + Q^e),$$

where u^2 is the official wage for this set of political actors.

There are a number of arguments in equations 5 and 7, which need to be explained. This will be done explicitly below, however here, suffice it to say the following. The equations present three prices – P_L, P_{IL}, and P_{ILC}. These are the prices charged for X_2 under conditions of legal sales, illegal sales, and illegal sales with collusion.[3] The number of sales of the good offered through the political sector is recorded by the variable s and is indexed by the type of sale made.

Analytics

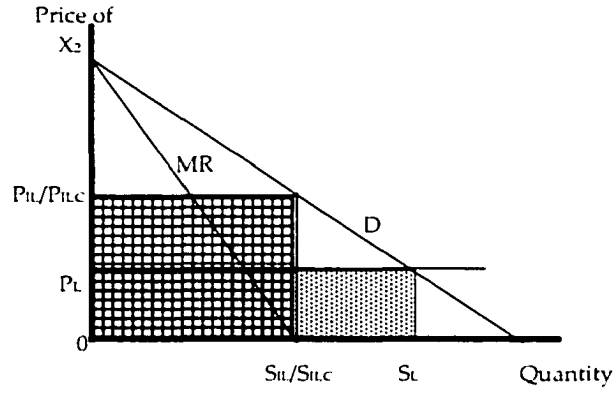
To make the analysis simpler assume that the marginal cost of provision of good X_2 is 0. This then means that the product of the price of X_2 and its sales gives us the rent generated from sale of X_2. Assuming that the lower level functionary or employee in the political sector actually makes the sale to consumers, three possibilities are allowed:

- Legal Sales – A legal sale occurs if it is recorded at both levels in the political sector and the revenue is presumably introduced faithfully in the government's budget constraint, which is not modeled here. The highest-ranking politician, is legally allowed to share in a fraction, κ, of the proceeds.
- Illegal Sales with Collusion – Here the sale is recorded at only the lower level but the proceeds are not introduced in the government's budget constraint. The upper level politician obtains graft by 'taxing' the lower level politician at the rate τ and leaves him with $(1 - \tau)$ of the proceeds.
- Illegal Sales – In the case of an illegal sale the sale is not recorded at any level and the revenue is simply usurped by the lower level functionary in the political sector.

[3] It may seem to the reader that this assumption allows for only limited flexibility of movement within the political-sector, however, as we shall see, I believe that the major results are not affected.

This distinction of types of sale of X_2 would not matter if there were no reason to believe a difference in the prices; and this is an essential detail.

FIGURE ONE: RENT SEEKING IN THE POLITICAL SECTOR



In Figure One, the distinction between the prices is illustrated. In the case of illegal sales, the price at which the sale is made is higher. In fact, it is the profit maximizing monopoly price obtained by creating a shortage of good X_2 compared to the quantity that would be sold at a government mandated price of P_L. The shaded area represents the revenue from the legal sale of X_2 and the checked area represents the revenue from illegal sales.

Equations 5 and 7 also have a final argument, Q. This is the cost of lowering the probability of being detected. In the case of illegal sales with collusion, the senior and junior politicians share Q and in the case of illegal sales by the junior functionary, he alone incurs Q. Note that,

$$8. \qquad Q=Q(p_d),$$

[1] Note that I assume that X_2 is in infinite supply and there is no quota or quantity restriction that the political-sector workers face. This assumption effects the comparative statics, which are not provided here.

$$\frac{\partial Q}{\partial p_d} > 0,$$

This cost is an increasing function of p_d, the a priori probability of being detected. The second derivative is also arguably positive.

Before we can continue our analysis of the model, a brief discussion of the vector $\mathbf{m}_i$ of the utility function is required.

For the private sector, among other things, this vector depends on three main things. First, it relates to the price difference of good X_2, ($P_{IL/ILC} - P_L$). The first derivative of the utility function with respect to this variable is, of course, strictly less than 0 and the second derivative is strictly greater than 0. The aggregate loss of utility is given as,

$$9. \qquad \int_{P_i}^{P_{IL/ILC}} D(p).dp$$

Second, for the businessmen in the sector, the vector also depends on interest groups. To understand this point, refer back to the figure above. Let the government-mandated price of P_L now be the marginal cost of production for all private goods in $\mathbf{X}_1$. Since I assume a perfectly competitive market, entrepreneurs make no supracompetitive profits. However, businessmen are able to (costlessly) organize and lobby for a monopoly status. They pay the upper level politician a fixed sum B, as shown in equation 5 for this privilege.[5]

Thereafter, these firms become monopolies and charge their customers a higher price, which obviously would be even higher than $P_{IL/ILC}$ shown on the figure.

The natural question is why do not all the firms in this world pay the upper level politician the required fee B and switch over to a monopoly. To answer this question we must consider the vector $\mathbf{m}_2$ for the senior politicians.

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[5] This fee B is clearly assumed to be much smaller than the net present value of expected monopoly rents.

For the political 'businessmen' the vector has three elements. First, it depends on the aggregate utility of the citizens, which in turn are composed of businessmen and employees. This is simply,

$$10. \qquad \sum_{k=1}^{2} \sum_{i=1}^{Pop} \lambda_k . U_i \ ,$$

where k indexes the two classes of citizens and $0<\lambda_k<1$.

Second, on the margin, the politician considers his or her career moves according to the following condition –

$$11. \qquad \begin{aligned} &(1-\nu).\sum_{t=1}^{r}\left[w_t^2 + (\kappa(P_t.s_L))_t\right] + \nu.Z \; > ? < \\ &(1-\omega).\sum_{t=1}^{l}\left[w_t^2 + (B.n)_t + (\tau(P_{IIC}.s_{IIC}))_t - Q_t\right] + \omega.Z \end{aligned}$$

where I assume that r and l are term lengths of the political office and that r>l. n is the number of private licenses sold. Z is the money value of prestige and power, political efficacy, legacy, etc. ν and ω are both bounded strictly between 0 and 1 and I assume that ν≥ω.

Equation 11 describes two types of politicians. A politician is 'honest' if for him the left-hand side of the equation is bigger than the right-hand side and 'corrupt' if the right-hand side is bigger. Corrupt politicians are assumed to have shorter terms since they accrue lower aggregate utility.[n] Note that they also weight their disposable incomes higher than the more honest politicians do. Recall that in equation 10 we can predict that honest politicians have different (more equal?) weights to the utility than do corrupt politicians (biased in favor of interest groups).

Equation 11 also introduces an important new variable, Z. Z is a harder to describe variable that senior politicians are assumed to consider in making career choices. It attempts at capturing Weber's notion of living purely *for* the political sector. It is an index of power, prestige and other

variables that hint at the agent's job satisfaction and overall respectability. While Z may be a function of several variables, present or absent in this model, what is of particular interest to me is that, among other things,

$$12. \qquad Z_i = Z_i(B, q, y^l),$$

$$\text{where } \partial Z / \partial B \leq 0,$$

$$\partial Z / \partial y^l > 0 \text{ ; } y^l \text{ is the legal remuneration package,}$$

$$\text{and } \partial Z / \partial q \geq 0 \text{ ; } q \text{ is the party-specific brand-name capital}$$

The behavior of the function with respect to B suggests that unless the politician is utterly 'corrupt and amoral', i.e. $\omega=0$, he or she will not sell private licenses for all goods in X_1.[7] The variable q is what I would like to call *party-specific brand-name capital*. Although political parties are not central to the thesis of this chapter, ignoring this variable entirely seems erroneous while considering political careers. Given various political parties, an 'honest' type politician will tend to join a party with high q value and a 'corrupt' politician will join a party with lower q values.[8] However, as I argue below, this might not necessarily be the case.

The concept of party-specific brand-name capital is simple and not entirely novel. Party names are like brand names such as McDonald's or Gillette. They send signals to their consumers. Just as a shaving can produced by Gillette guarantees a certain quality of shaving foam, a political candidate endorsed by a party promises a certain quality of candidate. Quality, in the case of

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[6] That they accrue lower aggregate utility should be obvious. Not only is the average price charged for X_2 higher but the social cost they impose on the society is higher too since they engage in DUP activities (captured by Q) and encourage DUP activities by interest groups (captured in part by B).

[7] It will be clear, if it is not already, that the 'corrupt' type politicians necessarily accrue a lower Z-value than do the 'honest' type politicians. Note that the politician can increase the legal remuneration package only by increasing legal sales.

politicians might mean a well-parameterized issue space, a certain 'strength of character', etc. Therefore, for higher values of q a consumer is more certain of the quality of candidate. However more significantly, consider again the problem of types of senior politicians. I have assumed that Z increases in q, but it might also be conceivable that honest politicians, who wish to have high Z values, might be at odds with the party. In this case, for such politicians, Z can be *decreasing* in q. Also, it is possible that since a high q assures the senior politician position, a potentially 'corrupt' type politician might join the party. In both these cases, subsequently the q-value of the party is very likely to decrease. For the purpose of this chapter, however, I ignore this complexity. To the extent that party-specific brand-name capital is indeed a valuable asset, we will tend to see controls such as various barriers to entry and constant checks on the activity of individuals in the political sector and his or her relation with the private sector.

The model is yet deficient. I have not characterized the allocation of individuals across sectors and between entrepreneurs (senior politicians) and employees (junior politicians). I assume that HC_i is a measure of talent, skill, knowledge, etc. and that individuals with higher values of HC naturally move to sectors and jobs with higher net incomes. However, this is yet unclear. Let there then be some HC accumulation process such that,

$$13. \qquad \Delta HC_i^{(t+1)-t} = \left(HC_i^t\right)^{\pi} \Big/ HC_i^t, \qquad \text{where } 0 < \pi < 1$$

[8] Note that this might not be necessarily true. In some personalistic systems the politician may have a high enough q-value of his own and might not have to join a party to participate in the political sector.

Here the rate of growth of human capital simply depends on the level of human capital. Therefore, there tends to be convergence in the infinite future.[9] The next task, therefore, is to rank order the net incomes.

In the private sector, the production function f embodies the level and state of technology in the world. Since the function depends on the entrepreneur's human capital, it is safe to assume that this activity is more conducive to individuals with high values of HC.

Next, let us consider the junior politician's problem. Given a limited horizon and an initial level of HC, the decision to advance one's political career can take some time to develop. In particular, as it was discussed above, he may want to become a senior politician himself. The motivation for this decision or his career goal – i.e. disposable income or Z - will dictate which type of politician he wishes to be – an honest or corrupt one.

If the junior politician aspires to maximize net wealth as a senior politician, it then also becomes important whether, as a corrupt senior politician, the junior politician expects to earn more. Is the expected value of equation 5 more than equation 7? If it is, this will then cause a self-selection sort of bias. Senior politicians will tend to be more honest.

Now, although this is not mentioned before, assume that q is non-monotonic in B. In particular, party-specific brand-name capital initially increases as more monopoly 'licenses' are distributed. This can be because of two reasons. First, the interest groups are now better off. Second, it is perhaps logical that the monopolies develop first in industries where there are substantial rents to be extracted. These are also industries that face inelastic demand curves, so plausibly higher prices are tolerated more easily. There is also the argument that monopolies might be better innovators. However, as the ratio of the number of monopolies in the private sector to the total number of goods in $\mathbf{X}_1$ increases, q starts to decrease. A further and more obvious detriment to q

[9] Note what this suggests. As HC levels become more equal, within specific jobs, each individual has more

relates to the activity of illegal collusive sales of the good X_2. In spite of the cost of evasionary measures incurred by the senior politician, ex post there is still a non-zero probability of detection. What all this implies in terms of the junior politician is that he or she may strategically stop all illegal collusion sales as senior political activity, in the same party as the senior politician, becomes a more real possibility for the future. He may want to stop all illegal sales in fear of tarnishing his own reputation, but this is not modeled here since it does not relate to q directly. This is, however, an interesting question since party-specific brand-name capital might be awarded only to selective and deserving junior politicians.

Finally, note that I have not assumed anywhere that there is any specific human capital across sectors, therefore in principal every individual has three career choices he or she can make, and form decisions following the one shown in equation 11. What are the determinants of career choice then? I have provided only some answers to this complex question. Individuals with the highest levels of HC will be private sector businessmen since they have a comparative advantage in doing so. In addition, their net income is likely to be higher. However, if the production function is such that this activity becomes less profitable we should then see a larger political sector. However, this might not be the only way the political sector expands. The model also suggests that as Z becomes larger, proportionately more politicians that are honest will enter the sector. This effect is assumed stronger when the legal remuneration is higher. This simply means that honesty is difficult if wealth falls below some undefined subsistence level.[10]

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similar net earnings. Although an equilibrium is derivable from this condition I am uninterested in it here.

[10] For a more detailed discussion of this issue see Kelly, Stanley Jr., (1998), "Politics as Vocation: Variations on Weber", in *Politicians and Party Politics*, editor: Geer, John Gray, Johns Hopkins University Press

Empirical Evidence

The preceding analysis is on topics that are hard to test empirically due to the lack of data. However, there are a number of predictions that are testable.[11]

Proposition A: An increase in the q-values of a party will cause an increase in aggregate utility in the society.

This primarily results from equations 10 and 11 that suggest that 'honest' type politicians will join parties with high q-values. Equation 8 then suggests that this will cause higher aggregate utilities.

Corollary to Proposition A: An increase in political corruption will cause a drop in the aggregate utility in the society.

There are also some implications related to allocation of talent to the political sector that can be tested.

Proposition B: As the earnings in the private sector increase, political sector participation will decrease.

This is a result from the model using the assumption of no sector-specific human capital.

Proposition B': A rise in the payoffs in the private sector will dissuade high human capital activity in the political sector.

This extension of Proposition B is possible since the model assumes a private–sector production function that enables higher payoff to high human capital individuals.

I will begin with a brief description of the variables that I shall be using for the analysis and that have been collected so far. Table 1 shows the summary statistics for the variables.

At this point, an important aspect of this analysis should be made explicit. It may appear to some readers that the analysis suffers from the ecological inference fallacy since I am attempting

[11] The empirical analyses provided here is not conducted with a view to identify culpable determinants. It is intended to provide a more involved understanding of the formal model and therefore necessarily ignores

to make individual level inferences from aggregate data.[12] However, remember that I have essentially only four jobs in this world. In the formal model itself I have already aggregated to only two jobs per sector. This has implicitly assumed a degree of homogeneity, which makes the analysis less susceptible (admittedly not entirely), to the ecological inference fallacy.

Table 2 presents an OLS regression analysis. The dependent variable, the 1998 Human Development Index, is used as a measure of aggregate utility. Its efficacy as a proxy for aggregate utility derives from that fact that other than just the standard per capita income, it also incorporates literacy and life expectancy. Consider Model 1. Notice first the independent variables TOP1 and TOP5. The partial effect of more parliamentary control by a single party is negative on aggregate utility.

This effect is very significant even after correcting the standard errors for heteroskedasticity. TOP5 control has a significant positive partial effect. The government-size variable was calculated by simply multiplying GOVGDP94 with GDP94.[13] It seems to suggest that a bigger absolute size of government increases aggregate utility. The Corruption Perceptions Index has a very significant positive partial effect.

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some variables. For instance, data limitations restrict me from even considering the impact of electoral systems.

[12] I thank Mr. Yijia Wang for this observation and Dr. Bradley Palmquist for helping me with the articulation of the argument for why this is not entirely true.

[13][13] There is, however, a potentially confounding problem with the variable GSIZE that I wish to communicate before I proceed with the analysis. It would be uninteresting to study the size of governments without any attention to their function in society. I subscribe to the mainstream economics approach on this issue. The government has two primary tasks. First, it provides and enforces property rights so that welfare enhancing transactions can be made while minimizing costs. Second, it provides aggregate-utility-enhancing public goods that would either not be provided by the private sector or be underprovided. Now, I have argued that, in general, two kinds of government activities are possible. Primarily corrupt and directly unproductive activities or primarily welfare enhancing activities. This taxonomy is not exhaustive but it provides us with a necessary framework for analysis. I regress the variable GSIZE on the 1998 Human Development Index, which estimates, in some sense, the level of public goods provision. Using the cutoff of $5,000 for per capita income I divided the dataset into two sets. This cutoff is arbitrary and motivated by visual inspection only. I find that whereas around 12% of the variation in the independent variable is explained by the 1998 HDI in the richer countries, only 1% is of the variation is explained in the poor

Less corrupt governments increase aggregate utility. This result coupled with the observation that bigger governments are better, then makes it possible to postulate that there does possibly exist a selection bias that I mentioned above. When only the 'honest' type politicians enter the political sector aggregate utility is better served. This substantiates both Proposition A and its corollary.

At first, the party-specific brand-name capital idea does not seem to get any support. After all, parties with a high degree of parliamentary control should also be the parties with a high q value. However, in the case of a single party in charge of a substantial percentage of the parliament, we may be seeing the effects of monopolistic control. A single party with monopolistic control, say for instance the erstwhile CPSU, have high q-values but are also plagued by corrupt politicians. This is so because rent seeking is encouraged by a party position that gives monopoly control over valuable assets.[14] The CPSU had the system of *nomenklatura* as a barrier to entry and, as discussed above, it also kept strict checks on all its functionaries. It is no surprise then that the variables TOP1 and POL98 are inversely correlated.[15]

Therefore, we have discovered an exception to Proposition A. Proposition A holds true unless high q-value parties combine, as a cartel, or as a single monopolistic major party. If this happens, then aggregate utility suffers. Proposition A can be refined as:

Proposition A°: Given an underlying competitive market in party formation, an increase in the q-values of a party will cause an increase in aggregate utility in the society.

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country regression. This rather rudimentary bivariate analysis conforms well to our notion that standards of living are much higher in the richer countries.

[14] For a more detailed debate on this point see Goorha, Prateek, (2000), "Corruption: Theory and Evidence through Economies in Transition", *International Journal of Social Economics*, (forthcoming). In this chapter a a more economics oriented approach was adopted.

[15] Note that TOP1 is also strongly negatively correlated with the CPI.

TABLE 1: SUMMARY STATISTICS

Variable	Mean	Standard Deviation	Minimum – Maximum Values	Description
GDPP	9209.367	11609.2	200 – 43570	PPP adjusted Gross Domestic Product per Capita in 1994
GDP94	308457	934557.4	1302 – 6648013	Gross Domestic Product in 1994
GR9094	1.511392	5.049371	-17.7 – 12.9	Growth of GDP from 1990 to 1994
GOVGDP94	15.74684	5.981742	6 – 32	Government Consumption as a percentage of GDP in 1994
GOVC8094	0.2405063	5.149596	-13 – 14	Change in Government Consumption from 1980 – 1994
EFI1999	2.777215	0.6031858	1.3 – 4.6	Economic Freedom Index 1999
TOP1	42.93025	20.548	3.75 – 100	Percentage of Parliament Control by the most major party in the latest election
TOP5	86.47033	17.00906	5 – 100	Percentage of Parliament Control by the five most major parties
LABFORCE	30.46753	96.62605	1 – 736	Labor force supply excluding hidden labor in millions
TI1998	4.918987	2.439792	1.4 – 10	Transparency International's Corruption Perceptions Index 1998
MAJPARTY	9.810127	6.351006	1 – 39	Number of major parties in the parliament
POPULATI	57.6743	169.1836	0.27 – 1190.9	Population of the country in 1994 in millions
HDI	79.41746	15.29547	35.7 – 95.1	UNDP's Human Development Index in 1998
POL98	7.157895	3.402166	0-10	The composite (democracy – autocracy) Polity score for 1998

sources:
The World Development Report 1996. The World Bank
The World in Figures 1998. The Economist
Transparency International. *www.transparency.de*
www.agora.stm.it/elections/home.htm, Derksen, Wilfried

TABLE 2: OLS REGRESSION ANALYSIS

Variable Name	Model I	Model II (10 Polity-98 clusters)
TOP1	-0.382 (0.083)	-0.380 (0.071)
TOP5	0.1798569 (0.072686)	0.201 (0.054)
GSIZE	0.0000113 (3.9e-06)	0.000011 (3.49e-06)
TI1998	3.311 (0.475)	3.091 (0.597)
R^2	0.62	0.62

Dependent Variable: HDI 1998
Robust Standard Errors in parentheses
Observations: 63

More can be learned from the variable TOP5, which measures the amount of parliamentary control wielded by the country's five most major parties. Higher values of this variable can be understood as less political fractionalization, which in turn implies that the country has a high number (at least 5) of political parties with a high q-value. Then it is no surprise that this variable has a significant positive partial effect on aggregate utility.

Table 2 also presents the same regression assuming that there is some significant dependence in observations between countries with equal Polity 98 rankings. The analysis appears to be robust across both specifications.

The next step that I wish to undertake is with the intent to understand the determinants of the allocation of talent to the political sector.[16] I use the count variable MAJPARTY as a dependent variable. This variable measures the number of major parties in the country's political sector.[17] Since a party is presumably initiated by an 'entrepreneur' type individual with a high level of human capital this variable is an indicator of diversion of talent to the political sector.[18] The problem with this variable, which I have not tested, but can only guess till I compile time-series data, is that there is presumably some path dependence; major parties are hard to dislodge in the short run. This reduces the efficiency of this variable as a viable proxy for the allocation of talent to the political sector.

The summary statistics for MAJPARTY shows a lack of equidispersion. A goodness of fit test further suggested that the Poisson regression model was inappropriate. Therefore a negative

[16] Note that this question is different from the allocation of labor to the political sector.

[17] One may argue that this variable does not really measure the amount of talent diverted to the political sector. It has been suggested that it may simply be a function of varying interests in the society. However, I find this simply untrue. At least ethnolinguistic fractionalization does not explain this variable to any significant extent.

[18] I have not modeled parties explicitly in the model, but equivalence between parties and firms is an issue that I am also currently working on. Assuming some such similarities, a variant of equation 2 would also describe net earnings of party initiators or founding members.

binomial regression was performed.[19] The results are presented in table 3. There are some interesting results. As expected, *cetaris paribus*, a single percent increase in growth in the economy causes a reduction in the expected number of major parties by a factor of almost 1. Growth in the economy is presumably driven by the private sector and therefore there is diversion of talent to the private sector causing reduced political sector activity. [20] This supports Proposition B, and by the choice of the dependent variable, also provides less reliable support for Proposition B'.

The sign of the GSIZE variable is harder to interpret directly. If the government is shrinking should we see the number of parties shrinking too? Since the GSIZE variable is lagged we can consider it to be 'the potential size of the prize or incentive that the political sector affords. Standard monopoly rent-seeking theory would suggest that since the underlying market for party formation is competitive only the larger parties with more resources at their disposal will survive and emerge victorious. Therefore, a negative partial effect is in fact very meaningful. What is harder to understand from the limited evidence here is that this actually implies increased political sector activity. Larger parties must keep the participants who share in the pie limited by spending more resources. However, which sector benefits from this more is unclear and cannot be tested with the current data.

The LABFORCE variable has a very significant positive partial effect. As the size of the labor force increases the amount of political activity increases. This is not too hard to imagine. As the

[19] A likelihood ratio test on the dispersion parameter has a value of over 60.

[20] Note that we are more confident about the direction of causation since, other than the HDI and the Corruption Perceptions Index, all other variables are lagged, in the sense that the major parties of the counties in the dataset are all updated to 1998, and the earliest election results that are still valid are from 1994.

supply of labor force increases, *cetaris paribus*, the size of the private sector must expand accordingly. If it is unable to do so then talent will inevitably be directed to the political sector.[21]

TABLE 3: NEGATIVE BINOMIAL REGRESSION ANALYSIS

Variable Name	Parameter Coefficients
GSIZE	-9.88e-07 (5.50-07)
GR9094	-0.017 (0.013)
HDI	0.014 (0.007)
LABFORCE	0.002 (0.001)
TI1998	-0.047 (0.037)

Dependent Variable: MAJPARTY
Standard errors in brackets
Number of Observations: 62

That higher HDI levels should lead to more political activity is also expected if one believes the notion that the political sector is responsible, to a large extent, in raising standards of living either directly through the provision of public goods or indirectly through better property-rights management.[22] This is more of a reinforcing effect. The society, in some sense, gets used to 'honest' type politicians who increase their standards of living. Such societies then tolerate and encourage bigger political sectors. [23]

Some Predictions of the Model for Sectoral Employment

As a demonstration of the implications of the model for the allocation of talent across sectors, I give some of the key equations in the model functional forms and impose a linear demand curve for both goods in the economy. Thereafter, using some numbers, I try to see what results were obtained concerning the allocation of talent. Some of the interesting findings are reported here.

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[21] Some basic analysis confirms this notion. A bivariate analysis of MAJPARTY on LABFORCE for fast growing economies only shows a much weaker relationship. However, the data are not sufficient and further confirmation is required.

[22] The last result is that less corrupt economies correlate with fewer political parties and is a result that is derived from some previous work I have presented. See Goorha (2000).

[23] There is no doubt from a look at the World Development Report, Government Budget figures that richer countries also have bigger political sectors.

In the appendix to this chapter, I present the 'start of time' payoffs for ten agents who have randomly been assigned human capital values from 1 through 10. I assume a CES Cobb-Douglas type production function with additive average worker human capital for the private sector.

The private sector entrepreneurs and the political sector senior politicians were further divided into two categories. Businessman 1 and Senior Politician 2 correspond to the scenario when the senior politician is the 'honest' type and therefore the entrepreneur operates in a competitive industry. In contrast, Businessman 2 and Senior Politician 1 correspond to the scenario when the senior politician is the 'corrupt' type and therefore the entrepreneur operates as a monopolist. The junior political sector functionary is assumed to be corrupt. The table also shows final payoffs for 'corrupt' and 'honest' senior politicians (using the average wealth payoffs for all ten agents) after incorporating hypothetical Z-values and utility weights. For case 2, comparisons between payoffs for the politicians should be made across the subsets a and b, and not within each subset. The idea here is not to show any tractable decision making process for senior politicians, but rather to demonstrate that looking at wealth payoffs alone is not sufficient to analyze the allocation of talent.

Are we then ready to rank-order the vocations in terms of final or net payoffs? The table makes a number of assumptions, which I shall discuss shortly, that have important implications on the rank-order. However, even as this simple table stands, two ranks are possible.

Rank-order 1: If the politician is completely honest then the rank, in descending order, is – Honest Politician, Junior Politician, Businessman and Worker

Rank-order 2: If the politician is completely corrupt then the rank, in descending order, is – Businessman, Senior Politician, Junior Politician and Worker.

The observant reader would have already noticed that there are a number of problems that exist here. Most of them are a function of the assumptions I used to derive table 4. I discuss them briefly below.

First, I assume extremes in the case of senior politicians to simplify the problem. One is either entirely corrupt or entirely honest. This is of course unlikely to characterize reality and can change the rank-orderings. In particular, if a 'honest' type politician is willing to give a monopoly license, then private sector employment can be beneficial and can draw the most talented individuals.[24]

Second, the private sector production function is questionable. In a more dynamic model, the businessman's human capital can have decreasing beneficial 'impact' in future periods after the initial collocating of productive factors has been achieved. In this case, the payoff to higher human capital agents is reduced relative to agents with lesser human capital.

Three, I assumed that evasionary expenses were a multiplicative function of the probability of detection and the price of the good X_2. A different function, say a first-period fixed cost and negligible marginal cost structure, can be more rewarding to junior level politicians.

Finally, from the analysis here, it seems that the workers in this world are the least well off. They seem to be unambiguously the lowest net earners. This too is not correct. Note that the production function is an explicit function of the average employee human capital. Therefore, to the extent that it is in the best interest of the businessman to have a 'smarter work force', he will have to increase the incentives offered to them.

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[24] It is possible that even 'honest' type politicians will be willing to accept bribes from businessmen but possibly higher in value than bribes to 'corrupt' type politicians. The idea being, quite simplistically, that, after all, every man has his price.

Concluding Remarks

At the beginning, my research question was simple. I had set out to discover what are the motivations for an individual to become a politician. However, I quickly realized that this is a vague question. Motivations across countries and across individuals can be far too varied to conduct any reliable investigation. Besides, since the functions of government are identical to a large extent, it is probably safe to assume that some motivations are more salient than others. The formal model I have presented above is an attempt at stripping the problem of most of its many complexities and studying just a few salient factors. This does not mean that it is necessarily simplistic in its approach. It incorporates Max Weber's incisive distinction between living for politics and living off politics and, in fact, even augments the analysis by making these distinctions essentially decisions made at the margin. Therefore, in some sense, this is a more unified approach to political motivation. Later, through country level aggregate-data analysis support for some of the predictions of the model was found.

I have discovered that the analysis of what motivates political actors is many-faceted. Although it is complex, it is so vital a question that I perhaps need not elaborate on the usefulness of further research on this topic. By first understanding their motivations we can hope to organize, direct and coordinate political actors more efficiently. Moreover, we can proactively decrease the probability that the political sector will be a sector that is barely a resource-drain on the economy.

Nevertheless, I feel a real need for a more substantive analysis. A largely substantive analysis will either lend support or provide reasons to refute the analysis presented in this chapter. It will give us that elusive story behind the numbers and the equations that we can more easily transform into policy advice. This being said, the fact is that a substantive analysis may also augment the model and provide less aggregated data so that a more micro-level analysis can be

undertaken. This will only strengthen the validity of any specific policy advice we may choose to give.

CHAPTER III

THE ROLE OF CREDIBILITY IN FEDERALISM: A CASE STUDY OF RUSSIA

Introduction

In this chapter, I wish to discuss some of the important insights extended to the research on federalism by the fields of applied international trade and development macroeconomics. More specifically, I analyze the literature on the problems of trade reform with respect to developing countries in proposing the relevance of credibility in the trade orientation of federal units in the Russian Federation. Prominently Dornbusch (1990 and 1993), Radelet and Sachs (1998 and 1999) and Rodrik (1989 and 1992) among others, have proposed the role of credibility as a significant, even the most crucial, aspect of trade reform and macroeconomic stabilization for developing countries and generally their efforts at economic reform. I believe that there is remarkable relevance of this literature with federal units as the level of analysis and especially so in a country undergoing dynamic macroeconomic transition such as the Russian federation.

The organization of this chapter is as follows. In the following section, I provide a catalogue raisonne of the literature on federalism in Russia with the intention of providing an overarching purview of its direction. In section III, I highlight the recent theoretical contributions made using macroeconomic trade theory applied to developing economies in the wake of recent financial crises and transitions to the market. I then proceed to develop these insights for federal units in proposing the relevance of credibility capital – an obvious public good by nature for federal units of the same country – for sustainable economic reform with trade reform of course as a major component. Some empirical analysis is then provided in section IV that lends support to the analysis and suggests some directions for further research. To provide some intuition behind the

'public good' nature of credibility capital, in the appendix to the chapter, I also attempt to develop a simple formal model that provides insight into the calculus of contribution to its production by various levels of government. The model is general and the hope is that it can possibly be molded by scholars approaching the issue from a number of different standpoints. It can perhaps serve as a common structural framework for analyses of federalism that are otherwise unable to be exploited to their fullest by other researchers in the field of different theoretical persuasions.

The Literature: Cumulative or Variegated?

There is a large amount of literature – most of which is of course very new – that is available to those that may wish to even simply compile a list of relevant material to the study of federalism in Russia, let alone provide a cumulative contribution. To achieve a comprehensive task is quite a Herculean feat to achieve, and I will sadly not be providing the reader with such a guide, valuable as I believe it might be. The magnitude of information can be discouraging to a student interested in the topic, especially one that is unfamiliar with research that is done in Russian.

It is my contention that although the literature relevant to political science on federalism in Russia has been diverse it has been uncharacteristically cumulative inside the broader fields within which it can be constructively segregated.[1] A 'random' cross section of the literature yields one with the observation that these broader fields are essentially two.

The first of these categories can be called the constructive theory of federalism. This line of literature wisely espouses a particularly careful analysis of the center–region relationship along various dimensions. We are by now very familiar with Yeltsin' 'big bang' effect of dispersed authority that started the process of decentralized pressure that arguably proved instrumental in

bringing the state of Russian federalism to where it is today. These 'dimensions' therefore study this process of big-bang dispersion at various levels of analysis and using a plethora of methodologies for that crucial insight that will reveal the enigma. We will then be in a position, or so we hope, to select from a range of policy instruments to facilitate the construction of a better (more efficient?) federal structure.

These dimensions then are various. One important dimension is the analysis of ethnically fractionalized republics that in general studies the role of culture as a tool for gaining leverage in the bargaining process.[2] A second dimension is one, which, for want of a better term, can be called politico-economic federalism. This strand of literature, quite often through the analysis of budget sharing, public good provision and generally the political economy of income redistribution, seems to be emphasizing what Qian and Weingast (1997) would generally describe as the benefits of 'decentralized allocation of information and authority' in achieving credible commitment to market-preservation.[3]

Yet a third dimension emphasizes and analyzes important concepts in relation to other institutions, policies, or regions, which in turn have indirect manifestations on the center-region struggle. Here, many interesting phenomena have been uncovered and discussed, some of which now appear to form the overarching predicaments that have come to characterize much of the newer research efforts. One such important topic developed around the issue of donor and recipient regions in terms of resource and revenue flows, and though cannot be said to have clearly issued from the study of fiscal federalism in Russia, obviously derives from it its major basis. Since the topic itself lends itself to relativistic allusions, say for example cross-sectional studies of economic performance or privatization, it has pushed geography palpably onto the

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[1] In my view, the dynamic nature of the problem itself forces the research effort to be cumulative to some extent.

[2] See Balzer (1995), Solnick (1996), and McAuley (1997) for examples and further references.

stage and therefore understandably has implications for the analysis of federalism. Also within this dimension are other research endeavors relating to diverse and interesting concepts such political leadership, ethnicity, living standards, and demographics each with some important insights into the health of federalism in Russia.[4]

The second strand of literature, primarily imported from the economic analysis of federalism has understandably taken a more positive science approach.[5] For this reason, I believe it is often unfairly ignored or deemed too universal or even irrelevant by the impatient scholar of federalism in Russia or elsewhere. It has provided valuable internally valid insight on the theory of economic federalism through the discussion of optimal fiscal structures, optimal structuring of local units regarding the efficiency of public goods provision, optimal tax structuring for such provision, and so forth. The effects of the exportability of undesirable externalities to other jurisdictions while internalizing positive national or sub-national externalities form an underlying framework that is familiar to many such analyses.[6] It would be unfair to label the public choice literature on federalism simply another 'dimension' of this strand of literature, but for this brief preview to the literature it will have to suffice. Charles Tiebout's (1956) theory of 'voting with your feet', William Oates' (1972, 1979) well known 'decentralization theorem' and even Brennan and Buchanan's (1980) 'collusion theory' are seminal contributions that make a tremendous impact apropos their theoretical implications for the study of federalism.

The cursory and sweeping manner in which I have grouped and outlined these immense bodies of literature may easily give the reader the impression that I am unfair to the true consequence of

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[3] See Kirkow (1996), Treisman (1998, 1999) and Wallich (1995)

[4] See Heleniak (1997) for example.

[5] William Riker's concept of peripheralized federalist structures is arguably a seminal positive science contribution from political science; one I believe provides exceptional insight to the case of Russia. See Blanchard and Shleifer (2000) for an application.

[6] See for important examples Bhargava (1953), Rose-Ackerman (1981), Gordon (1983), Quigley and Rubinfeld (1986) and Hochman et. al. (1995)

the literature. If this is so, I am glad for it is my intention only to prevent the opposite – an ignorance of the moment of the existing literature. A student best makes his contribution on the margin, and in order to do so some perspective is required as to what the corpus is where addition is possible.

In the limited space available, I cannot hope to unite these two strands of literature so that students of Russian federalism from either perspective may benefit from the insights provided by the other. This task too must be done incrementally. I have tried to achieve this with respect to the public choice literature.[7] In my viewpoint, the applicability of this literature to our study of Russian federalism is almost unconditional and can help guide our research efforts as social science scholars onto a more 'progressive' pathway.

Theory

Introduction

A most interesting phenomenon relevant to political scientists is occurring relatively recently in the field of international economics. A rare platform has developed for constructive dialogue between political scientists and economists since many prominent international economists realize the relevance of the political sector in relation to international trade.[8] It is in this spirit that this research too is being attempted.

The essential insights into the study of federalism that I think contemporary international economics provides us relate to the literature on trade reform and its attendant problems. Therefore, it is to a purview of this literature to which I now turn.

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[7] See Goorha (2001) for a discussion of this viewpoint.
[8] See Bhagwati et. al. (1984) for a particularly clear account.

The literature is rather new, and grew out of the rather recent increased tendencies in much of the world towards freer trade and in much of the developing world away from the policies of import-substituted industrialization, the adverse effects of which have been touted by academics as early as the 1970s.[9] A new appreciation for the economics of free trade and endogenous growth then I believe may in part have been a reaction to the debt crises of the past two decades that simply shocked the expectations of politicians.

However, the impetus and fervor for freer trade probably arose from a combination of factors. In my view, three deserve special mention. First, there was a general trend in the 1980's that de-emphasized the beneficial role of the government and criticized the poor heterodox and populist macroeconomic policies that produced miserable economic performance in a world economy where external credit became ever more scarce. Second, the dissemination of global information bloomed making relative progress measurements a real source of demand for economic growth and trade liberalization. Finally, World Bank loans increasingly came with the condition of trade liberalization.[10]

The concept of import-substituted industrialization or generally all policies that encouraged a wall of tariff and quota restrictions to be erected against free trade came as a result of the desire to protect foreign exchange reserves. This in turn was necessary since most often domestic debt is denominated in hard currencies. Eventually, this became an industrialization strategy and is now acknowledged to be just that in common parlance. It is true that the policy of import-substituted industrialization was argued by some to be a sound industrial development strategy in its own right without its 'benefit' of providing foreign exchange protection.[11] The argument went that since commodity exports dominate the exports of developing countries and since their high

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[9] See Little, Scitovsky and Scott (1970) for an excellent discussion.

[10] See Nash (1991) for a comprehensive discussion on the role of the World Bank and the problems of inward-oriented policies.

elasticity of demand make them extremely susceptible to world price shocks, protectionism can help adverse terms of trade shocks from creating extreme disruptions in economic performance. However, trade–related progress in countries like Korea and Turkey increasingly put doubt on this argument. (Dornbusch, 1993) What was realized was that protectionism itself had an anti–export bias since the currency appreciated creating a 'tax' on export–related activity.

Further, since trade liberalization created both economies of scale through improvements in resource allocation and technology and economies of scope through a larger variety of goods, the negative effects of a closed economy resulted from a variety and quality in intermediate and consumer goods that fell far short of world levels. These effects were more exaggerated for countries that were smaller and more closed, for in smaller economies the welfare effects of protectionism are stronger. Harberger (1959), in a classic study estimated that the welfare cost of protectionist policies in Chile had amounted to 2.5% of GNP. While this may seem relatively small or innocuous, he demonstrated that when combined with the costs that arose from domestic distortions in resource allocations the welfare costs shot up beyond 10%. Across time, such distortions understandably have massive opportunity costs due to the compounding nature of economic growth.

An obvious question that follows from this brief discussion is whether there is any scenario under which protectionism is a justifiable strategy. A case can indeed be made for protectionism on the grounds of externalities and learning effects. The problem of externalities arises if a domestic firm is unable to internalize the benefits created from accumulated capital – either human or physical – when the economy is opened. Learning–effects based arguments present a similar line of reasoning and occur when for instance, socially productive labor training is not undertaken by local firms since the resulting productivity benefits cannot be captured by it with

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[11] Prebisch (1984) was a pioneer of this view.

certainty. I will discuss these arguments again later. However, I now turn to the issue of the problems that are associated with trade reform.

After decades of pursuing protectionist trade policies like import–substituted industrialization the major problem faced by reforming countries was the issue of gaining credibility. The importance of credibility cannot be overemphasized. Even a government with truly 'noble' intentions of liberalizing, can well be seen as really redistributive in its intentions. In the absence of macro–level instability, a government has a much better chance of being seen as a genuine liberalizer, but in its presence there is doubt in the minds of economic agents since the government may really be redistributive but liberalizes to gain access to soft loans, which are plenty for genuine liberalizers through the World Bank for instance.[12] The debilitating impact of this environment of uncertainty on the economy comes through the consequent stultified incentives for inefficient resource users to make positive changes towards becoming competitive at world prices.

Now if the government does liberalize under severe uncertainty then according to the famous permanent income model, we should expect households to simply substitute consumption of imported goods towards the present. In other words, people will borrow against their future income and hoard the imported goods since they believe that their price is lower only temporarily. Meanwhile the uncertainty risk prevents the shifting of resources from the traditional sectors to uses that are more productive. In fact Rodrik (1992) shows that if the risk from uncertainty and asymmetric information is high enough then there can be even less investment in the export sector than there might have been under a closed economy with protective measures in place.

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[12] See the World Bank's Development reports published in 1987, 1991 and 1996.

With this brief introduction to the literature, I now move on to the issue of its relevance to students of federalism. I will present a few more ideas that are relevant as we proceed.

Federalism and the role of Credibility Capital

Economic analysis provides a discipline to political analysis that it sometimes lacks sorely – the consecrated discipline of an internally valid argument, what Giovanni Sartori (1970) so masterfully labeled 'conscious thinking' in his seminal essay. I am in unconditional agreement with his prescience when he warns us that "we may well disagree about future prospects, or as to whether it makes sense to construct formalized systems of a quantitatively well defined relationship (mathematical models) so long as we wander in a mist of qualititatively ill–defined concepts."

I believe that guided by such conscious thinking we can indeed look at federal units as autonomous nations allowing us to transport much of economic analysis of trade reform and economic development to the study of federalism. It would be simplistic and erroneous to discard the literature as irrelevant since perfect parallels for many terms used in the literature may not be directly observable. The most important difference, in my opinion, is that the rules of the game are arguably different in the case of federal units as the unit of analysis than in the case of a purely autonomous nation state, if indeed such a being exists. In the case of inter–regional trade, the superstructure is defined by the federal government in which marginal changes may or may not be effected by the trading partners and their corresponding lower levels of governments. In the case of international trade where one entity is a federal unit – the case that I am interested in here – the superstructure is then defined by a combination of international and sub–national governments. While a perfect description of this playing field as it were might be useful, it seems fraught with practical difficulties and a constant awareness of this must suffice for now. It is for

this reason among others that any theoretical adventure must restrict itself to analyses targeted on evaluation of the margins.

A policy of import substituted industrialization in a federal unit then must be seen not merely as an autarkic development strategy, but also as a means of protecting the local budget reserves. The extent that the regional government faces demands for liberalization should depend among other things on the extent to which it faces internal demand for liberalization and external directives from the central government. While with relatively decentralized control it can insulate itself from such external directives largely to the extent that it is not dependent on external-credit, internal demand can be more stubborn. No single region, even the most prosperous, has a clear economic preponderance in most federal economies and must consequently be considered a small economy. The large welfare effects of pursuing a protectionist policy can therefore be a significant source for internal demand. Even where mobilization capacity is not large due to large collective action costs, the even larger welfare costs that are imposed by protectionism, the relatively freer flow of information internally and the democratic process all create demands for economic change that the government cannot simply ignore for very long.

It is argued in the standard economic literature that the case for protectionism is weak. Most economists believe, and I think rightly so, that in applied analysis externalities are the refuge of scoundrels, an appellation more often than not leveled at politicians. If indeed there are externality and learning effect problems that arise due to uncertainty in whether the local firm will be able to internalize any resulting benefits, the better alternative that is proposed is targeted subsidization. Direct subsidization avoids the much larger deadweight loss and, in general, the welfare loss that protectionism creates. The problem then is clearly political due to the long-term nature of the benefits that accrue from trade liberalization and the short-term budget worsening that occurs in congruence with the story provided by Calvo (1989) discussed above briefly in a

slightly different context. Calvo suggests that if a region liberalizes under credibility uncertainty then the individuals may overconsume imported goods in the SR until reform is reverted. The result is of course excess borrowing – or worse – running down savings internally and causing investment to be crowded out. The sudden surge in borrowing instigated by this intertemporal substitution can be expected to worsen the local government's budget position in the immediate short term, a proposition unappealing to most politicians.

The link between the credibility argument that underlies much of argument presented so far and a federal unit is a delicate but obvious one, perhaps best highlighted by an insightful chapter by Steven Radelet and Jeffrey Sachs (1998). They suggest, in conjunction with the recent crises in the East Asian economies of Malaysia, Korea, Thailand, Philippines and Indonesia that the onset of the crises was unexpected by any account and even betrayed standard macroeconomic logic as applied by soft theorists like investment firms and even, according to the authors, the World Bank. They proffer the argument, which they bolster admirably, that the financial panic was simply triggered by deterioration in what can be termed 'political credibility capital' for the purpose of this chapter. The government withdrew its lender–of–last–resort promise made to offshore creditors causing a financial panic coupled with a disorderly workout, where creditors engage in a grab race. Many economies appear to have simply fallen prey to economic 'contagion' in their suffering sister economies.

This succinct analysis neatly demonstrates how Calvo's logic has its place in the analysis of federal units. In international trade, the importance of the central government among other things is in its more reliable signal of credibility than a local government – a signal substantiated by resources such as control over the central monetary authority and the bureaucratic apparatus that generates trade policy. There is perhaps little debate if any that in a federal structure the central government is the primary coordinator. Brennan and Buchanan's collusion theory

purports that economic rent generated in brokering the decentralized market corroborates this claim most clearly. However, it is then a classic free–rider problem as to which level of government must devote resources to the building of credibility capital. That within a country, credibility capital is indeed largely a public good should be obvious. Credibility is a signal based in information on political and economic risk. Information is perhaps the most important example of a pure public good due to its non–rival and non–excludable nature. The prospects of the internalization of rents occurring from signaling its credibility capital should guide the analysis of contributions to building it in any country. The model presented in the appendix on the problems of contributions among various levels of government in public good provisions is particularly useful in analyzing this issue where the public good is of course credibility capital.

Also relevant to this analysis is the idea of an investment tax, the concept of which was discussed above. There is naturally as difference required in the rate or return between the import–competing and export sectors or alternatively even foreign direct investment. This difference will in turn closely depend on the costs of shifting capital to the sector within the region and the probability that economic reform that widens the difference and enables the calculus will be reverted and there will then be costs of shifting back. Now, if this investment 'tax' is high enough, it is possible that there will be lesser investment in the export sector than there would have been under protection as suggested.[13]

I end this section then with a brief review of the link that is often drawn in the discussion of trade reform in development economics with macroeconomic stability programs since I believe an understanding of this link is important to make the analysis in this chapter more complete, notwithstanding its brevity.

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[13] See Dornbusch (1990) and Rodrik (1992) for excellent discussions on this issue.

The classic chronology of events unfolds with an adverse terms of trade shock to the developing economy brought about by exogenous changes in the global economy. This 'recession' stems the flow of direct foreign investment and local capital flight ensues. Speculation gives birth to volatile inflation rates as the government hopelessly fights a secular deterioration in the exchange rate drying up its coffers and decreasing its credibility even further. The country is then reduced to little else than asking for external aid, which comes at the condition that macroeconomic reform and trade liberalization should take place. Trade reform may well be then reverted if terms of trade start improving and there is internal pressure to do so. Protection of the terms of trade comes with an anti–export bias as discussed above since the exchange rate now starts getting overvalued. Alternatively, it is also possible that reform continues if the population and more importantly politicians with shorter time horizons are convinced of the benefits. The situation is one of a minimum of two equilibria - one virtuous in terms of high growth rates, high DFI and freer trade, the other inferior in terms of lower growth rates, low DFI and autarkic trade policies.

The cycle should now be obvious. The problem, as discussed above is then of gaining credibility if a move to the virtuous equilibrium is attempted at low adjustment costs. Without credibility, the investment tax will be too high for any growth in investment to occur in the shorter term. There is no macroeconomic theory that provides us with a secret way to do this painlessly. Sound fiscal and exchange rate policy is required and this *will* cause macro–level instability at least in the short term. There is no panacea.

Empirics

In this section, I present some results from a dataset I compiled on the regions of Russia from abstracts made available by the Russian Ministry of Statistics *Goskomstat*. The regression analysis

presented was not conducted with a view to identify culpable determinants. It is intended to provide a more involved understanding of the analysis presented in this chapter and must be seen as descriptive in its approach.

The dataset includes observations on foreign investment and trade among other variables on seventy-three of the eighty-nine regions of the Russian federation. It does however include observations on regions with the status of autonomous okrugs and republics. The regions that I am currently unable to incorporate in my analysis include the Republic of Kalmikiya in the Pavolzhshkii Rayon, the Republics of Ingushetia, North Ossetia–Alaniya, and Chechnya in the North–Kavkaz Rayon, the Republic of Altay in the West–Siberian Rayon, and the Chukotsky Autonomous Okrug in the Far–East Rayon.

Using the data I collected I then constructed an Openness Index as is usually defined in standard international economics – the exposure in total income from trade. I have defined it as the ratio of total *international* trade conducted by the region in total trade and commerce conducted within the region. The units are in comparable real 1998 roubles. The measure is unfortunately crude at this moment – as are most measures of openness Professor Dornbusch (1993) reminds us. The Openness Index is a crude measure since it does not consider trade restrictions imposed by regional governments. An example explains why this is a problem. Both India and the United States of America have very similar exposure to trade in their GDP, and consequently would score alike on the Openness Index as I have defined it. Yet, India is decidedly more closed than the United States. A necessary direction for future research would be the construction of a more sensitive index that considers QRs and tariffs. We can hope, as I believe would not be outlandish, that since we are considering international trade we are holding one of the countries constant and such divergences in trade restrictions that make the Openness

Index less reliable in country–level comparisons are minimized to a large extent. All the same, it would not be fair to use the terminology of autarky and free–trade without some concern.

I also constructed an Ethnic Fractionalization Index scaled from 0 to 1 where a lower score represents low fractionalization. The theory, inspired in part by the important contributions by Putnam (1993) and La Porta et. al. (1999), is that a more fractionalized region is less likely to be open due to a more interventionist and inefficient government. Most relevant to this chapter is the idea that a government in a more fractionalized region will contribute less to provision of our public good.

I have data for the Openness Index in 1997 and 1998. The Openness Index ranges from around 0.8% to over 35% in 1997 and from approximately 0.7% to just below 30% in 1998. The Ethnic Fractionalization Index lies between approximately 0.10 and 0.97. Some simple analysis of the openness variable is illustrative. Table One below presents the results of a regression analysis of the Openness Index on the Budget Balance and the Ethnic Fractionalization Index. The method used is a feasible generalized least squares regression. Since I have only two time periods I have used panel corrected standard errors as recommended by Beck and Katz (1995) and have assumed common autocorrelation parameters across observation units. As is perhaps expected, a higher budget balance marginally decreases the openness of a region. Rodrik (1992) suggests that paradoxically trade reform and macroeconomic stabilization efforts occurred simultaneously in the 1980s in many developing countries even though economic theory provided no strong reason for this to occur. He is forced to concede that perhaps the reason is that "when a man knows he is to be hanged, it concentrates his mind wonderfully" and that trade reform can have other roles such as buttressing credibility for a government to perform other seemingly unrelated functions such as "jolting entrepreneurial expectations" and fiscal retrenchment. A central government like

Russia's that is cash–strapped paradoxically helps in providing the final push to the region towards freer trade.

TABLE ONE: OPENNESS INDEX AS DEPENDENT VARIABLE

Variable	Coefficient	Panel–Corrected Standard Error
Budget Balance	–0.00179	0.00007
EFI	4.25676	1.83485
Constant	2.5792	1.48055

All coefficients significant at the 5% level other than the constant which is significant at the 10% level. 146 observations

The coefficient for EFI does lend support to the expectation that more fractionalization will cause a government to contribute less to credibility capital by suggesting that all things the same a less fractionalized a region is the more open it tends to be.

Perhaps the most important indicator of accumulated credibility capital is direct foreign investment of the type that involves the physical movement of capital for it indicates that the investment tax that was discussed above is not exceedingly detrimental. I have also obtained data on portfolio investment, which is direct foreign investment that incurs the least investment tax since it is relatively liquid compared to direct investment of foreign capital. I however use the former variety of investment as my dependent variable in a regression against a battery of independent variables described briefly in Appendix Two. The regression results are presented in Table Two below.

The results are not very surprising and follow the logic of the analysis rather well. First, note that less ethnic fractionalization does lend itself to more involved direct foreign investment in accordance with what we would have expected from the credible reform sustainability line of argument. In accounting for the sources of the budget balance, it is noteworthy that more expenditure is helpful in furthering the reform process. Presumably, this is reflective of the right kind of expenditures – perhaps on creating the necessary infrastructure and socioeconomic

conditions. In contrast, a higher budgetary income signals more self-sufficiency and creates doubt over the credibility of trade reform to some extent – perhaps an indication of the region's capacity to revert to the inferior equilibrium. Although the corporate profit variable is not significant, I am puzzled by its positive sign. With credible signaling of structural change to foreign investors in mind, I had hoped to see a negative partial impact on it since the more profitable regional enterprises are often those that are monolithic remnants of Soviet-era industrial enterprises. This however may no longer be true since the data being analyzed is almost a decade after the transition began. Structural employment changes, which are credible signals of serious reform intent, have occurred and do seem to provide solace to physical capital investors of foreign origin. The trade variables and especially trade with non-CIS countries, which very likely do represent structural changes in trading partner portfolios from the past, do seem to have the signs expected by market mechanisms. I see little information on credibility derived from the commercial activity variables – their partial effects are representative of supply and demand effects and are justifiably stronger on retail commerce. With larger inflows of citizens into the regions, direct foreign investment of physical capital decreases cetaris paribus. This seems perplexing at first since a larger market should be attractive to foreign investors. However, since we have controlled for the total population of the region and changes in structural employment, the marginal effect of an increasing might indicate an asylum effect engendered by resisting structural changes. Further research of this effect can indeed provide some valuable insight.

TABLE TWO: FOREIGN DIRECT INVESTMENT OF PHYSICAL CAPITAL AS DEPENDENT VARIABLE

Variable	Coefficient	Panel–Corrected Standard Error
Total Population	33.1868°°	11.5344
Budget Income	-11.53919°	6.760982
Budget Expenditures	12.46025°°	5.757688
Corporate Profit	10.143156	1.197794
Change in structural Employment	1385.7084°°	182.9981
EFI	20870.9°°	10249.16
Retail Commerce	-2.494172°°	1.267793
Wholesale Commerce	-0.8861015	0.7659897
Exports to Non–CIS Countries	-18.18103°°	5.955322
Imports from Non–CIS Countries	45.66175°°	15.74695
Exports to CIS Countries	-18.91389	14.0797
Imports from Non–CIS Countries	43.96813	84.43371
Net Domestic Migration	-3.115022°°	1.27297
Foreign Equity Investment	0.375688°°	0.0739086
Constant	-38299.51°°	12027.71

°°signifies significance at the 5% level while °signifies significance at the 10% level. 146 observations

Concluding Remarks

Qian and Weingast (1997) mention the role of credible commitments to market-preservation in their discussion of the role of decentralized efforts towards a more efficient federal structure using localized information and authority. I am therefore not the first in suggesting the importance of credibility in economic reform relevant for federalism. In this chapter, using some very basic concepts developed from international trade theory and development macroeconomics, I present a fresh approach to the problem that has hitherto gone unnoticed. I look at credibility as essentially a public good and therefore credibility capital as a production exercise where the free–rider problem looms large. I conduct some empirical analyses that do seem to lend at least some preliminary support to the idea of the importance of credibility capital deemed so important in international development economics at the level of federal units in Russia.

In the appendix, I present a model of public good provision using inter–governmental contributions and hope that it will accomplish two things. First, it will provide intuition on the calculus behind the public good provision problem in general that seemed so central to me in my

study of the extant literature on federalism in Russia in one way or another. I hope that this will bolster the uncharacteristic cumulative direction that political science research in this field seems to be taking. Second, less ambitiously, the model at least provides some further insight into the production of the public good central to this chapter – credibility capital.

CHAPTER IV

THE THEORY OF CONVERGENCE IN ECONOMIC INCOME: SOME APPLICATIONS, LESSONS AND OBSERVATIONS

Introduction

Political scientists have been fascinated by the concept of economic growth for a variety of very compelling reasons. Primarily, we are interested in uncovering the nature of the interplay between economic growth and components of the political sector. Political sector determinants of economic growth fascinate us to the extent it can be discovered how politics is or can be instrumental in engendering or impeding economic growth. For the American politics student, the instrumentality of interest-group politics to economic growth might be one such interesting example.[1] The marginal impact of individual states in national growth is another important area of research with obvious implications for a wide range of policies and prominently local and national government budgets.[2] In international relations, the effects of war on economic growth are of course an automatic topic for research.[3] Of relevance to many comparativists are studies that research political determinants of economic growth in datasets with more than one county as the unit of observation.[4] Also of much general interest have been research enterprises that test economic performance of political systems by assessing them over time on a variety of characteristics such as the relative position of labor unions, the relative strengths of political organizations on the traditional political left-right continuum, the role of political institutions

[1] For a general discussion of this argument see Gray and Lowery (1988) and Brace et. al. (1989).
[2] See Dye (1980) and Hendrick and Garand (1991).
[3] Rasler and Thompson (1985) research this link in a long time series framework for five major powers.
[4] For an excellent contribution see Alesina et. al. (1996). Similarly, I think, Gasiorowski (1995) deserves notice.

with respect to various entities within civil society, and so on.[5] Finally, the relevance to this debate of the idea of democratization is so significant that it has always deserved special attention.[6] It is perhaps now acknowledged that economic growth does not cause democratization *per se*, but there is compelling evidence that links democratic stability to levels of economic growth achieved by nations.[7]

It is however not my intent to provide a comprehensive review of the literature in political science here. This paper is about economic convergence across economies and I aver that given such interests in economic growth, it should not require a far stretch of imagination to see that the idea of convergence in economic growth also deserves our attention. The basic idea of economic convergence is quite simple even though the extant literature in economics often conveys differently. A straightforward definition of convergence might be that two regions A and B converge in income per capita if there is reason to believe that, some time in the future, their incomes shall differ from each other by a magnitude that is arbitrarily small and that this magnitude diminishes unconditionally during the time period considered. The relation of convergence to politics is of course intricate and important. Consider the European Union, which makes political and socioeconomic convergence, or cohesion, a fundamental objective and expends vast amounts of its resources towards actualizing a union that is 'closer' in every sense of the word. Convergence is taken seriously in the EU. Almost all its undertakings at some level are either directly or indirectly meant to achieve a common denominator among its members – from some objectives of the Common Agricultural Policy to programs aimed at vocational

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[5] An interesting example is Garrett (1998). For a different and fresh approach also see Hall and Franzese (1998) where they outline the role of central bank independence as a credibility measure that has significance for wage renegotiations in an economy.

[6] Huntington (1984) succinctly discusses the normative implications that form the reasons the topic of democratization has been of such intense attention in political science.

[7] The debate is neatly presented in an engaging article by Przeworski and Limongi (1997). More recently see Barro (1999).

training; from the Economic and Monetary Union[8] to the European Social Fund; from the Common Commercial Policy to the Common Foreign and Security Policy. It is obviously realized in the European Union that convergence in economic performance and political viewpoint allows cooperation on agendas that are more compatible by avoiding costly confrontation.

This therefore, is a theoretical and empirical paper that attempts to formally introduce the idea of convergence. In this paper, using theoretical constructs developed in economics, I discuss the idea of convergence in incomes across different units of observation. Through empirical analysis, I show different competing and corroborating evidence on convergence. I review and use the neoclassical growth model as a founding basis for the analysis on convergence. However, it has been shown that well-known empirical tests of this approach are fraught with potential error and difficulty, and therefore some alternative approaches are also discussed and demonstrated.

I start by providing a brief introduction to the neoclassical economic growth model. Thereafter I present various empirical analyses of convergence discussing the theoretical construct they employ. I discuss various new observations for each case. In the theoretical appendix to this paper, for the interested, I solve a version of the neoclassical growth model only for the sake of completeness. Most articles that are discussed in this paper rely on such a model but do not present it in the paper.

Economic Growth and Convergence

The Malthusian notion of uncontrolled population growth thwarting the amount of resources available per head has long been abandoned in the social sciences.[9] It was in economics on account of the Solow–Swan model and the so–called Inada conditions that belied this pessimistic

[8] Specifically, the convergence criteria laid out for consideration for membership to Stage 3 of the EMU is an obvious example. The criteria for price and interest rate convergence are even defined in terms of a function of the performance of the best performing member countries.

world.[10] The conditions formally introduced the idea that a country with a lower level of capital for its worker could hope to produce a larger amount of output at the margin than could a country where the level of capital for its worker was much higher. In other words, diminishing returns to capital was a distinct possibility and the neo–classical growth model uses this idea.

Modern endogenous growth models are more variegated than the simple neoclassical growth model (Solow or Solow–Swan growth model) and are preferred to the neoclassical growth model, which must assume that diminishing returns to capital do set in and provides no intuition on the determinants of its parameters. However, the fact that the Solow growth model can explain patterns of variation in income and has powerful implications for the notion of convergence prevents it from being replaced or even marginalized by other versions.

The mechanics of convergence in the neoclassical growth model are straightforward. I solve the model formally in the appendix however here I only present the basic insights. Barro and Sala–i–Martin (1992), for instance, following Solow (1956), Cass (1965) and Koopmans (1965), show convergence by assuming an intensive form production function and diminishing returns to capital, which is of course required to demonstrate convergence in the neoclassical growth model. They use the notion of effective labor growing at an exogenous rate x such that in the steady state of their version of the neoclassical growth model they suggest output (Y), capital (K) and consumption (C) per unit of effective labor $-(y,k,c)-$ must grow at the rate of x. In Mankiw, et. al. (1992) a similar specification is adopted. The essential insight however is not different in these different adaptations of the neoclassical model. The steady–state capital to labor ratio varies positively with the savings rate and negatively with the rate of population growth. This is just a verbal statement of the familiar Solow–Swan differential equation

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[9] For a restatement of Malthus's idea see Patten (1895)
[10] Solow (1956) and Okamoto and Inada (1962)

$$\dot{k} = sf(k) - (n + \delta)k$$

In the steady state, the time derivative of k is equal to 0. Therefore k and consequently y and c are all constant. Aggregate counterparts of these variables must hence grow at the rate at which the population is growing.[11]

The model takes all its parameters – including significantly savings rates, time preferences of actors, and technology – as exogenous and therefore, a group of economies that have similar underlying parameters should in theory converge to the same steady–state levels. The economy with low levels of per capita income should enjoy faster rates of growth than the economy that is already nearing the steady state. At the steady state of course, growth in all per capita income is zero. This idea contributes to the notion of conditional convergence whereby convergence is conditioned on making necessary adjustments for differences across countries in steady state levels of income per capita and growth in population and technology at the minimum. A primary reason why Barro and Sala–i–Martin (1992) chose to demonstrate convergence across US states is that differences in exogenous parameters are deemed to be minor. In other words, they depend on unconditional or absolute convergence.

An interesting suggestion in Barro and Sala–i–Martin (1992), other than obviously the startling conclusion that the speed of convergence in a wide variety of settings is roughly 2 percent per year, is that only differences across countries in natural resources, government policies and so on that translate to differences in levels of initial available technology do not affect the convergence rate. Further, in theory, since common steady–state values for per capita income and rate of technological progress are chosen for empirical investigation, convergence is direct and without

[11] In a rather offbeat and entertaining article Phelps (1966) provides the golden rule of accumulation which suggests that the steady–state rate of savings that maximizes the steady–state per capita consumption is called the Golden Rule savings rate. A savings rate that exceeds this rate leads to excess saving (and lower per capita consumption) and is therefore inefficient over time.

oscillation. In cross–sectional empirical testing however, random shocks have an offsetting effect on the convergence parameter and must therefore be decomposed to keep the error Gaussian and obtain consistent conditioned estimates for the rate of convergence.

Sala–i–Martin (1996) elaborates much more clearly on two separate types of convergences – namely β convergence and σ convergence. The former, like the regressions presented in Barro and Sala–i–Martin (1992) is primarily concerned with finding a negative association between the growth rates of income per capita and its initial levels. This is convergence in the sense of regression to the mean. The latter variety deals with the dispersion of per capita income across groups of economies. Therefore with $0 < \beta < 1$ the estimation of

$$\log(y_{it}) = a + (1-\beta)\log(y_{it-1}) + u_{it} \qquad u \xrightarrow{d} iidN(0, \sigma_u^2)$$

provides an estimate for β convergence, and the sample variance

$$\sigma_t^2 = \frac{1}{N}\sum_{n=1}^{N}\left(\log(y_{it}) - \mu_t\right)^2$$

provides an estimate for σ convergence. The two concepts are of course closely related.

$$\sigma_t^2 \cong (1-\beta)^2 \sigma_{t-1}^2 + \sigma_u^2$$

Therefore, β – convergence is a necessary though not sufficient condition for σ convergence. I shall return to this later.

The question of whether the Solow–Swan model of economic growth implies convergence or not is debatable since there is persuasive empirical research both for and against the case. What perhaps can be drawn from the literature without much contention is that convergence probably does not exist unconditionally even in asymptopia. There is the need to qualify convergence by suggesting the nature of conditionality. Convergence is observed when certain variables are controlled for (like in Barro and Sala–i–Martin (1992), Sala–i–Martin (1996)). Contemporaneously

for example, Mankiw et. al. (1992) suggested that augmenting the Solow model with human capital in addition to physical capital explains why empirical analyses of the model result in 'too much' emphasis on its exogenous parameters – population growth rates and savings rates. Similarly though, they find convergence in congruence with the Solow model's predictions once differences in savings and population growth rates are accounted for.

I now turn to empirical investigations of convergence. I begin with two analyses that explicitly test for convergence within the neoclassical growth model. Later I assess reactions to such analyses and alternative specifications for convergence analysis.

Observations and Empirical Analyses

Initial Condition Regressions

In the initial condition regression, or the so–called Barro regression, we expect growth rates to be inversely related to the initial levels of income. The standard form of the regression is outlined as equation 15 in Barro and Sala–i–Martin (1992)

$$\frac{1}{T}\log\left(\frac{y_{t,t_0+T}}{y_{t,t_0}}\right) = B - \left(\frac{1-e^{-\beta T}}{T}\right)\log\left(y_{t,t_0}\right) + u_{t,t_0,t_0+T}$$

where $B = x + \left[\left(1-e^{-\beta T}\right)/T\right]\left[\log\left(\hat{y}^{*}\right) + xt_0\right]$ and has independence from i since the assumption is that the steady state level of income per unit of effective labor and the level of technological progress is constant across observation units. Economies in a Barro regression are of course considered to have similar preferences and similar technology. Empirical applications of the Barro regression are numerous. For a good overview, the reader should see Barro and Sala–i–Martin (1995). For the purpose of this paper however, some examples are provided below.

Credibility as a conditioning variable

The data for this section are obtained from the Penn World Table version 5.6a. Data on real GDP per capita in constant dollars for a group of 38 countries was compiled. The countries included are all either industrialized or industrializing economies. The idea is to qualify, at least at a basic level, the assumptions of holding constant the regime in a simple Barro regression. This is implicitly based on the vast literature in development economics on the effect of stability and credible economic reform on economic growth through a rather unexplained process of placing economies on persistent virtuous rather than vicious cycles.[12] I shall elaborate below. For now, suffice it to say that if all countries are indeed on a virtuous cycle that has common defining characteristics then we can say that we are perhaps controlling for the larger part of the deviations in steady-state values of income per effective unit of labor.

The results are in table one. A total of four models were estimated. Consider for now the first two columns. The first column uses data for all 38 countries whereas the second only uses countries that were OECD members in 1992 even though the series begins before the OECD came into existence. This gives us a total of 24 countries. We find some evidence of convergence in both cases. Both results are interesting - especially so when we consider that the average growth rate of the population in the full cohort was 1.32% from 1951 to 1992. The negative relationship is evident from the line of best fit presented in figure one. The simple correlation between the two variables is -0.48. This compares to -0.93 reported by Barro and Sala-i-Martin for US states between 1880 and 1988 and a population growth rate of 2% per year. It is troubling however to note that to generate these levels of convergence the capital intensity parameter must be in excess of 0.9 for any of the models estimated if we assume similar parameters as do Barro and Sala-i-

[12] See for example Calvo (1989), Dornbusch (1993) and Rodrik (1989, 1992). Rodrik (1992) allows "...unorthodox roles for trade policy such as buttressing credibility for a government's anti-inflation program, helping out with fiscal retrenchment, and jolting entrepreneurial expectations."

Martin (1992).[13] The independence of the error term across observations was a concern that prompted the third model, which attempts to decompose the error term into controlling variables and a spherical disturbance term. In keeping with the emphasis of this analysis on the benefits of a country being on a virtuous cycle that aids convergence, the average openness of the countries and the variation of the openness index for the country were included as regressors. The opinion was that it would control for the effects of shocks to growth rates in economies that emanate from autarkic tendencies or in general any set of government policies that amount to perceived detraction from a dedicated commitment to the virtuous cycle. The Cook–Weisberg test for heteroskedasticity is strongly rejected for the third model. The simple correlation between the openness variable and the initial level of income is very weakly positive so the bias on the convergence estimate is negligible. The table also reports the steady state values of the standard deviations of the cross–country dispersion of income per capita in the fifth row. Note that for the models for all countries this value is systematically greater than that for the OECD countries. While caution is advised in interpreting this result too forcefully, it nevertheless suggests that cross–country income dispersion is perhaps inherently more in the full dataset in the steady state implied by this analysis.

Although the openness variables are not significant, their signs are instructive to consider.[14] Controlling for variability in the openness index, in the full dataset, which includes industrializing economies, an increase in the average openness is likely to decrease growth rates. After decades of pursuing protectionist trade policies like import–substituted industrialization the major problem faced by reforming countries was the issue of gaining credibility. The

[13] Specifically, they assume a log utility, growth rates of population and labor augmenting technological progress at 2%, depreciation at 5% a year, and the rate of discounting at 5% a year.

[14] Significance is not a good measure for assessment of the variables' performance anyway since the two openness variables are highly correlated. Note the much higher percent of variance explained by Model Three compared to Model One.

importance of credibility cannot be overemphasized. Even a government with truly 'noble' intentions of liberalizing, can well be seen as really redistributive in its intentions. In the absence of macro–level instability, a government has a much better chance of being seen as a genuine liberalizer, but in its presence there is doubt in the minds of economic agents since the government may really be redistributive but liberalizes to gain access to soft loans, which are plenty for genuine liberalizers through the World Bank for instance.[15] The debilitating impact of this environment of uncertainty on the economy comes through the consequent stultified incentives for inefficient resource users to make positive changes towards becoming competitive at world prices.

TABLE ONE: INITIAL CONDITIONS REGRESSION

Variables	Model One	Model Two	Model Three	Model Four
Rate of Convergence	0.8867% p.a.*** (0.0022666)	1.95988% p.a.*** (0.0018085)	0.39825% p.a. (0.0024448)	2.27427% p.a.*** (0.0022086)
Average Openness	–	–	– 0.0469872 (0.0591036)	0.0414469 (0.0473688)
Openness Variability	–	–	0.0008413** (0.0003215)	– 0.0002848 (0.0002636)
Constant	0.0866606*** (0.0177319)	0.1368005*** (0.0148749)	0.049904** (0.0197845)	0.1477919*** (0.0182033)
R^2	0.2271	0.7091	0.4609	0.7256
Steady–state σ	0.0110578	0.011450	0.0091369	0.0119331
Cohort	1950–1992 38 Countries	1950–1992 24 Countries	1950–1992 38 Countries	1950–1992 24 Countries

***Denotes significance at the 1% level
**Denotes significance at the 5% level
Standard errors in brackets

[15] See the World Bank's Development reports published in 1987, 1991 and 1996.

Now if the government does liberalize under severe uncertainty then according to the well-known permanent income model, we should expect households to simply substitute consumption of imported goods towards the present. In other words, people will borrow against their future income and hoard the imported goods since they believe that their price is lower only temporarily. Meanwhile the uncertainty risk prevents the shifting of resources from the traditional sectors to uses that are more productive. In fact Rodrik (1992) shows that if the risk from uncertainty and asymmetric information is high enough then there can be even less investment in the export sector than there might have been under a closed economy with protective measures in place.

It is also surprising to note that the initial condition is no longer significant in Model Three and the convergence rate is substantially slower than in Model One. I believe this is evidence of some dynamics in the convergence rate, which we are ignoring in such panel regressions that average across observation units however I shall return to this point later below.

A reversal of the signs for the OECD countries is also rather interesting since in mature economies credible signs are expected by the private sector. While more openness does translate to higher growth, holding the level of openness constant more variability is still punished.

In table two, I have expanded the dataset to include a variable suggested by Henisz (2000) for the type of growth regression reviewed here. Using a rather simple model that analyzes the behavior of a number of independent political actors, I believe he is persuasive in suggesting the role for considering the number of institutional constraints placed on such political actors (such as the executive, the lower house, the upper house and the judicial system) in their interaction with the private sector. The variable he generates is highly correlated with more traditional political sector analysis variables like the International Country Risk Guide and Polity and is

claimed to work even better in settings that are more dynamic. Unfortunately, his dataset only begins in 1960 and I therefore review the previous results again before I add this extra variable. The results are presented in table two below. Notably the political constraints variable does not show up significant in Model Three but is highly so for Model Four.[16]

TABLE TWO: CREDIBILITY AND CONVERGENCE

Variables	Model One	Model Two	Model Three	Model Four
Convergence	0.8889% p.a.** (0.0027763)	1.7421% p.a.*** (0.002226)	0.5950% p.a.* (0.003409)	5.14425% p.a.*** (0.0026315)
Average Openness	-	-	- 0.0618261 (0.0651225)	0.0520659 0.0386872
Openness Variability	-	-	0.00105*** (0.0003514)	-0.0002258 (0.0002245)
Political Constraints	-	-	0.0140558 (0.0084348)	0.0351343*** (0.0085271)
Constant	0.0951892*** (0.025087)	0.141729*** (0.0209488)	0.0718512** (0.0284727)	0.1941219*** (0.0212068)
R^2	0.1644	0.5797	0.5411	0.7896
Steady-State σ	0.0126498	0.012898	0.0093956	0.011394372
Cohort	1960–1992 38 Countries	1960–1992 24 Countries	1960–1992 38 Countries	1960–1992 24 Countries

***Denotes significance at the 1% level**Denotes significance at the 5% level
* Denotes significance at the 10% level Standard errors in brackets

[16] The higher rate of convergence for model four still implies an alpha of over 0.8.

The signs are as expected. More political constraints do in fact assure the private sector of the government's credibility. The variable is weakly correlated with the average openness of the economies, but it does not perform much better in terms of significance even when the average openness of the economies is not considered. Nevertheless, it is instructive to note that the convergence rate is much higher when it is considered. It certainly does appear to be explaining variation in the growth rates to some extent.

Cities of the world and regions of some EU members

Initial condition regressions provide insight in a wide variety of settings and are for this reason compelling tools for studying convergence. Consider a few more examples. Figure two presents data obtained from the Economist Intelligence Unit on the hourly cost of labor for 68 of the major cities of the world over a span of 11 years. There appears to be a negative relationship between growth and the initial condition. The simple correlation between the two values is -0.24. One can assume at first pass an implicit conditioning in this analysis on the idea of cities themselves. Besides embodying urbanization, many face similar problems emanating from their attributes of size, population density, infrastructure management, relative economic progress, and so on. However, problems do exist in the interpretation of results. That the rate of convergence obtained is a negligible 0.1% and that even this is insignificant can be construed to mean either the conditioning is crude and incomplete or that there really is no reason to believe that hourly wage per worker in Istanbul and Munich should converge.

Maintaining this identification problem however, notice that while even by removing (one might suspect perhaps somewhat arbitrarily) Colombo, Manila, Lagos, and Bucharest from the analysis increases the simple correlation further to -0.48, the convergence is now just 0.3% and is very significant – perhaps evidence in favor of the second interpretation.

Figure three shows data obtained from Eurostat, the statistical office of the European Union, for 502 regions in four current EU members at the lowest denomination available from 1980–1996.[17] Here the simple correlation is rather weak. The estimate for the rate of convergence however is 2.17% and is also significant at the 1% level. A cursory analysis suggests however that practically no convergence obtains for any of the countries taken individually. I suspect that this reflects the tremendous diversity that exists among the regions themselves in size and endowments, made more stark when a only a single country is observed. The least well off region considered, Badajoz, Spain, remains approximately ten times poorer than the richest region, Kreisfreie Stadt, Frankfurt am Main in Germany. Again, this sort of analysis is just giving us an average estimate for convergence.

Solow Regression

Mankiw et. al. (1992) argue that it is important to consider human capital in addition to the exogenous population growth and savings rates in a Solow regression to determine the steady state level of income per capita else their estimated partial effects will be too large. The authors argue that ex ante "one should not expect convergence" and that the Solow model itself does not predict convergence unless indeed it is possible to control for differences in human capital accumulation, savings and population growth rates.

The discoveries in Mankiw et. al. are made by operationalizing the Solow growth model by substituting the steady state level of capital per effective unit of labor into the intensive form Cobb–Douglas production function. Thereafter, the following model is estimated

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[17] This corresponds to the NUTS 3 level. NUTS stands for Nomenclature of Territorial Units for Statistics. The entire territory of the EU is subdivided into 77 regions at the NUTS 1 level, 206 at the NUTS 2 level and 1031 at the NUTS 3 level.

$$\ln\left(\frac{Y}{L}\right) = a + \left(\frac{\alpha}{1-\alpha}\right)\ln(s) - \left(\frac{\alpha}{1-\alpha}\right)\ln(n+g+\delta) + \varepsilon$$

where the term $a + \varepsilon$ are components of initial technology, A(0), and include resource endowments, climate, institutions etc. Differences across countries are absorbed in the shock parameter. Income per capita is the end observation in the time series and is an approximation for the steady state – perhaps a disadvantage of this approach. Theoretically, s, the level of savings, which is estimated as the average share of investment in GDP over the series, and n, the average population growth rate, are assumed to be independent of the shock parameter in the initial Solow model. Therefore, assuming the standard share of capital in the production function, the testable prediction for the absolute values of the elasticities of income per capita with respect to the savings rate and with respect to the population growth rate (when summed to the technology growth rate and the depreciation rate) is that they must equal one half.

TABLE THREE: SOLOW REGRESSION

Without Productivity		With Productivity	
Variable	**Partial effects (std. error)**	**Variable**	**Partial effects (std. error)**
ln(savings rate)	0.984395** (0.385517)	ln(savings rate)	0.460062** (0.188117)
ln(population growth+g+δ)	-0.986236 (0.708485)	ln(population growth+g+δ)	-0.506556 (0.332503)
		Ln(productivity)	0.706930*** (0.080066)
Constant	7.97471*** (2.10412)	Constant	1.69394 (1.20629)
R^2	0.2952	R^2	0.8561
k intensity	0.496302 (0.346467)	K intensity	0.325667 (0.203933)
		H intensity	0.476707 (0.063738)
Rate of Convergence	2.96% p.a.	Rate of Convergence	1.16% p.a.

The average population growth rate for the cohort is 0.876%. The Cook–Weisberg test rejects heteroskedasticity only for the expanded model. ***Denotes significance at the 1% level **Denotes significance at the 5% level Standard errors in brackets

As an exercise to demonstrate the analysis table three presents some results for 24 OECD countries. The trouble with this sample is of course its rather small size. The benefit is that the data is more reliable and that any variation in omitted features are not likely to be significant. Two models are presented in the table. The first does not include as a regressor any measure of the productivity of the labor force as a proxy for the level of human capital. The second, by including such a measure augments the model presented above and is able to provide reasonable estimates for the elasticities. Significance tests that both coefficients, in absolute value, are equal to 0.5 confirm this result satisfactorily.

Objections

Danny Quah (1993, 1996) outlines a number of objections to the theory of convergence as outlined by authors such as Mankiw, Romer and Weil (1992), Barro (1991), Barro and Sala–i–Martin (1992) and Sala–i–Martin (1996). His criticism is deceptively simple and relates to the notion of Galton's Fallacy – the mistake a researcher makes by observing a point in time cross–sectional dataset and attributing subsequent fading of extreme observations to a diminishing standard deviation. In Galton's study of a 'regression' towards the mean in the heights of offspring of British aristocrats, he found a regression slope of less than one leading him to claim 'convergence'.

Quah (1993) gives the formal definition of Galton's fallacy. He suggests that rather than a collapsing cross–sectional distribution of income per capita it is possible that the distribution simply keeps repeating itself. If so, he shows that for $t_1 < t_2$ a cross–section regression of $Y(t_2)$ on $Y(t_1)$ and a constant becomes

$$P\left[Y(t_2) - Y(t_1) \middle| 1, Y(t_1)\right] = \mu - (1-\lambda)Y(t_1)$$

where $\lambda = \frac{(\mathrm{cov}_{C}.(Y(t_2), Y(t_1)))}{\mathrm{var}_{C}.\, Y(t_1)}$, C stands for cross section. Using the Cauchy–Schwarz inequality by assuming that the cross sections are in steady state and hence cross–sectional variances are equal across time, Quah neatly demonstrates that the coefficient on the initial income variable is *never* greater than zero (even when the cross–sectional distribution is invariant over time) and thus cannot 'imply' convergence. In fact this criticism is rather strong since it does not require that cross–sectional variances in fact be equal, that the cross–sectional distribution be time invariant, that the two points in time used for observations be ordered in any particular way or even that there be homogeneity in the errors.

Then, for convenience of comparison to the original Francis Galton study, Quah (1996) rewrites the Barro regression as follows

$$Y_i(T) = a + b_T Y(0) + u_i(T)$$

where the size of the time series in the denominator has been included in the regressor and the regressand and $b_T = e^{-\beta T}$. Surprisingly, using a Monte Carlo study to replicate the literature's findings from these parameters, Quah demonstrates that when the convergence rate is 0.02 as suggested by Barro and Sala–i–Martin (19920) and T is one then b_T is indeed close enough to suggest a unit root. If anything, there is convergence to this value of one for the regressand's coefficient under a variety of assumptions for the regression's error term. So, we might find convergence at 2% even when true underlying model suggests a random walk instead. What is more, Quah (1994) shows that this 'bias' originates from small samples and disappears as the sample gets larger. Specifically when T rises, the bias vanishes at the rate T^{-1} and only at $N^{-(1/2)}$ when N is increased.

It therefore behooves the researcher to test for unit root processes for the observations in the dataset. Based on Elliott, Rothenberg and Stock (1996) the DFGLS test for a unit–root is presented

in table four. This test is preferred over the Augmented Dickey–Fuller test for small samples like the one used above and is considered by its authors to have "substantially improved power when an unknown mean or trend is present. " We do, as feared, find evidence of the problem. However, this does not imply that the rates of convergence discussed above were entirely uninformative. Quah's Monte Carlo study generated suspiciously high estimates for the variance of the rates of convergence and therefore he was lead to the conclusion that a unit–root process was not the whole story. I shall return to this point below.

Bernard and Durlauf (1995) are also not impressed with panel data for testing convergence across countries. They mention two significant objections. First, so long as the marginal product of capital is indeed diminishing, the negative association between the initial condition and the growth rate across countries will hold true even if the countries are not converging. Recall, that σ convergence implied a diminishing of the cross–section dispersion of income over time. A steady–state σ is still stochastic in the sense that the income levels are still gyrating within that distribution. If the initial level of σ is indeed smaller than the steady state value then there will actually be growth in this distribution over time. As should be obvious then, β convergence does not imply σ convergence. Quah (1996) shows, interestingly, that the notion of both types of convergences coinciding is based on the assumption of a punctuated equilibrium whereby a one–shot perturbance assures such dynamics. Instead, Quah suggests "disturbances are likely increasing in severity through time."

Like Bernard and Durlauf (1995) then, Quah too is convinced that cross–section regressions are only representing average behavior and not the correct behavior of the distribution and how it evolves. It is "inappropriate to attempt to draw dynamic implications from cross–section evidence." (Quah, 1993)

TABLE FOUR: TESTING FOR UNIT-ROOT PROCESSES

Country (1950–1992)	DFGLS	Interpolated DF-Critical Value
Argentina	-1.092	-2.976 (10%)
Australia	-1.395	-2.976
Austria	-0.121	-2.976
Belgium	-1.359	-2.976
Brazil	-0.991	-2.976
Canada	-1.682	-2.976
Cyprus	-3.274 [ADF: -2.968]	-3.293 (5%) [-3.119 (10%)]
Denmark	-1.111	-2.976
Finland	-1.718	-2.976
France	-0.373	-2.976
Germany	-0.646	-2.976
Greece	-0.333	-2.976
Iceland	-2.132	-2.976
India	-1.896	-2.976
Ireland	-2.570	-2.976
Israel	-0.958	-2.976
Italy	-0.455	-2.976
Japan	-0.558	-2.976
Korea	-1.171	-2.976
Luxembourg	-2.706	-2.976
Malaysia	-2.573	-2.976
Mexico	-1.828	-2.976
Netherlands	-0.929	-2.976
New Zealand	-1.983	-2.976
Nigeria	-1.568	-2.976
Norway	-2.085	-2.976
Philippines	-1.396	-2.976
Portugal	-1.636	-2.976
South Africa	-0.589	-2.976
Singapore	-1.575	-2.976
Spain	-1.017	-2.976
Sweden	-0.585	-2.976
Switzerland	-1.118	-2.976
Taiwan	-1.589	-2.976
Thailand	-1.550	-2.976
Turkey	-1.756	-2.976
United Kingdom	-3.396 [ADF: -2.373]	-3.770 (1%) [-3.119 (10%)]
United States	-2.282	-2.976

A second objection against cross-section empirical work voiced by Bernard and Durlauf is that intermediate cases are completely ignored. Either all countries are converging or none are. This objection is a result of course of the panel regressions that are traditionally considered for convergence analysis since they ignore much of the dynamics within the distribution and the evolvement of some parts of the distribution relative to others. We are only provided with estimates of their aggregated effects on the estimated trajectory or pulsion.

Using Unit Root Tests to Test for Convergence

Using data from 1900 to 1987, Bernard and Durlauf (1995) suggest two useful definitions in an explicitly time-series setting. They define convergence between countries i and j if long-term forecasts of output for both countries are equal at fixed time t. Further, they define existence of a common trend in output if long-term forecasts for output series of countries i and j are proportional at a fixed time t. Therefore,

$$\lim_{k \to \infty} E\left(y_{i,t+k} - y_{j,t+k} \middle| I_t\right) = 0$$

implies convergence and,

$$\lim_{k \to \infty} E\left(y_{i,t+k} - \alpha y_{j,t+k} \middle| I_t\right) = 0$$

implies a common trend.

Based on these definitions and the same dataset, Greasley and Oxley (1997) discover pair-wise convergence for the following countries: Sweden and Denmark, France and Italy, Belgium and the Netherlands, and Australia and the United Kingdom. They do so using pair-wise ADF unit-root tests. Fearing that discontinuities in the data tend to bias the test results in favor of non-rejection of the unit--root null hypothesis they also use tests suggested by Perron (1989) and Zivot

and Andrews (1992). I expand the dataset to 1999 by using data from the OECD and the World Bank. The unit root tests for the individual time series are presented in table five and the updated results for the Greasley and Oxley application are presented in table six along with a new discovery concerning Italy and Austria.

TABLE FIVE: UNIT ROOTS IN LONG-TERM DATASERIES

Country (1900–1999)	DFGLS (Interpolated DF Critical Value)	Phillips–Perron (Interpolated DF Critical Value)
Australia	-1.223 (-2.747) (10%)	1.635 (-2.580) (10%)
Austria	-0.689 (-2.747)	1.283 (-2.580)
Belgium	-0.729 (-2.747)	1.318 (-2.580)
Canada	-0.938 (-2.747)	1.088 (-2.580)
Denmark	-0.749 (-2.747)	1.662 (-2.580)
Finland	-0.786 (-2.747)	1.883 (-2.580)
France	-0.900 (-2.747)	1.007 (-2.580)
Germany	-0.923 (-2.747)	0.980 (-2.580)
Italy	-0.620 (-2.747)	2.015 (-2.580)
Japan	-0.696 (-2.747)	1.081 (-2.580)
Netherlands	-0.937 (-2.747)	1.124 (-2.580)
Norway	-0.855 (-2.747)	2.709 (-2.580)
Sweden	-0.924 (-2.747)	1.084 (-2.580)
United Kingdom	0.070 (-2.747)	3.338 (-2.580)
United States	-1.391 (-2.747)	1.374 (-2.580)

Table six presents three unit-root tests. The parametric Augmented Dickey-Fuller test is the primary one used in the Greasley and Oxley study. The semi-parametric Phillips-Perron test is also presented since its power is increased in larger samples. Since however, this is still not a very

large sample, the Elliott, Rothenberg, and Stock DFGLS test for a unit–root is also presented. The mean is insignificantly different from zero and the trend term is also insignificantly different from zero indicating a common trend for the pairs. As in the original study, the unit root is not rejected for Sweden and Denmark. Using 1939 as the discontinuity year the authors strongly reject the unit–root as do I however, as opposed to them, I obtain significant estimates for both the trend and the constant. Table seven below presents the implied cointegrating vectors for the pairs of countries that demonstrate convergence in table six. The vectors seem to be unique and correspond well to the theory. Figures four through eight present the output series for each pair identified in this section. As evident, the cointegrating relationship is often best seen by visual inspection of the series themselves.

Finally, in Figure Nine, I present how the non–structural impulse response functions behave for a representative series – France and Italy. What is noteworthy in these pair–wise convergence relationships is that there appears to be a leader–follower relationship between the two countries. In the figure, the leader appears to be France and Italy the follower. A natural extension of this paper would be to research this finding more closely and to develop a testable theory as to why this might be the case. The leaders, in order, for the other cases are Belgium, Australia, and Italy. For the last relationship, the leader appears to be Sweden though it is less clear than for the other cases.

TABLE SIX: PAIRWISE CONVERGENCE

Countries (1900–1999)	ADF Phillips–Perron	p–value Time trend	p–value Intercept	DFGLS
France–Italy	-3.241* -3.683**	0.831	0.481	-3.553**
Belgium – Netherlands	-3.942** -3.965**	0.498	0.280	-2.740*
Australia – UK	-2.610 -3.238*	0.567	0.392	-3.606**
Italy–Austria	-3.499** -3.707**	0.823	0.389	-3.319**
Sweden–Denmark	-1.524 -1.629	0.340	0.316	-1.369
Sweden–Denmark (1940–1999)	-5.220*** -5.171***	0.002	0.000	-1.744

* Implies significance at the 10% level
** Implies significance at the 5% level
*** Implies significance at the 1% level
The lag order for the Dickey–Fuller generalized least squares test is based on the Akaike Information Criterion.

TABLE SEVEN: COINTEGRATING VECTORS FOR CONVERGENCE PAIRS

Countries (1900–1999)	MLE Standardized Cointegrating Vector	LR Test Statistic
France–Italy	(1, – 0.9953)	0.000
Belgium – Netherlands	(1, – 0.9737)	0.000
Australia – UK	(1, –1.013)	0.000
Italy–Austria	(1, –0.956)	0.000
Sweden–Denmark	(1, –1.178)	0.06
Sweden–Denmark (1940–1999)	(1, –0.977)	0.000

The LR tests the null that the cointegrating vector is a nonzero n x 1 vector which spans a subspace of cointegrating vectors.

The Theory of Convergence Clubs

If the role of political science in suggesting conditionality variables for panel regressions was significant, it is no less so in testing for different coalitions or convergence clubs within a given dataset. Quah (1996) suggests that the "...configuration of coalitions comes from recognizing the forces across countries for consolidation and fragmentation." The members of the OECD, the European Union, or its members of the Economic and Monetary Union, may all be considered as possible coalitions or convergence clubs. Various relevant characteristics that are attributes of a

convergence club are then endogenous to the club itself. If largely political characteristics can be shown to explain the genesis of a superstructure for a coalition club then politics causing convergence itself becomes a testable hypothesis.

To capture intra–distribution dynamics more explicitly, cross–section regressions must be discarded in favor of alternative methods. Quah's solution is simply to model how the distribution itself evolves over time. He uses a stochastic kernel to hold transition probabilities that map the distribution of incomes from one time period to the next rather like a VAR process. Estimation proceeds by first discretizing the relative country incomes within fractiles and then conducting a Markov–chain analysis. Table eight provides an example for the data used in the section above.[18] Contrary to Quah's findings, which were for a much larger number of countries over some 23 years, the middle–income economies are quite likely to remain in the same part of the distribution as are the richest and the poorest.[19] Even in this limited set of fifteen countries, there is no evidence of the traditional convergence to a single club so to speak.

TABLE EIGHT: QUARTILE TRANSITION PROBABILITIES

0.25	0.50	0.75	1.00
0.99	0.01		
0.01	0.99	0.00	
	0.00	0.98	0.02
		0.02	0.98

Real Income per Capita 1900–1999 relative to cohort average

CONCLUSION

The literature on convergence is truly vibrant and dynamic. This paper has provided a simple introduction to the neoclassical growth model and theories that test for convergence in incomes

[18] For a more involved analysis, I refer the reader to Quah (1993,1996).

[19] Note though that the table shows that there is only very weak evidence of the kind of polarization that Quah obtains.

across observation units using this model. I have also discussed the source of problems faced in such analyses and briefly shown alternative approaches to convergence in the literature.

I began with the assertion that convergence analysis has relevance to political science and that there is much that we can offer to the debate. By analyzing the literature and making a few observations along the way, I respectfully wish that I have, at the very least, sparked some interest in the literature. Ideas of convergence clubs or coalitions and leader–follower relationships in bivariate convergence analyses have obvious implications for political science research. The notion of political constraints or maintaining credible commitments to economic reform having direct implications for growth and convergence are issues that are situated at the intersection of economics and political science. Perhaps it is the analysis of just one of these sets of variables – either 'purely' economic or political – that is the source of many problems that plague convergence analysis like open-ended theorizing, heterogeneous parameters and a lack of differentiation between causality and correlation.[20]

[20] See Brock and Durlauf (2000) for a detailed and masterful discussion of problems in convergence analysis.

CHAPTER V

A THEORY OF POLITICO-ECONOMIC TRANSITIONS:

EVOLUTION AND GROWTH[1]

Background

It is instructive to see economic or political reform as evolution - as evolution from a less developed primitive stage of being to a more developed advanced stage of existence. The topics of economic development and the politics of regime transition then become the science of studying this evolutionary dynamic. There is little need to suggest the charisma of such a topic. Everyone has a horse in the race and excitement is high about who will make it and who will not. There are swashbuckling economic advisors, the meanest of 'secondary property rights enforcers', the slimiest of corrupt politicians, the most pitiable of the downtrodden, the most intrepid and the most opportunistic of entrepreneurs - the whole nine yards. Nevertheless, perhaps even more than evolution from a biological perspective, while there is a strong feeling among many scholars that there is indeed a unifying method to the madness (that there is indeed sense in looking at a composite dual transition), an overarching integrated "theory of evolution" for economies and polities in transition eludes us. We have made progress through answering some difficult questions about many of the specifics, but we simply do not have enough understanding of the big picture to provide anything close to a single evolutionary theory of politico-economic transitions.

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[1] Parts of this paper have benefited from helpful comments and suggestions made by Gary King, Kenneth Shepsle, George Tsebelis and my mentor, Richard Tucker, and I would like to express my gratefulness to them. Any errors that remain are a reflection of my own shortcomings. I would also like to thank Gary King and Will Lowe for making their dataset available to me.

For this paper then, the following observations provide the impetus. It is now commonly acknowledged in the economic growth literature that convergence in economic income of all countries to the same high-income group of homogenous countries will not happen unconditionally no matter how much time we allow the laggards to catch up.[2] We know in addition that, *ceteris paribus*, we can expect two groups of countries to form in the limit – one high-income group and one low-income group – with any middle-income groups simply disappearing.

We also know from the economic development literature that economic growth is closely related to sensible and credible economic policy. It is an established truth – to the degree that major international institutions base their very existence on it – that certain policies cause dismal economic performance and yet others are correlated with better performance. There even seems to be some consensus that these policies are self-reinforcing and hence countries that adhere to one set of policies or the other are lumped together in the so-called vicious-cycle or virtuous-cycle. In this literature, an inordinate amount of emphasis is placed on credible commitments and much has been written about it. Credibility can be studied in numerous ways. If it is a public good that one can free ride off of and accumulate, then all the well-known problems of public-good provision are immediately relevant and we are in familiar territory. A point of interest here is that the accumulation of credibility is a process. The net result is interesting in that one might have credibility or no credibility with the concept of having some credibility becoming less relevant in the limit or in a steady-state equilibrium, where having no credibility is a Nash equilibrium in the transition game just like the low-income group or the vicious-cycle members.

[2] Of course, another way of saying this is that we have some idea as to what some of the relevant variables might be for increasing a country's national income.

What is more is that one can argue that having no credibility or belonging to a low-income group can be seen, *ceteris paribus*, as a stable evolutionary strategy. This characterization of credibility makes it a pivotal element of the story and links the political and the economic in a manner that reduces necessity of the term "dual transition". The problem now is to be more explicit about where the credibility is coming from – providing a sort of credibility capital production function for the political sector of the unified economy in transition and consequently how it is being accumulated.

Here, I suggest that the theory of evolutionary games is of fundamental importance and I provide an example of an evolutionary game that produces the credibility I seek and conforms to a number of established facts about politico-economic transitions. In an evolutionary game, at the start of time, we would have in the world a homogenous group of 'animals' or phenotypes – countries in our case. A natural genetic function then determines the relative fitness of an animal defined quite simply as the rate of change in overall population representation of the animal group. In the case of countries and credibility in particular, we are interested in assessing learning strategies instead of the genetic function, which in effect provides for an estimation of relative fitness over time. This can be achieved by looking at the role of credibility capital in spatial voting models and the degree to which political entities like parties, which tend to exist across a variety of regime types, internalize it in their strategy of playing a political game.

The purpose of this project is to provide a causally connected theory between the mechanics of the political regime and the resulting economic income of a state and to therefore propose a logical and internally valid causal explanation for the interplay between regime change and economic growth in a general equilibrium framework thus devising a unified theory for politico-economic transition in the process. To achieve this, I introduce evolutionary game theory. The reason for doing so is that it provides a very convenient and simple way of looking at the

dynamics of the system and neatly incorporates the political processes we are interested in with the economic outcomes that are observed.

The structure of this chapter is as follows. First, I discuss briefly the key elements that I use for the purpose of this paper and suggest their relevance in the unified theory I intend to present. More comprehensive reviews of much of what I outline already exist and thus the discussion here is kept minimal. Second, I elaborate on the theory of transitions that I favor and suggest its implications. Finally, I conclude with some observations and remarks about possibilities for further research.

Preliminary Discussion

On Economic Growth and Development

In the economic growth literature, in a series of articles, Quah (1993, 1994, 1996) and Bernard and Durlauf (1995) among others have suggested fairly recently that, in per capita income, countries do not all necessarily converge to a point (actually, to be exact, a stochastic steady-state) in asymptopia like many before them had argued (see Solow (1956), Mankiw, Romer and Weil (1992), and the idea of unconditional convergence by Barro (1991, 1999), Barro and Sala-i-Martin (1992, 1999) and Sala-i-Martin (1996)). Instead, they might form clubs of convergence. In fact, to be exact, just two clubs – a club of high-income countries and a club of low-income countries with any middle-income groups simply vanishing over time as the system approaches steady state. While there is convergence within those clubs the system on the other hand is characterized by divergence. As to exactly what causes this surprising outcome is not entirely resolved in the economic growth literature and remains somewhat of a puzzle.

Separately in the development economics literature, Rodrik (1989, 1992), Calvo (1989), Dornbusch (1990, 1993), Garrett (1998) and Dixit (1992, 1993) among others have suggested that countries undergoing economic reform (without much attention to regime[3]) face a polarized outcome too. Unreformed countries form one group and reformed ones form the other. Those countries that are reforming must credibly suggest their sincerity to the domestic private sector and foreign investors in order to successfully jump from one group to the other. If reform is seen as fleeting or 'incredible' then distorted incentives will cause capital flight, mobile capital investment (which is less complementary with long-run growth), intertemporal substitution in consumption and so on which is likely to hinder the progress of reform. The credible commitments idea then gives us the virtuous vs. vicious cycle theory.

It is easy to see that these two strands of literature are obviously closely related. Simply, the idea is that virtuous cycles are virtuous for the reason that they reinforce economic reform, which eventually leads to higher growth; it takes no far stretch of the imagination to see that these countries are liable to be the ones that form the high-income convergence club. Likewise, the low-income convergence club is composed of the countries facing a vicious cycle of pathetic reinforcing economic performance, which in steady state should be a stable group if the cost of reform outweighs those elusive benefits accrued even in the slightly longer run that initially tend to be a significant component of the lure towards reform.

On the Political Front

In comparative political science, Przeworski and Limongi (1993, 1997) and Leblang (1997) have reminded us - reflecting the frustration of the field - that while we know political institutions matter for growth in some broad almost ineffable sense, we are in no position to suggest that

[3] Although Rodrik grants that democracy can be seen as a meta-institution for economic growth.

specific political regimes matter other than that we have a strong hunch that democracy matters. This is a dismal state of affairs and not much has changed since the late 1990s. Geddes came to the same conclusion in a 1999 Annual Review of Political Science piece, as did Heo and Tan, the authors of an article published in 2001. This begs the obvious question - Why do political institutions matter? Consider one simple explanation for why institutions matter for economic growth. To start with, I hope most will agree, following North's seminal work, that they suffer – or benefit, depending on what their position on the root scale economies curve would suggest – from path dependence. That this path dependence then, in the limit, would create a tendency to reinforce a virtuous or a vicious cycle is also probably not that contentious a claim to make. In fact, it would then further suggest why steady-states of convergence clubs might be 'steady' in the sense that one would not expect their composition to be changed by club members extricating themselves from one club and joining another. The costs of such a change, which obviously are conveniently bounded, become prohibitively high as the club approaches steady state precisely because of path dependency, and can therefore be seen as a situation of transaction costs (of institutional change) superseding benefits.

This would provide for a good foundation of an explanation for why democracy might matter for economic growth if democratic institutions systematically produce 'virtuous path dependence'. What is more is that the economic convergence story can be modified by a cost function rooted in political institutional embeddedness (which need to be endogenous to the model) that maps out the probability of a successful transition depending on temporal distance from the steady state outcome within the respective club compared to the position of the other club along a similar dynamic.

In Figure One below, it is obviously more likely for a successful transition to occur at time Ta than at time Tb. A formal model based on the story I have provided thus far on political

institutions engendering credible commitments (or accumulated credibility capital) that then generates virtuous-cycle or vicious-cycle path dependence and finally convergence clubs will, in my opinion, be a huge step forward in our understanding of transitions.

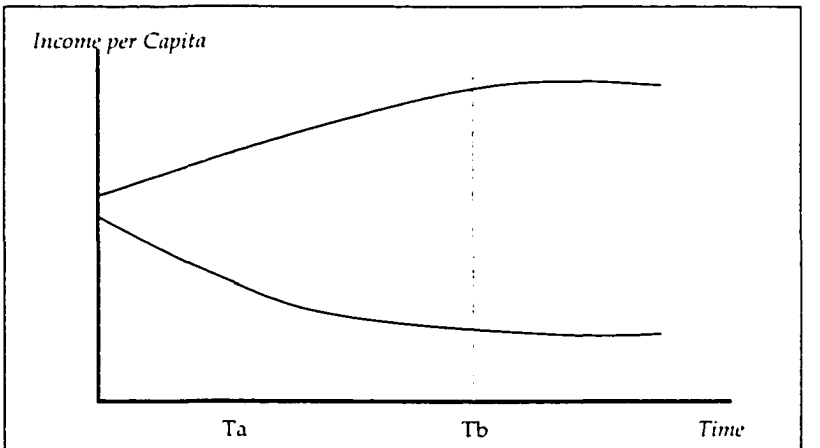

FIGURE ONE: A POSSIBLE TIME PATH FOR CONVERGENCE CLUBS

So far so good, but here is where things get murkier. Geddes reminds us that any relation of regime type (specifically democracy) to growth evades us. But if we allow that path dependence exists in institutions, then, if we can knit a story about the relative type and relative proportion of political institutions that characterize a democracy of quality x on a scale from 1 to 10 as opposed to another regime, then we can fiddle with the amount and direction of path dependence to suggest where convergence through virtuous cycles is coming from. Alas, our task is more complicated. Pierson (2000) recently advised us on using the term path dependence carefully lest we might fall prey to the monster of conceptual stretching who smiles beamingly upon political science. Thus, in a recent article Alexander (2001) throws a spanner in the works by suggesting that democratic institutions do not embody anything special that provides them with extra path dependence in the first place. Economic institutions that deal with property rights are more susceptible to path dependence he argues than are democratic institutions.

There is some merit in this argument. Some very astute political scientists from the American politics tradition have argued why this might be the case.[4] Shepsle and Weingast (1984a) argued that public sector institutions should be evaluated on the basis of self-interested actors facilitating evaluation of public-sector institutions like their private-sector counterparts. McKelvey and Ordeshook (1984) then support the suggestion that when rules engender political constraints that lead to results that are not to the liking of politicians, they (political groups) are able to bypass such constraints. They are unable however to support a stronger version of the hypothesis that institutions are therefore subservient to political actors to the extent that they can permit certain equilibria not to obtain in spite of original institutional design and of course this is what Alexander is worried about. To this, Shepsle and Weingast (1984b) answer that rules have consequences and therefore politicians are indeed interested in them in accordance with their preferences. They believe that the first hypothesis is necessary and the second fails because a sufficient condition is not met – that of Coasian transactions costs. If these are incorporated, then we find that certain institutionalized procedures are more susceptible to manipulation by motivated politicians than others.

Note here that Shepsle and Weingast's assertion serves to only bolster our position that costs increase as transitions approach steady states since transaction costs approach a level high enough to dissuade more and more efforts at institutional change and in fact provides good grounding for modeling the institutional path dependence dynamic. The link however between these transaction costs with an explicit political process has yet not been provided and without that link all we have is a rather good story for divergent outcomes. I will return to this point

[4] Though public choice theorists like Niskanen (rent-seeking bureau), Brennan and Buchanan (private contract-enforcing rents), and so on have long recognized this.

below and indeed this is a motivation for this paper. First, however, I make some finer points in the story clear.

On Hope and Doom

We are arguing that from an economic convergence (to convergence clubs) standpoint the situation progresses towards one where extrication becomes prohibitively expensive. This can be construed as a doom story for it provides reason for why divergent outcomes are stable (and the 'steady-state' terminology does nothing to dispel the impression). The confusion comes from the fact that we are looking at ceteris paribus conditions or a situation of unconditional convergence where the state's behavior does not diverge wildly from the past. This is a very important point. Transaction costs will probably take care of slight deviations in behavior for instance a politician that is slightly more interested in leaving a legacy compared to exploiting his office than his predecessors or an autocrat in a particularly good mood. Wild deviations, like an autocrat dying and a strong reformist backbencher suddenly rising to power or a severe economic shock creating adverse terms of trade causing a drying up of reserves and a subsequent financial crisis allowing the IMF to come thundering through the front door, dramatically change the conditions and may indeed force the country on to a credible virtuous cycle and therefore convergence to the high income club. So, simply, what we are not suggesting is that such economies desperately seek to extricate themselves and are nevertheless hapless.

A punctuated equilibrium process might well be at work here where institutional redesigning (through shock therapy, gradualism or whatever) disturbs the country's path to steady state and consequently the relative cost of extrication from the group. Then, within the tatonnemont process of the punctuated equilibrium time period – where equilibrium is defined simply as the adjustment to a path to either one of the convergence clubs – incentives of relevant actors, in the

language of development economics, are permanently shocked. This then is a significant opportunity for change since, in general equilibrium, individuals should be attracted to the institutions that best serve their needs. Talent is reallocated efficiently in equilibrium and utility is maximized. If we can argue that the reallocation of talent is vital to furthering marginal political reform and consequently economic growth then extrication from the vicious-cycle group becomes more possible. This is a vital component of an explanation for how stubborn path dependency can be overcome.

On Parties and Political Regime

Thus far the emphasis has been on explaining economic outcomes using the concept of path dependence in political institutions, albeit in a manner I think provides more meaning to the political sector in equilibrium analysis than the extant literature in comparative political science achieves. However, it does little to incorporate regime-type variables. This, as I will argue more comprehensively below, can be done by exploiting the parallel literature in political science on convergence to the median voter's bliss point.

The first principles of political convergence are simple. In a Downsian spatial voting model with two parties, single-peaked preferences and perfect information both parties converge to the median voter's bliss point through iterated reaction function competition in a tatonnemont process. What happens when information is incomplete or parties have policy preferences that differ from each other's and from the median voter's bliss-point defined platform? What happens when electoral rules differ? Alesina and Rosenthal (1995) provide a good basic analysis. They show that we can get policy divergence. The analysis gets infinitely more complicated with more than two parties and issue cleavages based on orthogonality principles. Some very recent advances are being made in this field that provide predictions about the degree of divergence.

What is material here however is that a parallel to convergence clubs exists and is even more nuanced than the simple high-income/low-income convergence clubs that the economic growth literature offers.

For instance, Person and Tabellini (2000), building on some high-quality work by Myerson (1993), Ferejohn (1986) and Lizeri and Persico (2001), argue convincingly that PR regimes and large district sizes are theoretically characterized by more rent seeking, larger government sizes and more broad-based public goods than presidential regimes and smaller district sizes. Likewise voting among party lists in PR and small district magnitudes with high barriers to entry attracts low talent (due to the possibility of free riding) and could consequently engender lower economic growth. (See Murphy et. al., 1993 for instance.) So does institutional redesign with PR and small district magnitude necessarily doom the punctuated equilibrium to the low-income convergence-club steady state path? Obviously, as McKelvey and Ordeshook remind us, these neat and simple predictions need to be tempered by the incentives of the relevant actors within the matrix of political institutions they are operating in and the marginal changes they are able to effect to it. I hope that at least some will be convinced that an evolutionary game-theoretic approach, like the one I outline below, provides such a theoretical frame rather neatly.

For the purpose of illustration, one such important political institution can be considered – parties. The reason I select parties are several. First, they are institutions that face substantial potential for path dependency emanating at the very least from the stability of partisan identification over time (see Lipset and Rokkan 1967; Green and Palmquist 1990, 1994; Mair 1993) but also due to more proactive marginal changes that endogenize partisan identification. After all, why is it that advanced countries have higher partisan identification than developing ones? Mobilization theory – whether cleavage-based or cognitive – is glaring evidence of this, and is, broadly, a concept of crucial significance in a theory of politico-economic transitions. The

cognitive mobilization literature (Zaller, 1994) makes the claim that parties are able to influence voter preferences by effectively broadcasting the party message. The problem therefore with Converse's (1966) learning model to some degree is that it assumes only reactive political institutions. Second, they are political institutions with more connection between the private sector and the public sector and necessarily operate at an intersection of the two. Formally, the literature (like Ferejohn and Noll, 1978 and Calvert, 1985) looks at the party's expected utility from a policy position as an additive probability function of the value it ascribes to its own policy platform and that of the opponent. If one assumes that the allocation of talent across sectors is important for economic growth and political institutional transformation, then this necessitates looking at both sectors anyway. Third, parties exist across political regimes and therefore concentrating on them and not the regime in particular saves us from being included in the Hall of Shame type list that Przeworski and Limongi drew up containing research endeavors attempting to provide a causal connection between political regime and growth by sorting on regime type variables. Parties almost always exist in democratic regimes barring some exceptions Anckar and Anckar (2000) mention in their engaging CPS article. Even in non-democratic regimes they appear to be permanent fixtures - like the National Unity Party of Burma, Zhong Guo Gong Chan Dang of China, CPSU during the Soviet Union, Niyazov's Democratic Party of Turkmenistan and the Democratic Front for the Reunification of the Fatherland in North Korea.

Before I continue with this example using parties, it is instructive to ask the following question - How is political convergence to the median voter (or divergence to party-defined bliss points) as I outline above related to convergence in economic growth within convergence clubs and divergence in the global system? One simple answer lies in the theory of credible commitments. On the economic front, we know that credible commitments by governments (to economic reforms at the least) have immediate and serious repercussions on economic growth. On the

political front, the task then is to explore where credibility (accountability being a key manifestation) originates from and how it can be developed by political microfoundations.

On a Theory of Evolution

John Aldrich (1995) has conveniently answered the question for me about the relevance of parties. Although he obviously does not suggest any real explanation for why parties might be relevant in making a connection between the credible commitments argument and economic growth, he does provide three extremely strong reasons for why they are important. The three reasons that Aldrich suggests why parties exist are, first, to solve an Arrovian-type social choice problem, second, to overcome a collective-action dilemma in providing public goods and finally to provide solution to the ambitious politician's problem of satisfying career-politics needs. These reasons are the final piece of the puzzle we need to knit together the whole story thus far provided into a unified theory on politico-economic transition.

Let us start from the observation that divergence from the median voter's preferred outcome is obtained (like Alesina and Rosenthal argue for instance) if there exists value in making credible commitments to party-defined bliss points different from that of the median voter, say, to prove one's party loyalty. The dilemma is then obvious if politicians should make credible commitments, which is – assuming certain regularity conditions hold - reconciling convergence to the median voter (and its social welfare maximizing attributes) with the value inherent in divergent outcomes (i.e. rewarding politicians that make credible commitments).

Further note that there are, as Przeworski and Limongi have noted before, two distinct median voters - one relevant for the political game and one for the economic. And that there is an incompatibility between market based 'voting' done by economic agents using the resources they own to derive their 'weights' compared to state-backed voting by citizens where weights are

likely much different (and theoretically more equal). The median voter therefore for 'capitalist' or market-based transactions is not the same as the one in a 'democratic' universal suffrage political regime.

What is interesting however is that a "theory of evolution" for political groups like parties can be created that reconciles these two median voters within the same game and in the process also rewards the divergent outcomes that produce credible commitments. The political groups induce public spiritedness among their followers (a process some have dubbed creating a "warm-glow effect" in explaining why people vote and also in location theory) by providing broad-based public goods. The public nature of these goods causes parametric shifts towards the median voter from both sides albeit possibly at different rates depending on a number of factors.[5] For example from Perrson and Tabellini's work one can argue that plurality rule and small district size produces this faster than large districts and PR. We can however preclude the inevitable homogenization by a single group this process will suggest (in the style of a non-democratic single-party regime on a virtuous cycle) by introducing diminishing marginal utility to the public good it provides. This prevents a natural (though obviously not an "imposed") extinction of other parties. The process uses Buchanan's optimal group size theory to allow other groups to capitalize on the opportunity as well provided their public good package is of a different type. We can also allow this package to differ, and consequently enable an expansion of the optimal group size, by allowing provision of specific selective incentives to identifiable allied interest

[5] The type of public good is of course of obvious importance in the analysis. Schultz (1996), for example, discusses a situation of two parties attempting to provide public goods that may or may not be desired to the same extent by the electorate. Using a model of Bayesian updating along the equilibrium path, he suggests that non-revealing equilibria (concerning true costs) result when there are parties with polarized preferences and revealing-equilibria obtain when at least one party's preferences coincide with the median voter's.

groups (subsidies, transfers, pollution licenses, etc.).[6] This allows the group to delay the point of inflexion on its aggregate provided utility surface and these special interests become important to this extent.[7] The schematic in figure three of chapter provides a summary for this example.

This process also provides a tractable understanding for the endogenization of the median voter position itself like mobilization theory suggests. Although it is perhaps overly simplified – as will be explained below in our treatment of the learning strategies provided to us in spatial voting models – we have now a unified explanation couched in social choice theory that employs public good provision by political parties to provide an explanation for credible commitments and convergence to the median voter's bliss point in stochastic steady state.

Modeling the Dynamic

In order to look at these elements of the story as a cohesive evolutionary theory of transition some terminology of evolutionary game theory can now be introduced. As suggested at the beginning of this paper, at the start of time in an evolutionary game, we have a world of a

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[6] It is illustrative to note that Acemoglu and Robinson (2001) suggest that political transitions and the subsequent stability of the regime depends crucially on the degree of asset equality among the electorate. Through their emphasis on mass revolution and elite reaction, they find that consolidated democracies have more asset equality, which causes fiscal stability, and less incentive for a dissatisfied electorate to tip the boat.

[7] It is interesting that McFaul (2001) asserts that party development depends more proximately on the institutional choices made by relevant political players. He also notes in conjunction with party development in Russia that the party system in Russia is yet not in equilibrium and a more stable party system may develop provided some institutional changes are made. The theory I provide here explains his suggestions rather well. Institutional choices would determine the rates of convergence to the median voter by the political group and also the degree to which it can make selective incentives to allied interest groups. It is no surprise then that political agents should be interested in the specific institutions chosen during transition so that they have more direct control over the degree to which rates of convergence can be manipulated.

homogenous group of 'animals' or phenotypes. Natural genetics then determine the relative fitness of an animal defined quite simply as the rate of change in overall population representation of the animal group. The "final" distribution of animals provides us with the evolutionary stable strategy or strategies (known as the ESS) with all other possible strategies getting systematically eliminated.

Evolutionary game theory is most interesting in a game theoretic setting and provides intuitive understanding of strategic behavior in repeated-play games. Of interest to us in this paper however is the polarized economic performance of countries and not so much interaction between countries. Specifically, in steady state, *ceteris paribus*, memberships in high-income and low-income clubs appear to be the two unique evolutionary stable strategies.[8] What is therefore of material relevance to us here is the genetic encoding as it were that determines the outcome. Obviously, there is no merit in talking about genetics with countries apart from perhaps issues such as resource curses and maybe even absolute size and location of territory. In the age-old nature versus nurture debate, we prescribe to the nurture thesis, which is why we must take refuge in the *ceteris paribus* condition when talking about the process of convergence and the membership of convergence clubs. Therefore, instead of genetics we are interested in a learning strategy for politicians (and the electorate), which we believe must be careful and sophisticated because the process of learning itself must be nothing but rational to avoid any "genetics-based bias" to the analysis. Any learning strategy that leads to low-income club membership for the country and pathetic economic performance should be just as rational as another that leads to high-income club membership and fantastic economic performance.

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[8] This is precisely what Quah's Markov Chain Quartile transitions experiment attempts to demonstrate as it studies what the distribution of countries looks like over a long period of time.

	POLITICIANS	
POPULATION	*Reform*	*No Reform*
Reform	10,10	5,9
No Reform	4,6	6,12

FIGURE TWO: AN EVOLUTIONARY GAME

An Example of an Evolutionary Game

To understand better how evolutionary game theory logic can be applied to the kind of problem we are interested in here, consider the game shown in Figure Two above. The game is developed more fully for the purpose of this paper with the help of a simulation in the appendix to this chapter. The two players, politicians and the populations they represent, as collective entities, can choose to either undertake or support economic and political reforms or not to reform at all. Let the sum of the payoffs they consequently receive determine the nation's income. The two pure Nash equilibria of this game are of course (Reform, Reform) and (No Reform, No Reform).

When no reform is taking place the politicians are able to benefit disproportionately perhaps through inefficiently designed property rights leading to corruption and other forms of intervention in private sector activity. If, from this equilibrium, either player "mutates" and chooses to reform and the other does not concur then that player loses more than the other does.

Only when both players want reform can reform occur successfully. Obviously this sort of game is, very generally, a common framework we come across with in political science.[9]

From an evolutionary perspective the resistances of the equilibria of this game are important in considering its stability. Specifically, the resistance of (Reform, Reform) against (No Reform, No Reform) is 3/5 and the resistance of (No Reform, No Reform) over (Reform, Reform) is 2/5. What this means is that unless more than a two-fifths or forty percent of the total respective populations of the players want to reform, the country will be stable at the unreformed outcome. Similarly at least three-fifths of the reformers must want to reverse reforms for the equilibria to switch to the "inferior" outcome, evaluated so of course in normative terms and not strict Pareto criteria. Although it need not always be so, in this game the superior outcome is also the risk dominant outcome. It has been shown that the long run equilibrium of such a game tends to coincide with the risk-dominant equilibrium due primarily to a specification of the process of mutation, which, in turn, can be significant over longer periods. (Kandori, Mailath, et. al. 1993)

On the Role of Mobilization

Lipset (1959) has famously argued that democratic tolerance norms are required for democracy and that a reciprocal relationship that fosters free participation is vital. Huber, Rueschemeyer, and Stephens (1993) reaffirm its importance and suggest a more nuanced analysis based on the role of the state, the impact of transnational entities, but most importantly relative class power, which directly dictates the degree of political participation. Shin (1994) masterfully reviews the extensive literature and also suggests that commitment to democracy is one of the most crucial components for successful democratization. There is then little debate then over the relevance of

[9] A long line of literature talks about such a negotiated transition game. Some of the most notable are perhaps Rustow (1970), Przeworski (1991), Casper and Taylor (1996) and the concept of a focal point in Weingast (1997)

committed political participation for democratization and thus any politico-economic transition theory should include it in some manner. An evolutionary game-theoretic approach, even as simple as the example provided above, can do so through emphasis on the thresholds that the resistance criterion suggests. Resistances provide parsimonious and intuitive understanding for why participation is crucial, why democratizers need to mobilize, and why its resisters need to be cautious of the size of their opponents. What such an approach also does is incorporate a separate observation made most recently by Przeworski, Alvarez, et. al. (2000) that authoritarian regimes have a higher population growth rate than do democracies and thus lower per capita income. In my view, their most convincing explanation of this fact is borrowed from Becker, Murphy and Tamura (1990) who suggest that in countries with higher human-capital acquiring resources, it makes sense to invest more resources into fewer children and emphasize quality over quantity since human capital is accumulated with increasing returns.[10] A theoretical framework that lends some intuitive understanding as to why demographics are important in politico-economic transitions simply does not exist and an evolutionary game-theoretic approach once again appears to be a constructive avenue. Threshold maintenance (or increasing the resistance of a Nash equilibrium) can happen either by increasing the population or by thwarting participation. If participation increases (in a positive way if it is democratic or in a negative way if it is exclusionary and to the benefit of a select few like in an oligarchy) the only way the current outcome can remain with a higher or equal resistance is if the opposing class of players increases its numbers. Here obviously a new debate emerges. What is more effective – increasing the group's numbers or its efficacy? In a highly repressive authoritarian regime this point may not be debatable since efficacy can be kept in check. Hence, Przeworski's and his coauthors' result

[10] Note that their puzzling over democratization and economic development continues since this explanation uses and does not explain their carefully formulated observation that the occurrence of democracies is correlated with higher economic income.

would obtain. But it can also obtain through other sources and hence the fertility literature, income inequality literature and mobilization literature are all relevant in sorting out the exact causal mechanism. The theoretical frame however is this hidden calculus of group fitness – a "hidden calculus" perhaps like the famous pool shark who "knows" how to solve complex physics and geometrical problems without really knowing how to.

This sort of analysis lends some additional theoretical grounding to the top-down and bottom-up approaches to democratization efforts that have emphasized either the role of mobilization of democratizers and demobilization of anti-democratic movements or both. Mobilizing, by its tradition in collective effort games, seeks a critical threshold or, as the n-person coordination games describe it, a tipping point. The concept of resistance of Nash-equilibria in a game like the one depicted above, in my view, provides an intuitive understanding for what is really happening underneath. A major problem with this approach is that it analyzes a single game – that of democratization or that of economic reform. If we are interested in looking at a learning strategy that specifies how changes or mutations are produced over time, it is perhaps more constructive to analyze a series of nested games for they would give us richer understanding for why a given amount of mutations occur. Here again the democratization literature in political science is of immediate relevance for it suggests what exactly these nested games might be. We feel that it would be erroneous to simply look at the distichous process of the largest and substantively most significant game when the mutations carry us over the critical threshold as it were.

On the Learning Strategy

A possible learning strategy, one that we are proposing here, relates primarily to the behavior of politicians and the political institutions they belong to, but directly incorporates the effects of

their electors or, more generally, their supporters. This is done by marrying the theory of clubs and the multidimensional spatial voting model – the former provides a measure for how political entities interact with their environment and consequently how they change with it while the latter links political entities with their supporters in a dynamic setting. Together they provide how the evolutionary process might work. A brief discussion of this link follows.

Buchanan's (1965) theory of clubs pertains to groups that provide a semi-public good. This is an impure public good that, though excludable, is non-rival only a certain extent beyond which sharing it decreases utility to the existing group members. As a matter of fact, marginal utility to existing members of an additional member to that point increases at a decreasing rate. Obviously this neatly determines the optimal size of the group. One such semi-public good might be the brand name or credibility capital as it were of the group. In political groups such as parties, we can assume that participation in the group is at least valuable for this reason to politicians. What is instructive here is that the concavity of the relationship posited – due perhaps in this context to diseconomies of scale setting in through membership – engenders a need for a membership rule. The organization structure of the group (or its "hierarchy") accomplishes this by providing legitimate roles for members and effectively curtailing illegitimate membership. It is thus not surprising that admission to the hierarchy of a political group such as a party is often based on a sort of voting system irrespective of the regime it operates within. Of course we do not dispute that the nature of candidate selection in Zhong Guo Gong Chan Dang of China is less "democratic" than it is in the Social Democratic Party of Germany, but of material relevance to us that it is "democratic".

This facilitates analysis of transitions of political groups (and by extension of the economy and polity) using a similar underlying logic as was outlined in the section above titled On the Theory of Evolution. The logic introduced there can be restated in more general terms by introducing the

language of multidimensional spatial voting models. In the spatial voting model literature, the geometric concept of a yolk pertains to the circle of minimum radius that intersects all median hyperplanes of ideal points distributed in the issue space. (See the appendix for a visual description.) What is important is not the dispersion of ideal points that generates the yolk, for, depending on the configuration of ideal points, even more dispersed ideal points can produce a smaller yolk. (Miller, et. al. 1989) Instead, once we grant the assumption common in much of the literature that politicians want to stay in power and political groups wish to perpetuate themselves, the amount of ideal points becomes important, and in this manner the idea of mobilization remains crucial in the learning strategy being suggested. This assumption then is crucial to the development of the concept of a finagle point with minimum finagle radius – a point on the issue space, which when chosen by a politician enables her to beat any competitor by changing her position to a new point that beats the competitor without hurting her credibility with her supporters. Her credibility is preserved – and indeed enhances – by careful politicking only within the finagle tolerance of the electorate. Using the construct of a finagle point, likely situated within the yolk, with a minimum finagle radius much smaller than that of the yolk itself, Wuffle et. al. (1989) show that as the number of voters increases, the finagle radius becomes increasingly smaller than the radius of the yolk.

This provides the foundations of a rather sophisticated learning strategy for politicians that has in it a number of ingredients identified as being important in analyses of regime dynamics. A fuller development of this or other, perhaps better, learning strategies is however necessarily subject for future research. Some remarks are nevertheless in order. Sensible economic reform enables higher growth. Reforms however do not work unless they are credible. Where then does credibility come from? If politicians want to stay in power, they cannot change positions indiscriminately and this should lend them credibility and support from the electors. This is the

fundamental defense that politics has from protecting itself from chaos (in the style the global-cycling theorem might suggest). Credibility is the constraint, but the maximand is the political career objective (whatever this may be) and in this project I have outlined what they might be and how they might relate to building credibility. If so, then the politician must locate himself in a position that is defensible from an attack by a competitor (e.g. a finagle point with minimum finagle radius). The political group will gain credibility from such behavior and the politician will be rewarded. Alas, there is a catch. This expands the resources the political group has – through the very growth it seeks. It allows more membership and the increase in relevant ideal points constrains the politician toward a more "democratic" game. Does democratization necessarily ensue? The answer is not theoretically unambiguous.

Consider the mechanics this framework suggests. All that is really required is an increased representation of ideal points in the issue space through voter mobilization, extension of the franchise or generally reducing barriers to entry. A forward-looking politician must then incorporate their positions on the issue space in recalculating where she must locate herself to remain in power. An unbiased increase in the population being represented will force the finagle circle towards a more democratic outcome quite aside from the political institutions in place. The rate of issue space representation is crucial in determining the progress towards this democratic outcome and, as follows from some of the discussion above; the matrix of political institutions in place would directly govern this rate. However, there is nothing here to suggest the optimality of any particular rate, or, in other words, can democracy be introduced too soon or too slowly. It is plausible that a very high rate of issue space infiltration, especially if the starting point was heavily biased, might make recalculating the finagle circle an especially tedious process resulting

in dissatisfied voters and perhaps eventually failed reform. This, I think, would be a logical direction for future research.

Concluding Remarks

As most politico-economic transition theorists would probably attest, a theory that provides intuitive understanding of a process as complex as simultaneous political regime transition and growth in economic income would be a valuable addition to political science. In this paper, I have attempted to provide such an explanation by employing evolutionary game theory and developing its application to politico-economic transitions by borrowing freely from various bodies of literature including observations on convergence from economic growth, contributions in the spatial voting model literature that employ geometric analysis and the literature on development and democratization in comparative politics. The result is a theoretical frame that comfortably deals with transition as a relatively smoother dynamic process and provides some explanation for how regime transition might occur. It also provides an example of a learning strategy for politicians, which generates the credibility required for successful economic reform (and subsequent higher growth) and a rationale for democratization. However, the analysis is necessarily incomplete and a fuller analysis, though essentially warranted, would require more space than I have. One natural extension of this analysis would be its application across more distinct political systems by devising underlying learning strategies similar in nature to Tsebelis's (1995) institutional veto players, which in turn agrees rather well with the analysis in this paper.

I end with the hope that transition theorists will employ evolutionary game theory in their work for the flexibility and simplicity it provides towards building of a more systematic and cumulative research enterprise for the study of politico-economic transitions in political science.

CONCLUDING REMARKS

Introduction

The causal chain in the Lipset's modernization theory has been suspect and political scientists have long recognized this. The question asked was whether or not democratization can be endogenized in an economic development story and not the correct even if less spectacular one of what is the real relationship between economic change and political regime change. In the introduction to this project I outlined the empirical observation of nonconvergence obtaining in economic income per capita and in political regimes as well. Yet we have no reliable theory of politico-economic transition that can give us a reasonable explanation for this empirical fact.

My motivation was therefore to simply get the causal connections correct in my mind and to be able to provide a theory for the whole process of dual transition.

I therefore begin these remarks with an overview of what I have learned from this project thus far.

On the Proposed Theory

The revision to modernization story I suggest is simple. We start from the observations that need to be explained. In economic income and in political regimes, the cross sectional distribution of the world is suggesting a situation of nonconvergence. Specifically, a polarization over time into two groups is to be expected. Coupled with existing theoretical contributions made in fields of regime transition and economic growth and development, in my view, these observations can be best explained by the application of evolutionary game theory.

Evolutionary game theory is particularly good at dealing with longer-term dynamics and easily provides justification for nonconvergence results. Evolutionary games are played out in a setting

of intergroup interactions where payoffs to strategies of choice determine fitness levels. If the fitness level of a group as a whole suffers then its members would rationally defect to playing a different strategy that promises them with higher fitness. But an alternative also exists as was suggested by the notions of risk dominance and resistances of equilibria. The suffering group can increase its numbers (or its effectiveness) beyond the resistance levels of the undesirable equilibrium and tip the equilibrium in its favor. A mass based revolution can easily occur when the population pulls this off. The elite group can of course counter by increasing their favored equilibrium's resistance perhaps by suppression of other groups or strengthening of their own group. There is little strikingly new in these suggestions. The revelation here is the framework of an evolutionary game that introduces a general framework over often isolated findings in political and economic regime transitions.

In this project emphasis was also placed on finding out why a set of politicians would play a particular strategy in the first place. It was suggested that we can analyze this from the perspective of a learning strategy.

If we forget for the moment the traditional classification of political regimes, we have a situation of some political actors in charge of representing members of their society. If we assume that these politicians are rational agents who want to maximize their chances of staying in office and power then they must adopt a strategy that promises success. Multidimensional spatial voting theory suggests that one manner in which this can be achieved is by locating oneself on the issue space inside the "finagle circle" which is an area that outlines the size of minimal adjustments to a platform and promises victory without losing credibility. Being credible allows politicians to undertake economic reform with more chances of success and is thus important for that reason to economic success as well.

The problem with the strategy of locating oneself in the finagle circle is that as more and more people are franchised or begin to be represented on the issue space the size of the finagle circle becomes smaller and smaller. This understandably would cause relatively lesser inflexibility for the politician over time. While I have not outlined my view on this subject in this project carefully, this is where I believe the role of parties is most crucial, for, as an institution, they are able to specialize over a subset of the issue space and systematically internalize points turning up in that area of the issue space. If parties can "speak for" their members, then the size of the party-defined finagle circle can be kept relatively stable. A stable party platform provides credibility to the party and allows the party to continue internalization of ideal points over time.

The only other strategy that this structure would allow to be played against this one is one of the politicians disallowing entrance into the issue space in the first place and surrounding themselves with loyal followers (because random issue-space infiltration causes the strategies to behave like corner solution). This would allow them to define the characteristics of the finagle circle for themselves including its location and its size. The side effect of this strategy is of course the lack of credibility the politician can obtain and therefore a tendency for economic reform to fail from being seen as purely redistributionary.[1]

Some Further Remarks

What I have suggested here is that regime change and economic development are surely related but not in a straightforward fashion that allows us to provide a simple story – especially a story

[1] It is encouraging to see that since I started this project Acemoglu and Robinson (2002) have proposed that in fact there might well be a political replacement effect at work whereby political elites in societies with minimal political competition tend to block economic development for fear of the status quo being jolted and, specifically, leading them to be displaced from their cushy positions.

like Modernization Theory that would enable us to not have to worry about either regime change or economic development since one or the other would naturally obtain simply over the course of time.

Time remains a crucial element from an evolutionary perspective too, but for a specific reason. It allows mutations to groups playing a specific learning strategy to have their fullest effect on the system. Climacteric events such as war or occupation can be seen as epidemics that would increase (or decrease) the rate of mutation for a particular phenotype or subgroup in a population. In other words, time and such events would allow for the fitness of one group to grow in relation to another eventually to the point where one group and its strategy emerges dominant. The idea of strategies then characterizing a steady state or an "end of history" for the economy and polity is more contentious and of course rests on the notion of the adopted strategy being immune to mutations.

Running simulations of even a simple evolutionary model reminded us of the complexities that can arise in the evolutionary dynamic and that oscillations of strategy fitnesses are quite possible over time. All this when a specific payoff was imposed on the game. It is of course perfectly plausible that a new strategy emerges and the game starts afresh. This game was played in retrospect based on (sound) theories that posit that economic reform provides for higher income for countries than those that remain unreformed. It therefore only provides a heuristic rule and not any serious predictive power, especially not in a system that has a different set of theories as its parameters. Predicting how many democracies will there be in the world thirty or hundred years from now must therefore take the state of our knowledge about politics and economics as a necessary constant.

Theories must, of course, be endorsed by reality and the empirical investigation conducted in Appendix B of Chapter Five suggests that it is indeed a fruitful exercise to test whether or not

what we are feeding into the evolutionary model and expecting it to predict is actually supported by actual interaction. This is not an easy task, but since a good evolutionary model is one that is based on correct parameters, the theory would be served well by taking into account what transition theorists in political science, economics and sociology have learned over the years. I have attempted to take but a first step in this project towards such an eclectic approach.

APPENDIX TO THE PREFACE

TABLE ONE: TRANSITION PROBABILITIES FOR POLITIES

	0	1	2	3	4	5	6	7	8	9	10
0	98.51	0.46	0.20	0.05	0.20	0.10	0.19	0.03	0.15	0.05	0.05
1	1.62	96.52	0.30	0.66	0.30	0.12	0.24	0.18	0.06	0.00	0.00
2	3.85	0.77	92.31	1.28	0.00	0.00	0.26	0.26	0.26	0.77	0.26
3	1.87	1.17	1.17	91.80	1.17	0.70	0.23	0.23	0.94	0.00	0.70
4	1.81	0.82	0.16	0.82	94.08	1.15	0.82	0.00	0.33	0.00	0.00
5	2.88	0.36	0.72	1.44	1.08	91.01	1.44	0.36	0.36	0.36	0.00
6	2.98	0.99	0.00	0.33	1.32	0.99	91.39	1.66	0.33	0.00	0.00
7	0.34	0.00	0.17	0.00	0.00	0.00	0.51	95.62	2.02	0.67	0.67
8	2.63	0.48	0.72	0.00	0.00	0.00	0.00	0.24	91.63	2.39	1.91
9	0.61	0.00	0.61	0.00	0.00	0.00	0.00	0.31	2.76	92.02	3.68
10	0.16	0.00	0.00	0.05	0.05	0.00	0.05	0.11	0.16	0.27	99.13

Rows Represent Initial Polity Score and Columns Represent Final Polity Score

TABLE TWO: LONG-TERM DYNAMICS OF REGIME TRANSITION

	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	2	4	5	6	7	8	9	10
-10	94.12	3.53	0.00	1.18	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-9	0.72	93.48	2.17	0.72	0.00	0.72	0.72	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00
-8	1.59	3.17	87.30	3.17	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	1.59	0.00	0.00	1.59	0.00	0.00
-7	0.00	0.00	0.49	94.66	2.43	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.49	0.49
-6	0.00	0.00	0.00	2.04	87.76	2.04	0.00	2.04	0.00	2.04	0.00	0.00	2.04	0.00	0.00	0.00	2.04	0.00	0.00
-5	0.00	1.56	1.56	4.69	0.00	85.94	1.56	0.00	0.00	1.56	0.00	0.00	0.00	0.00	0.00	1.56	0.00	1.56	0.00
-4	0.00	0.00	0.00	6.67	0.00	6.67	80.00	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3	0.00	0.00	0.00	2.33	0.00	2.33	0.00	90.70	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.00
-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82.35	5.88	0.00	0.00	0.00	0.00	0.00	0.00	5.88	5.88	0.00
-1	0.00	4.55	0.00	0.00	4.55	0.00	0.00	0.00	0.00	81.82	0.00	0.00	0.00	0.00	4.55	0.00	0.00	4.55	0.00
0	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	0.00	71.43	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00
2	6.25	0.00	0.00	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00	12.50	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.14	7.14	78.57	7.14	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	2.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85.71	5.71	2.86	2.86	0.00	0.00
6	0.00	4.35	0.00	4.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.30	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	83.78	13.51	0.00	0.00
8	0.00	0.00	0.00	2.15	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	89.25	5.38	2.15
9	0.00	0.00	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.76	89.29	3.57
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21	0.00	0.00	0.00	0.41	99.17

Table is based on 44 countries with series longer than 140 years. Row values indicate initial level of composite democracy scores and column values indicate final levels.

FIGURE ONE: HISTOGRAMS OF INSTITUTIONAL DEMOCRACY

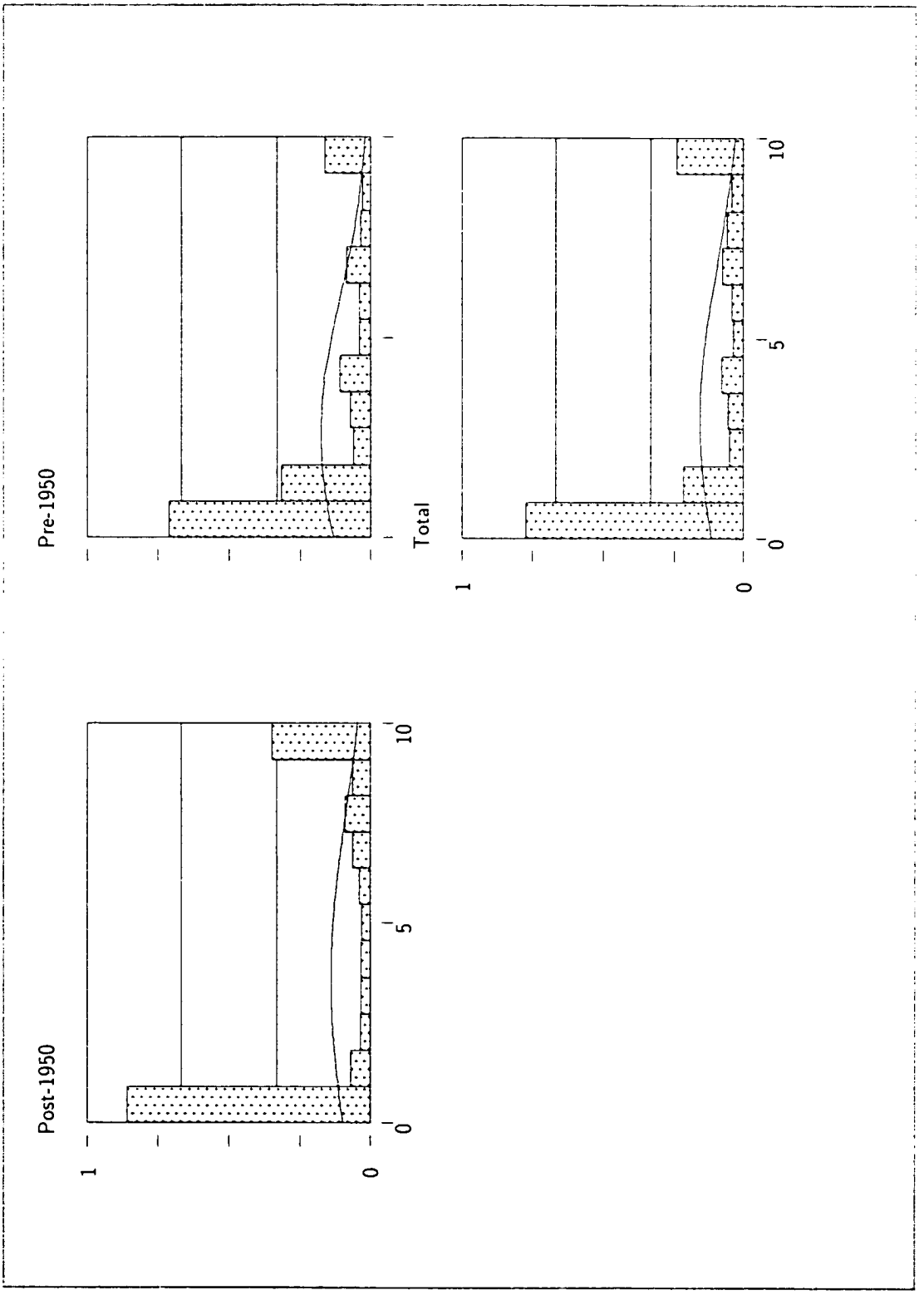


TABLE THREE: MARKOV-CHAIN CENTILE TRANSITION PROBABILITIES FOR ECONOMIES

	0.95	0.05			
	0.05	**0.90**	0.05		
		0.05	**0.90**	0.05	
			0.05	**0.93**	0.02
				0.01	**0.99**

From Quah (1993). Based on income per worker from 1962 to 1984

TABLE 4: START OF TIME DECISIONS

Agents	HC	Businessman 1	Businessman 2	Worker	Senior Politician 1	Senior Politician 2	Junior Politician
1	2	11.0653	61.8651	1.1111	27.2749	2.4749	24.7249
2	3	11.3385	62.1384	1.6667	27.5482	2.7482	24.9982
3	4	11.5072	62.3070	2.2222	27.7168	2.9168	25.1668
4	5	11.6253	62.4251	2.7778	27.8349	3.0349	25.2849
5	6	11.7143	62.5141	3.3333	27.9239	3.1239	25.3739
6	1	10.4822	61.2820	0.5556	26.6918	1.8918	24.1418
7	7	11.7846	62.5844	3.8889	27.9942	3.1942	25.4442
8	3	11.3385	62.1384	1.6667	27.5482	2.7482	24.9982
9	4	11.5072	62.3070	2.2222	27.7168	2.9168	25.1668
10	9	11.8904	62.6902	5.0000	28.1000	3.3000	25.5500

				Corrupt	Honest
	Senior Politicians		Z value	25	50
		Utility Weights			
	Case 1	Wealth	0.5	13.8175	1.4175
		Z value	0.5	12.5000	25.0000
				26.3175	26.4175
	Case 2a	Wealth	0.7	19.3445	1.9845
		Z value	0.3	7.5000	15.0000
				26.8445	16.9845
	Case 2b	Wealth	0.3	8.2905	0.8505
		Z value	0.7	17.5000	35.0000
				25.7905	35.8505

APPENDIX TO CHAPTER III

A. THE MODEL

The Central Government's Problem

First, consider the broader problem of how a central government should provide public goods. This is a recognized problem and has a well-known solution, and I believe that it can provide much insight by very simple manipulations.

Consider an economy that has two localities. Let us assume that each of those localities or the governments of the localities have utility functions that vary positively with two things. First, they care about the total level of public goods that are provided by the central government. Due to the non-rival and non-excludable nature of the classic public good, it is the total level of public good provision that is important and not only the level of public goods generated by the resources contributed by any particular locality. Second, the locality also cares about the income that remains after contributing towards the public good. Now we can assume, if it facilitates our discussion about the nature of this residual income. In particular, it may well be so that the constituents of the locality care about the residual income because they wish to see their locality richer or more simply that they also care about a private good that the residual income makes possible. The local government, or the politician that represents it, may care about the locality's residual income since he is liable to receive benefits in terms of payoffs, bribes, or even just political support.

Given this simple characterization of the economy's localities let us now write the problem of the central government.

Maximize

$$[\{\alpha(\ln(p_1 + p_2) + \ln(Y_1 - p_1))\} + \{(1-\alpha)(\ln(p_1 + p_2) + \ln(Y_2 - p_2))\}] \quad 1.0$$

In equation 1.0, the p_i stand for the public goods generated by contributions made by a particular locality subscripted by $i = 1,2$ and the Y_i are of course the incomes. Within the maximand, the two terms separated by the curly brackets are the utilities for each of the two localities. For ease of exposition, I have chosen a simple Cobb–Douglas form for the utility functions.

The first–order conditions for the public good contributions are then

$$\frac{\alpha}{(p_1 + p_2)} + \frac{(1-\alpha)}{(p_1 + p_2)} = \frac{\alpha}{(Y_1 - p_1)}$$

and 1.1

$$\frac{\alpha}{(p_1 + p_2)} + \frac{(1-\alpha)}{(p_1 + p_2)} = \frac{(1-\alpha)}{(Y_2 - p_2)}$$

Therefore, for the central government, the solution is clear. It must equalize the marginal utilities of the residual incomes of both localities. This can be achieved in a number of ways consistent with the analysis. If the central government has full control over the contributions that the localities make towards the public good, say through an appropriately devised taxation regime, this is a relatively simpler problem. If indeed, the government imposes a tax on the locality's income for this purpose then, from the right hand sides of the equations in 1.1, we have that

$$\frac{\alpha}{(Y_1 - (t_1^c Y_1))} = \frac{(1-\alpha)}{(Y_2 - (t_2^c Y_2))} \quad 1.2$$

Therefore, if we assume that the central government ascribes equal weights to the utilities of both localities, or in other words, it does not discriminate against any one of them, then we have that

- If $Y_1 = Y_2$, then for equation 1.2 to hold, the central government applies a uniform tax rate to the incomes of both localities
- If $Y_1 > Y_2$ or $Y_2 > Y_1$, then the central government simply taxes the richer locality's income more heavily.

If we relax the assumption that the government does not discriminate then these solutions can change considerably. Assume for instance that the government favors locality 1 over locality 2 by a factor of two. Then we get the result that

- If $Y_1 = Y_2$, then for equation 1.2 to hold, the central government must tax locality 2 at a minimum rate of 50% of the locality's income. I mean minimum rate in the sense that at a tax rate applied to locality 2 of any less than 50% the government may well be seen as subsidizing locality 1.
- If $Y_2 > Y_1$, or let us assume in particular that $Y_2 = 2Y_1$, then the minimum rate the central government applies to locality 2's income becomes 75%.
- Finally, if $Y_2 < Y_1$, and that in fact $Y_2 = \frac{1}{2}Y_1$, then once more the minimum rate that the central government must charge locality 2 becomes 50%.

The Reaction Functions

Since there are two localities in this economy, the problems of free riding loom large in the provision of the public good by any one of the localities. It is instructive to study this problem.

Let us continue to assume that the local government wishes to maximize some function of the residual income – local income remaining after contribution towards the public good. Further, let us now assume that the local government does in fact care about its constituents' utilities and that they in turn depend solely on the amount of public goods that the local government provides. Assume further that instead of making the simplifying assumption that $p_i = tY_i$, as we implicitly did above, now allow

$$t = t_i^{c} + t_i \qquad \therefore p_i = (t_i^{c} + t_i)Y_i \tag{1.3}$$

Equation 1.3 suggests that the tax structure in this economy is one of an inter-level tax sharing mechanism whereby the public good is created by contributions by both levels of government.

Although we will consider some alterations to these assumptions in the following section, analyzing the following maximization problem is sufficient for now

$$U_i^{L} = \alpha_i((1-t)Y_i) + u_i(p_1 + p_2) \tag{1.4}$$

In equation 1.4, α_i is a function that increases at an increasing rate in its argument, the residual income – the local income generated in the private sector that remains after contributing towards production of the public good. Notice that the first argument in equation 1.4 does not incorporate any interests of the citizens of the locality and its reason for being is simply to model an interest of the local government in private sector wealth in their locality. We do however assume that the local government wishes to maximize a utility function, denoted u_i, of its constituents. We can

see this function to be illustrative of the representative citizen in a homogeneous constituency or simply the utility function of the median voter. In some accordance with equation 1.0, we can rewrite equation 1.4 as

$$U_i^L = \ln\{(1 - t_i^C - t_i)Y_i\} + \ln(p_1 + p_2) \qquad 1.5$$

After substituting 1.3 in 1.5, the first order conditions for this problem for locality 1 with respect to the choice variable for the government, the local tax rate, gives us

$$\frac{\partial U_1^L}{\partial t_1} = -\frac{Y_1}{(Y_1 - t_1^C Y_1 - t_1 Y_1)} + \frac{Y_1}{(t_1^C Y_1 + t_1 Y_1 + t_2^C Y_2 + t_2 Y_2)} = 0 \qquad 1.6$$

If the central government levies an equal tax rate on both localities, then from equation 1.6 (and a similar equation for the other locality), we get the reaction functions for the localities

$$t_1 = \left(\frac{Y_1 - t^C(Y_1 + Y_2) - t_2 Y_2}{2}\right)$$

and 1.7

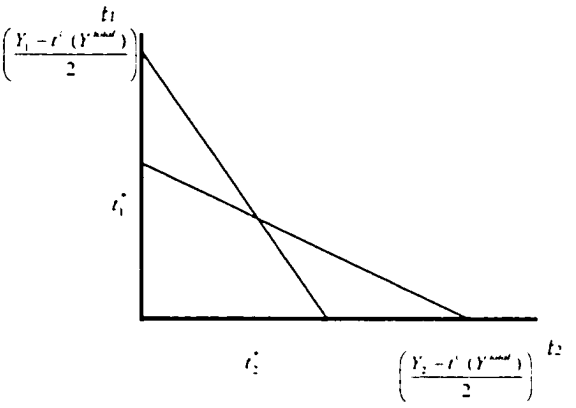
$$t_2 = \left(\frac{Y_2 - t^C(Y_1 + Y_2) - t_1 Y_1}{2}\right)$$

Therefore, the tax rate that a locality will impose on its own income depends on the following factors

- It depends positively on the level of income in the locality
- However, it also varies inversely with the rate at which the central government taxes its income
- It varies inversely with the central government's revenues excluding the voluntary contributions made by all the localities
- It varies inversely with the voluntary contribution made by the other localities

Ceteris paribus, the following picture emerges for the choice variables of the localities

FIGURE 1: COURNOT–NASH EQUILIBRIUM



Note that from the standard textbook assumptions of Cournot behavior what is evident here is that in the absence of full information the local governments will ascribe a positive value to information on how other localities are behaving.

An Analysis of the Local Government Politician's Behavior

Now let us look at a slightly different problem – the behavior of the local government politician or perhaps the elite politician apparatus.

Here, drawing on our earlier analysis, we shall make the problem even more specific. Specifically, now consider the case where the local government politician wishes to maximize only residual income. This approximates the scenario where the politician uses his of her office to extract income generated in the private sector. However, there exists a constraint. Perhaps, assuming that our economy exists in a democratic environment, it therefore forces at least some degree of political accountability on the local government politician. Therefore, a potential threat point of recall exists in the localities and restricts the politician's behavior.

In this economy then, with democratically elected politicians with 'inefficient' private–sector interests, the politician's maximization problem can then be stated as

$$\textit{Maximize} \qquad \left[\left(1 - t_i^{c} - t_i\right)Y_i\right]$$

$$\textit{subject to} \qquad r(t_i) < u_i(p_1 + p_2) \qquad 1.8$$

The constraint is the idea of a threat point, which is described by the function $r(t_i)$. The constituents of the locality must have a utility level higher than the value of this function, which in turn increases at an increasing rate in its argument t_i. Although it is possible to see the threat point as determined by a public evaluation of a vector of local policies, it is easier to imagine that the constituents simply desire a higher utility if they are 'taxed' at a higher rate. It may well be argued that it is not altogether plausible that the politician is aware of this threat point, however let us assume that this is indeed so and that therefore he or she incorporates this explicitly in the maximization problem.

The corresponding Lagrangian for our case can then be written as

$$\Lambda = \left[\left(1 - t_i^{c} - t_i\right)Y_i\right] + \lambda\left\{\ln\left((t_1^{c} + t_1)Y_1 + (t_2^{c} + t_2)Y_2\right) - r(t_i) - \phi\right\} \qquad 1.9$$

$$\textit{where}\ \phi > 0$$

The Kuhn–Tucker conditions for locality 1 are

$$\frac{\partial \Lambda}{\partial t_1} = -Y_1 + \lambda\left(\frac{Y_1}{(t_1^{c} + t_1)Y_1 + (t_2^{c} + t_2)Y_2}\right) - \lambda\left(r'(t_1)\right) = 0 \quad \& \quad t_1 > 0$$

$$\lambda > 0 \quad \& \quad \ln\left((t_1^{c} + t_1)Y_1 + (t_2^{c} + t_2)Y_2\right) - r(t_1) > 0 \qquad 1.10$$

These are interesting results. Consider first the case when, the threat point is a function of the local tax as specified. Through substitution in equations 1.10 we get

$$\lambda = \frac{Y_1}{\left(Y_1 \atop G\right) - r'(t_1)} \qquad 1.11$$

We can interpret equation 1.11 to suggest that the utility to the politician at the margin of the constituents' utility will depend positively on the rate of change in the threat point from a given increase in the tax rate he imposes. The more tolerant his constituency of higher taxes or the less likely they are to increase their threat point, the better off the politician will be. Furthermore, the effect of the marginal utility of the public good to the constituents appears negatively.

Therefore, if the politician were to increase the tax rate and for his constituents the marginal change in the threat point is very high compared to the increase in their marginal utility from consumption of the public good, then the politician will 'care' more about the constituents' utility. This is an intuitive result.

Notice that equation 1.11 allows negative values. Imagine a local income low enough relative to the total amount of public good provision, a very intolerant constituency, or some combination thereof. It is conceivable that this can lead to a change in the marginal utility of the politician from a change in the constituents' utility, given the politician is maximizing his own utility, is actually negative. However, the Kuhn–Tucker conditions in equation 1.10 disallow this 'perverse' result.

By imposing the strict inequality restrictions on our maximization problem, we get the results that

$$G > \frac{Y_1}{Y_1 + r'(t_1)} \qquad \text{and } r'(t_1) < Y_1 \big/ G \qquad 1.12$$

B. TABLE THREE: DESCRIPTION OF THE VARIABLES USED IN TABLE TWO

Variable	*Description*
Direct Capital Investment	Foreign direct investment in each region of physical capital in thousands of 1996 US dollars
Total Population	The total population of each region in thousands
Budget Income	The total budget income of regional governments in real 1998 roubles
Budget Expenditures	The total budget expenditures income of regional governments in real 1998 roubles
Corporate Profit	Recorded profit of enterprises within the region in real 1998 roubles
Change in structural Employment	Change in the structural level of employment within the region compared to the previous year in thousands of workers
EFI	Ethnic Fractionalization Index
Retail commerce	Total retail activity by entities registered in the region in millions of real 1998 roubles
Wholesale commerce	Total wholesale commerce by entities registered in the region in millions of real 1998 roubles
Exports to Non-CIS Countries	In millions of nominal US dollars
Imports from Non-CIS Countries	In millions of nominal US dollars
Exports to CIS Countries	In millions of nominal US dollars
Imports from Non-CIS Countries	In millions of nominal US dollars
Net Domestic Migration	Total change in the population of the region in thousands of people after accounting for internal migration within Russia
Foreign Equity Investment	Foreign direct investment in each region of equity and portfolio capital in 1996 US dollars

APPENDIX TO CHAPTER IV

The Neoclassical Growth Model

The neoclassical or Solow growth model is known to all students of macroeconomics interested in economic growth and general dynamic equilibrium analysis. Its elegance is inherent in its simplicity. Since the model forms a central part of this paper, it is therefore worth our while to briefly review the formal model here for our reference.

The infinite–horizon homogeneous consumer's problem can be written as

$$\max_{\{k_{t+1}\}_{t=0}^{\infty}} \left\{ \sum_{t=0}^{\infty} \beta^t \frac{(f(k_t) - k_{t+1})^{\sigma}}{\sigma} \right\} \tag{1}$$

Where

$$f(k_t) = Ak_t^{\alpha} \tag{2}$$

is the Cobb–Douglas production function in intensive form and assumes that $0 < \alpha \leq 1$. β is the discount parameter.

Now let,

$$v(k_0) = \max_{\{k_{t+1}\}_{t=0}^{\infty}} \left\{ \sum_{t=0}^{\infty} \beta_t \frac{\left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma}}{\sigma} \right\} \tag{3}$$

Where we conjecture that there exists a function $v(\ )$ such that when fed the argument k_0 returns a real number that is the optimal value of the utility function evaluated at the path that starts with k_0

Now if we define an operator T such that

$$Tv_t = v_{t+1} \tag{4}$$

Then from (3) we have,

$$v(k_0) = \max_{\substack{(c_0, k_1) \\ \{k_{t+1}\}_{t=1}^{\infty}}} \left\{ \frac{\left(Ak_0^{\alpha} - k_1\right)^{\sigma}}{\sigma} + \sum_{t=1}^{\infty} \frac{\left(AK_t^{\alpha} - K_{t+1}\right)^{\sigma}}{\sigma} \right\} \quad (5)$$

Which conveniently can be written as

$$v(k_0) = \max_{\{k_1\}} \left\{ \frac{\left(Ak_0^{\alpha} - k_1\right)^{\sigma}}{\sigma} + \beta v(k_1) \right\} \quad (6)$$

Speculate now that there exists a condition whereby

$$\lim_{n \to \infty} T^n v = v^* \Rightarrow Tv^* = v^* \quad (7)$$

Then the equation $Tv = v$ has a solution and under some assumptions is unique. The sequence of consumption and capital are characterized by Euler equations.

The first order condition is

$$\frac{\partial}{\partial k_1} : -\left(Ak_0^{\alpha} - k_1\right)^{\sigma-1} + \beta v'(k_1) \leq 0 \quad (8)$$

with equality if $k_{t+1} > 0$

Where, while this can be formally shown, here we simply assume that v is differentiable and concave and that if the operator defined in (4) preserves concavity the limiting function is also concave since $u(\ ) = \frac{c^{\sigma}}{\sigma}$ is concave.

From (6) we can write

$$v(k_t) = \max_{k_{t+1}} \left\{ \frac{\left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma}}{\sigma} \right\} + \beta v(k_{t+1}) \quad (9)$$

$$\frac{\partial v(k_t)}{\partial k_t}$$

$$= v'(k_t) = \left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma-1}\left\{\alpha A k_t^{\alpha-1} - \frac{\partial k_{t+1}}{\partial k_t}\right\} + \beta v'(k_{t+1})\frac{\partial k_{t+1}}{\partial k_t}$$

$$= \left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma}\alpha k_t^{\alpha-1}A + \frac{\partial k_{t+1}}{\partial k_t}\left\{-\left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma-1} + \beta v'(k_{t+1})\right\}$$

This can be simplified using the envelope theorem, if $k_{t+1} > 0$

$$v'(k_t) = \left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma-1}\alpha A k_t^{\alpha-1} \tag{10}$$

The optimal path $k_{t+1} = \phi(k_t)$ can now be characterized where

$$k_t = k_{t+1} = k_{t+2} = \ldots = k^*$$

Other than the uninteresting solution where $k^* = 0$

Therefore, we search for a stationary state where $k^* > 0$

$$-\left(Ak^{*\alpha} - k^*\right)^{\sigma-1} + \beta\left.\frac{\partial v(y)}{\partial y}\right|_{y=k^*} = 0 \tag{11}$$

$$-\left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma-1}\Big|_{k_t=k_{t+1}=k^*} + \beta\left.\frac{\partial v(k_{t+1})}{\partial k_{t+1}}\right|_{k_{t+1}=k^*} = 0$$

$$-\left(Ak_t^{\alpha} - k_{t+1}\right)^{\sigma-1}\Big|_{k_t=k_{t+1}=k^*} + \beta\left(Ak_{t+1}^{\alpha} - k_{t+2}\right)^{\sigma-1}\alpha A k_{t+1}^{\alpha-1}\Big|_{k_{t+1}=k_{t+2}=k^*} = 0$$

This then simplifies to a unique solution given $k^* > 0$ since

$$1 = \alpha\beta A k^{*(\alpha-1)} \tag{12}$$

Note that this raises the interesting question that if indeed $k_t \neq k^*, k_t \neq 0$ then does it follow that there will be convergence to k^*? If for example more than one k^* exists then we might have to consider local and not only global convergence.

However, if a function $v(\ )$ is concave as we assume and is differentiable then by definition we must have

$$\left[v'(k_t)-v'(k_{t+1})\right]\left[k_t-k_{t+1}\right]\le 0 \qquad (13)$$

The first term in (13) according to the envelope theorem is

$$v'(k_t)=\left(Ak_t^{\alpha}-k_{t+1}\right)^{\sigma-1}\alpha Ak_t^{\alpha-1}$$

The second term in (13) according to the Euler equation is

$$-\left(Ak_t^{\alpha}-k_{t+1}\right)^{\sigma-1}+\beta v'(k_{t+1})=0$$

$$\Rightarrow\left[\left(Ak_t^{\alpha}-k_{t+1}\right)^{\sigma-1}\alpha Ak_t^{\alpha-1}-\frac{\left(Ak_t^{\alpha}-k_{t+1}\right)^{\sigma-1}}{\beta}\right]\left[k_t-k_{t+1}\right]\le 0$$

$$\left(Ak_t^{\alpha}-k_{t+1}\right)^{\sigma-1}\left[\beta\alpha Ak_t^{\alpha-1}-1\right]\left[k_t-k_{t+1}\right]\le 0$$

Which suggests that if $k_t < k^*$

$$\Rightarrow k_{t+1} > k_t$$

And if $k_t > k^*$

$$\Rightarrow k_{t+1} < k_t$$

The Euler equation in particular prohibits oscillatory behavior and so the sequences

$$\begin{array}{l} k_t < k_{t+1} < k_{t+2} < \ldots < k^* \\ \text{or} \\ k_t > k_{t+1} > k_{t+2} > \ldots > k^* \end{array}$$

are monotonic and are bounded by k^*.

Figure One: Growth Rate versus Initial Income (1950-1992)
38 Countries

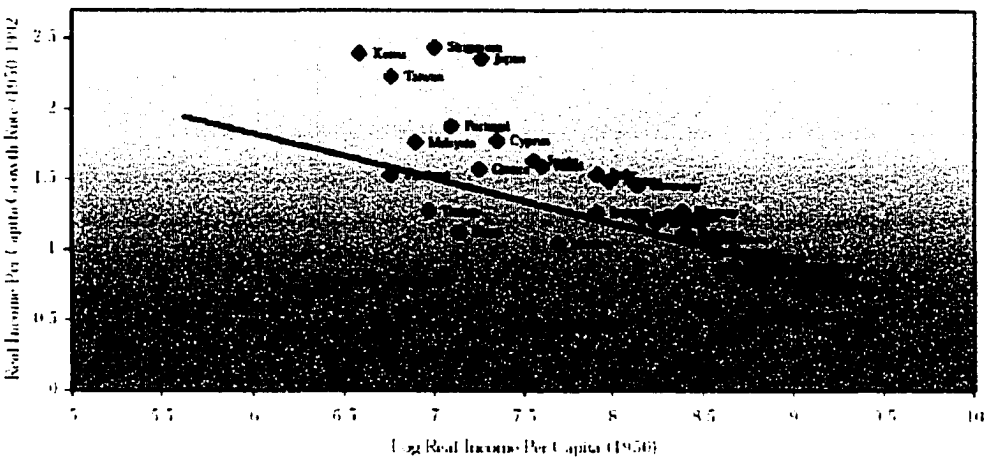


Figure Two: Growth Rate versus Initial Income (1990-2000)
68 Cities

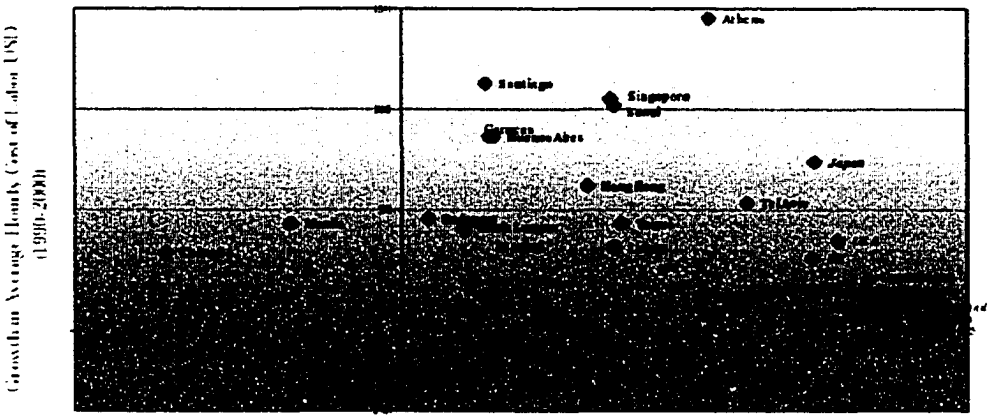


Figure Three: Growth Rates versus Initial Income (1980-1996)
502 NUTS 3 Regions in Belgium, Germany (West), Spain and France

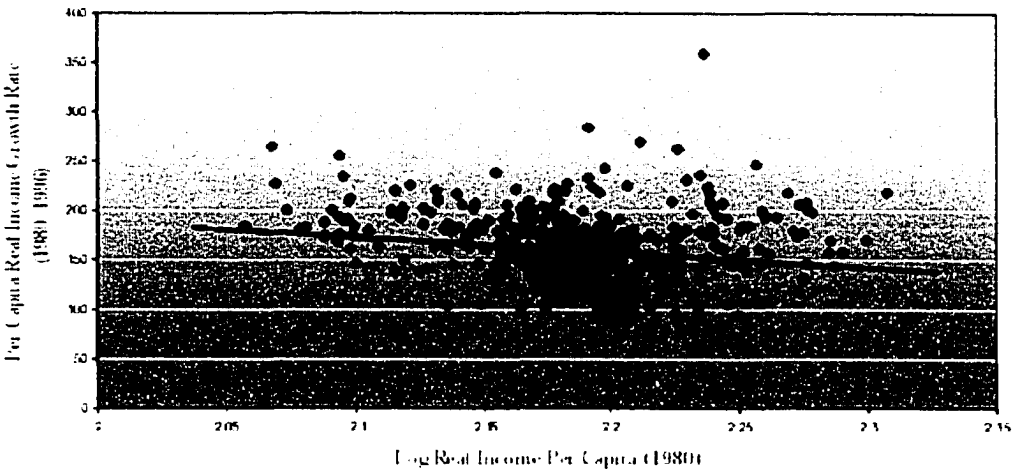


Figure Four: Log Real GDP per Capita (1900-1999)

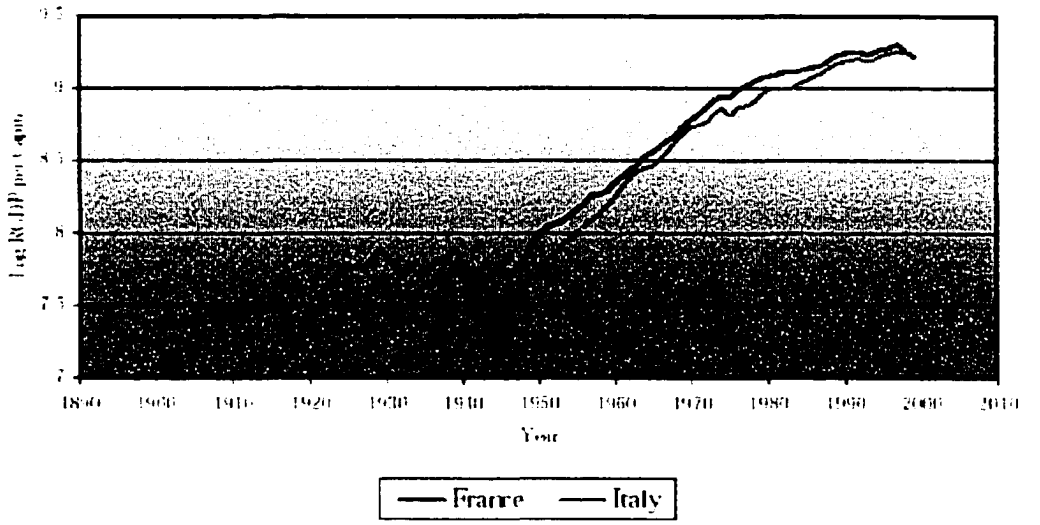


Figure Five: Log Real GDP per Capita (1900-1999)

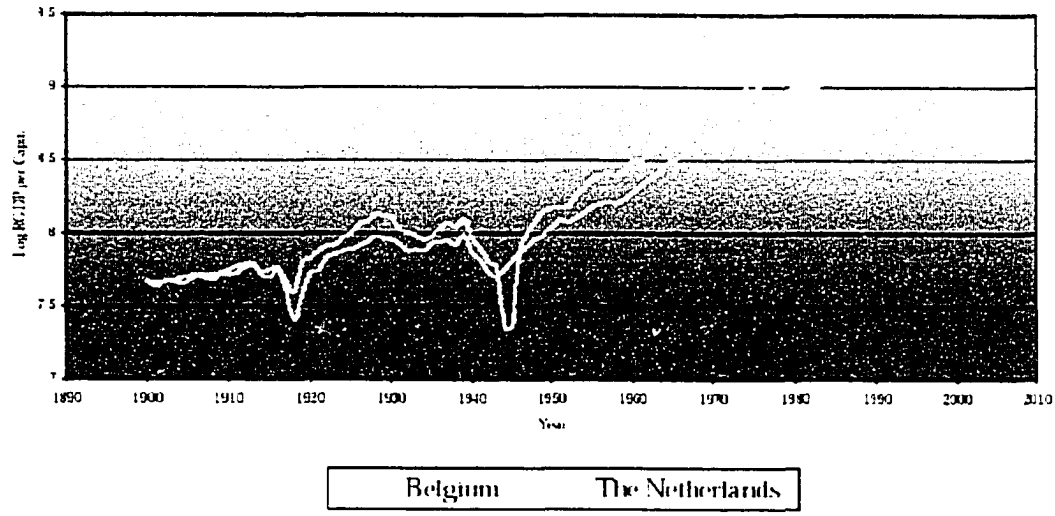


Figure Six: Log Real DGP per Capita (1900-1999)

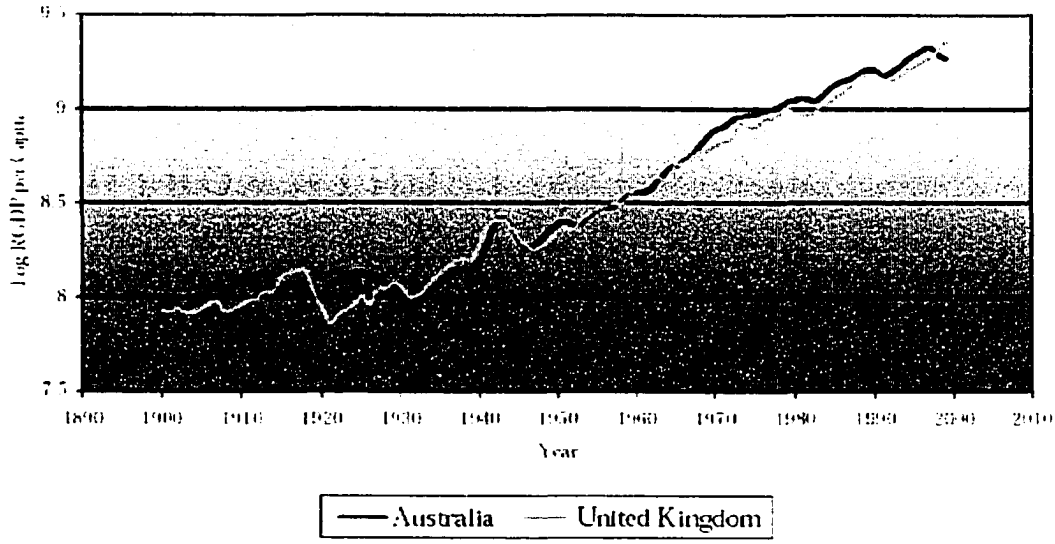


Figure Seven: Log Real GDP per Capita (1900–1999)

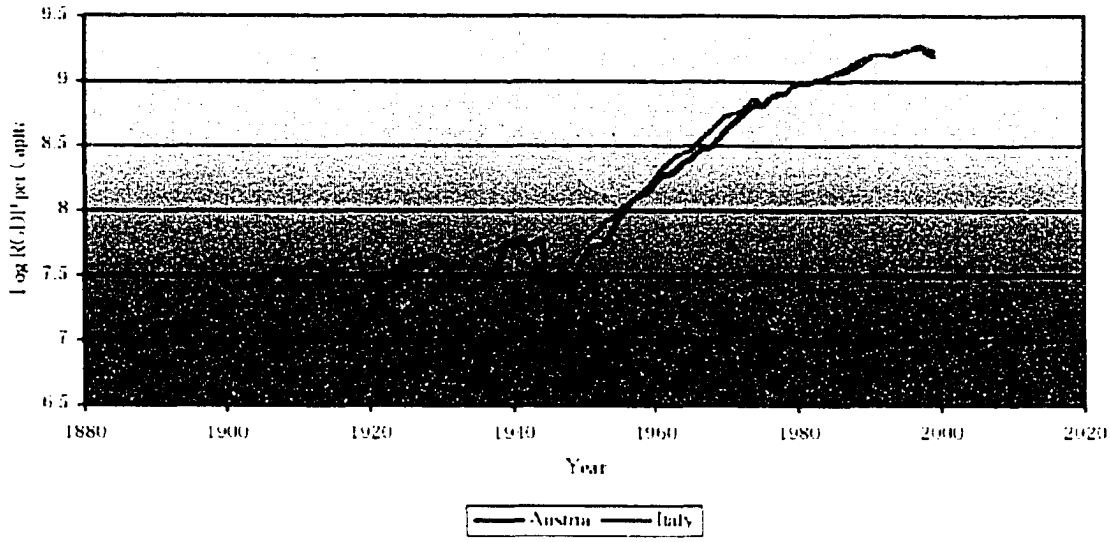


Figure Eight: Log Real GDP per Capita (1900-1999)

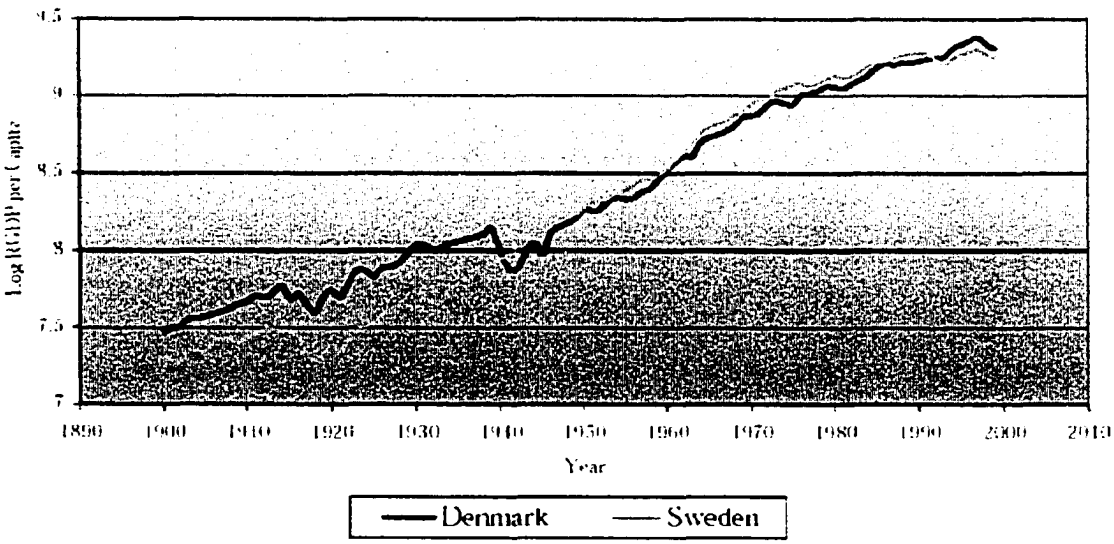
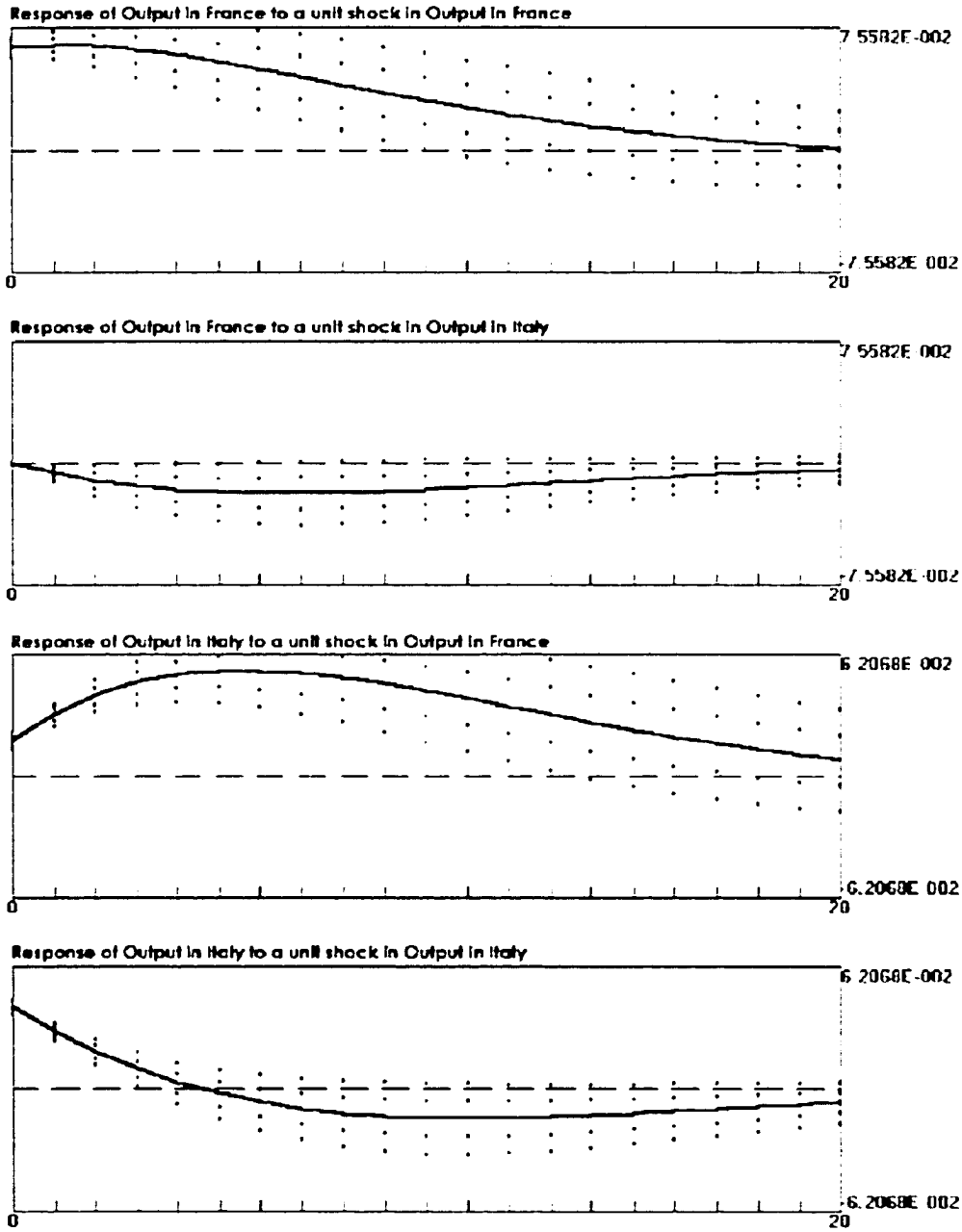


Figure Nine:

IMPULSE RESPONSE FUNCTIONS
Non–Structural (1x and 2x std error bands)



APPENDIX TO CHAPTER V

A. Further Analysis of the Evolutionary Game

Let us now consider the evolutionary game presented in Chapter V little more closely. The two players relevant in that game are a unified population body and a unified politician body. The game can very well be modified, according to the problem at hand to have instead two kinds of politicians or two pacts between politicians and various classes in the population, as is often the case.

In this game the players can choose from two strategies – reform or no reform. We can denote these strategies by R and NR. Now let the average fitness of the players playing a particular strategy be F_R^t and F_{NR}^t, superscripted by time. Also, let the average fitness of the entire country at the outset of the game – that is the population and the politicians – be denoted by $\overline{F}^0$.

The average fitness at time 1 of the players playing the reform strategy is thus autoregressive and can be written as

$$F_R^1 = F_R^0 + n_r^0 \Delta F(R, R) + n_{nr}^0 \Delta F(R, NR) \qquad (1)$$

where $n_{r,nr}$ stands for the proportion of players playing each strategy.

Similarly, for the no reform strategy the fitness can be written as

$$F_{NR}^1 = F_{NR}^0 + n_{nr}^0 \Delta F(NR, NR) + n_r^0 \Delta F(NR, R) \qquad (2)$$

Here note that while I have not done thus for the sake of simplicity, since our game was not symmetrical in payoffs, it is important to write fitness equations for each player separately.

We can now write the replicator dynamics for this game as follows. The assumption, to be more accurate, that needs to be made is that the game lasts a long time and that changes over a given time period are infinitesimal.

$$\frac{\partial n_r}{\partial t} = \frac{n_r\left(F_R - \bar{F}\right)}{\bar{F}} \text{ and } \frac{\partial n_{nr}}{\partial t} = \frac{n_{nr}\left(F_{NR} - \bar{F}\right)}{\bar{F}} \qquad (3)$$

With this information it is now possible to model the fitness of a strategy over time.

As an example, consider the game we had considered in the previous chapter. For each player, we can write the fitness function as

$$F_R^t = F_R^{t-1} + n_r^{t-1}\Delta F(R,R) + n_{nr}^{t-1}\Delta F(R,NR) = F_R^{t-1} + n_r^{t-1}R_{p,l} + n_{nr}^{t-1}R(NR)_{p,l} \qquad (4a)$$

and

$$F_{NR}^t = F_{NR}^{t-1} + n_{nr}^{t-1}\Delta F(NR,NR) + n_r^{t-1}\Delta F(NR,R) = F_{NR}^{t-1} + n_{nr}^{t-1}NR_{p,l} + n_r^{t-1}NR(R)_{p,l} \qquad (4b)$$

where the subscripts p and l on the payoffs index the players in the game, namely the politicians and the population.

Specifically, for the population we would have

$$F_R^t = F_R^{t-1} + n_r^{t-1}10 + n_{nr}^{t-1}5$$

and

$$F_{NR}^t = F_{NR}^{t-1} + n_{nr}^{t-1}6 + n_r^{t-1}4 \qquad (5a)$$

and for the politicians we would have

$$F_R^t = F_R^{t-1} + n_r^{t-1}10 + n_{nr}^{t-1}6 \text{ and } F_{NR}^t = F_{NR}^{t-1} + n_{nr}^{t-1}12 + n_r^{t-1}9 \qquad (5b)$$

Note the following interesting feature of this particular game. Ignoring, for now, the variables on the right hand side in equations 5a and 5b, for the population, playing the reform strategy provides for higher fitness, and for the politicians playing the no reform strategy imparts higher fitness. These contradictory ideal fitness strategies begs the perennial question in evolutionary game theoretic approaches – which equilibrium should result – and might be resolved by looking at resistances.

The resistance of one equilibrium against another is defined as the maximum number of players playing one strategy required to infiltrate the population of players playing the other strategy before their evolutionary advantage is lost. The definition is clumsy and is best understood by way of interpreting the numbers for the game. Specifically, in this game, the resistance of (Reform, Reform) against (No Reform, No Reform) is 3/5 and is thus higher than the resistance of (No Reform, No Reform) over (Reform, Reform), which is only 2/5. Therefore, unless more than forty percent of the total respective populations of the players want to reform, the country will be stable at the unreformed outcome. Similarly at least three-fifths of the reformers must want to reverse reforms for the equilibria to switch to the "inferior" outcome, evaluated as such of course in normative terms and not strict Pareto criteria. Although it need not always be so, in this game the superior outcome is also the risk dominant outcome. It has been shown that the long run equilibrium of such a game tends to coincide with the risk-dominant equilibrium due primarily to a specification of the process of mutation, which, in turn, can be significant over longer periods. (Kandori, Mailath, et. al. 1993)

While resistances are useful in evaluating the stability of an equilibrium in a game, in studying economic and political reform, especially in transition countries, we are very interested in the time aspect as well as the capability or fitness of a country. That capability may stem from the success of its initial reforms, the dedication of the political elite, or even simply exogenous factors like terms of trade shocks and the ability to get loans for the construction of social safety nets. Transition theorists have always had a hunch that variables with temporal elements to them like the speed of reforms, the number of elections conducted, intergenerational effects and so on are important in their studies. To examine the effects of fitness and time in this evolutionary game we must bring back the variables we ignored earlier. I find it easier to run some sample simulations of the model to keep track of what effects these variables are having.

Simulations of the Model

Figures 1 through 4 are examples illustrating the workings of the model outlined above. While the concept of an equilibrium's resistance provides for understanding outcomes in terms of minimum proportions criteria, it says nothing directly about the effect of average starting fitnesses, the rate of convergence to the equilibrium outcome, and so on. Some simple simulations prove rather instructive here in my view.

In Figure 1, the initial proportions of reformers and non reformers has been set to be equal to each other and the initial fitness of the subpopulations is identical. In this case evolutionary advantage "naturally" obtains from the payoffs the players receive from the game. The simulation shows, as expected, that the reform strategy has an evolutionary advantage for the population and the non-reform strategy has an evolutionary advantage for the politicians. Convergence is complete, non-oscillatory and more rapid for the population than the politicians. Note that the figure is not suggesting that the final outcome in the game would be politicians steadfastly playing no reform and the populations obstinately playing reform nevertheless. It only suggests which strategy has an evolutionary advantage for a subpopulation and only one of the reasons why rational individuals might want to play a strategy.

In Figure 2 the simulation has been slightly perturbed from the one illustrated in Figure 1 by providing the "natural" strategy that the subpopulation is drawn towards a handicap, while still keeping the starting proportions identical. Now the strategy that provides politicians with an evolutionary advantage is that of reform instead. Convergence is direct and rapid. For the population, while handicapping the natural outcome still eventually gives the reform outcome an evolutionary advantage, convergence is now oscillatory and much less rapid. Due to the higher

starting average non-reform fitness, the population initially seems to have evolutionary advantage playing the non-reform strategy instead.

Finally, in Figure 3, the handicap for the politicians is reduced, while the handicap for the population is made much more severe. Starting proportions are still the same. Here note that no reform appears to have finally taken over as the strategy with evolutionary advantage for the population. Convergence seems complete, non-oscillatory and very rapid. The decreased handicap for the politicians causes convergence to the reform outcome to be more gradual, but still direct and, by the 264th time period, complete to the 15th decimal place. However, the figure is unable to show clearly that convergence for the population to the non-reform outcome was initially not complete and the "natural" outcome of reform begins to regain evolutionary advantage. In this case, convergence to the strategy with evolutionary advantage for the population is indirect, oscillatory and gradual. Convergence, complete to the 15th decimal place, is achieved only by the 213th time period.

Another way in which we can manipulate the fitness of a strategy in this model is by changing the starting proportions of each subpopulation playing each strategy. The simulation for Figure 3 was run for 50,000 time periods to check for any late unexpected oscillations in evolution strategy. None were found. Then the initial proportion of politicians playing the reform strategy was decreased to approximately 16%. Figure 4 illustrates that now the no reform strategy once again has evolutionary advantage for the politicians in spite of it being disadvantaged at the outset due to lower fitness than the reform strategy.

Remarks

Where in the scheme of a modernization story can evolutionary games shed light? I aver that it has immediate relevance in the concept formation stage and provides a valuable organizing

mechanism for studying complicated transition processes. Class struggle and class alliances, repression by politicians of their citizenry, revolts by a population against their leadership, transferring economic benefits to select groups, etc. are obvious applications as they would immediately impact the fitnesses of the subpopulation and the proportions playing a particular strategy. And again, the observation that autocratic regimes have higher population growth rates would make sense in this framework.

Figure 1: Evolution of Politician and Population Fitness
with identical initial fitness and equal distribution across strategies

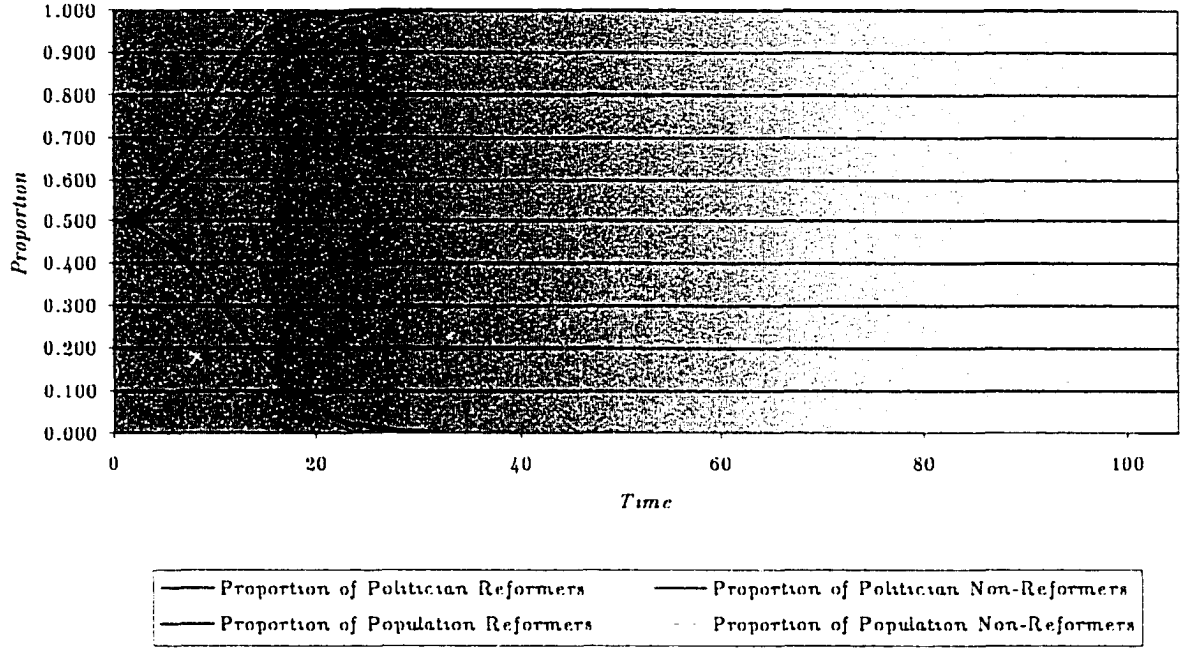


Figure 2: Evolution of Politician and Population Fitness
with reform strategy starting fitness for politicians 50% higher than the no reform strategy
and vice versa for the population

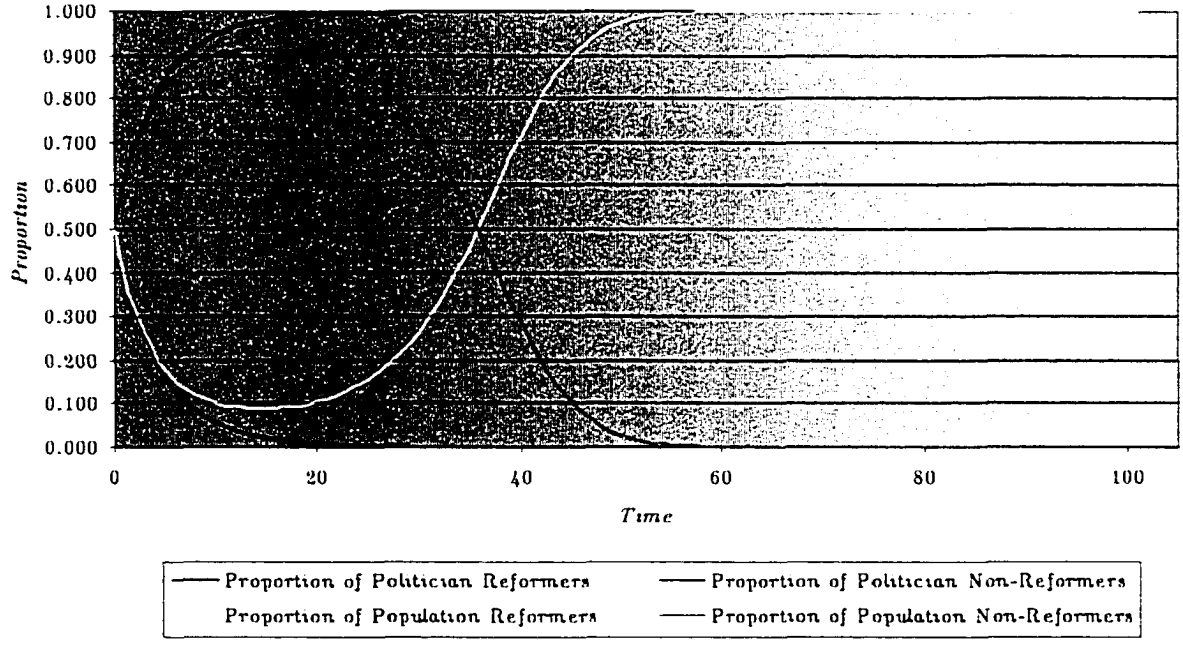


Figure 3: Evolution of Politician and Population Fitness
with reform strategy starting fitness for politicians 25% higher than no reform strategy
and no reform strategy starting fitness for population at 125% more than reform strategy

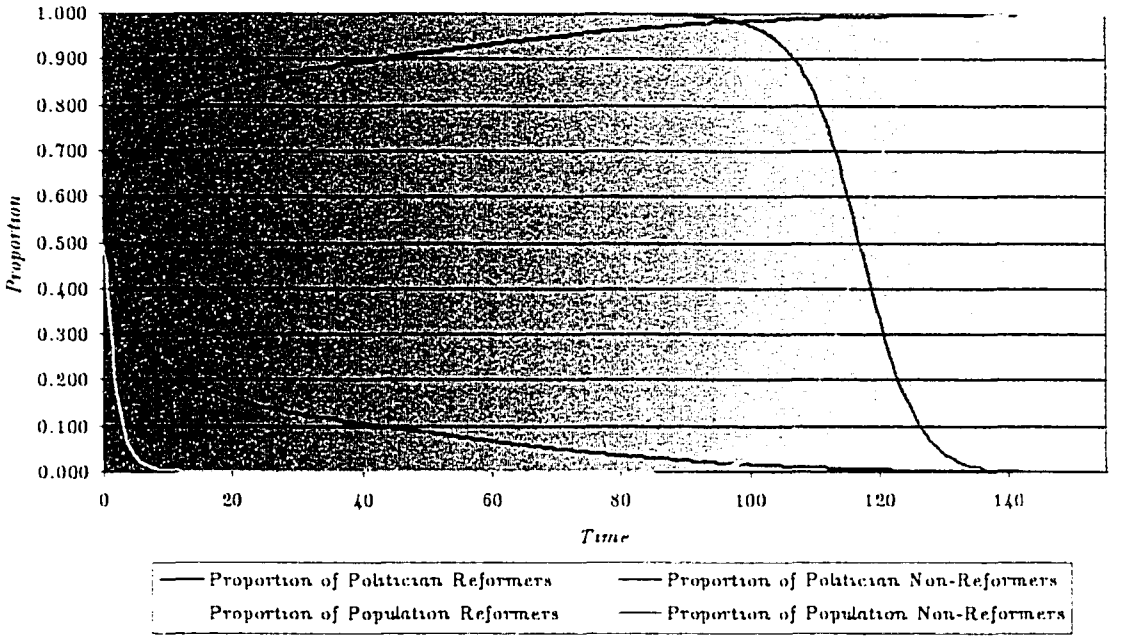
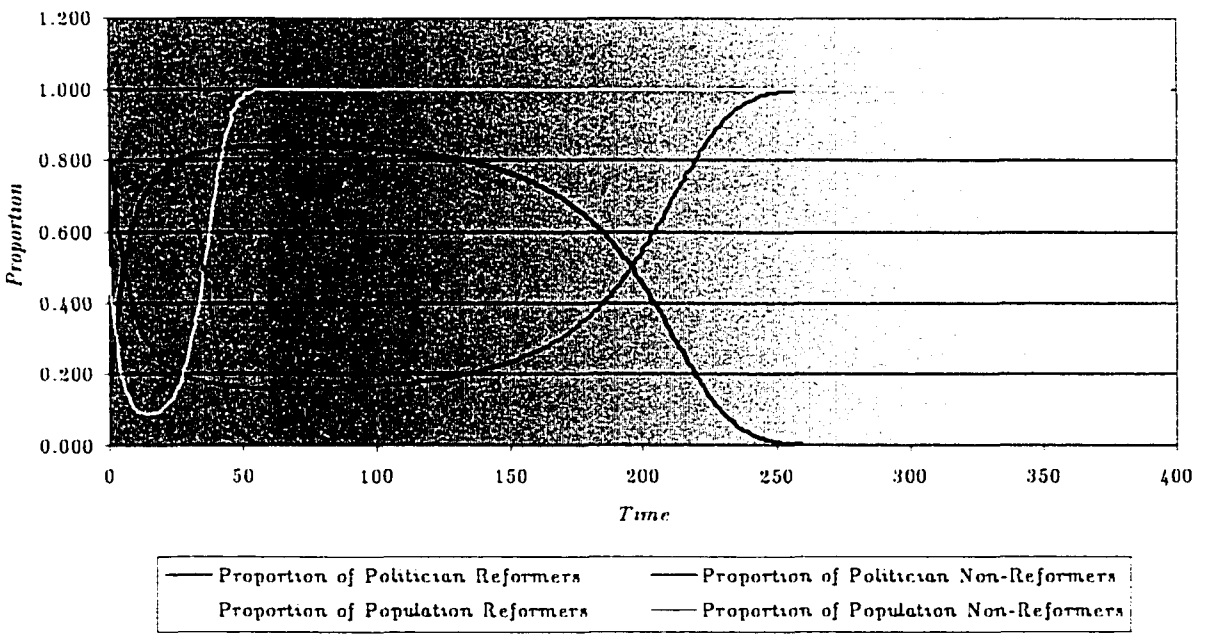


Figure 4: Evolution of Politician and Population Fitness
same as in figure 3 with initial proportion of Politicians playing reform only 16%



B. An Evolutionary Game of Dyadic Interaction

	USA		
China	Be Nice	*Be Neutral*	*Be Bad*
Be Nice	20,20	9,15	10,11
Be Neutral	15,9	10,10	9,8
Be Bad	11,10	8,9	12,12

The game above is one of strategic interaction between two countries. There are two players relevant to this game - China and the US. Each country can pick from three different strategies in their interaction with the other country. They can choose to foster a friendly and cooperative environment and play a "be nice" strategy, they can, alternatively, choose to be confrontational and play a "be bad" strategy, or they could prefer a moderate relationship and play a "be neutral" strategy instead of the other two extremes.

The payoffs in this game are highly subjective, but this need not concern here for the purpose of illustration. Now there are three Nash equilibria in this game. When both countries are nice to each other they both benefit. Think of the benefit being accrued in terms of a net internal and external political and economic benefit from the relationship. Presumably, being nice produces economic gains from interaction and trade and political benefit due to feelings of friendship and security. Being bad might have higher payoff than simply being neutral if being bad provides rather high internal political payoff through feelings of national pride.

In any case, in this game each country can now choose from three strategies - to be nice to the other country, to be bad to the other country or to simply be neutral. While this might complicate the analysis a little, in essentials the game is unchanged. We can denote these strategies by N, B,

and U respectively. The average fitnesses of the countries playing a particular strategy are now F_N^t, F_B^t and F_U^t, superscripted by time. Also, recall that the average fitness of the country at the outset of the game was denoted by $\overline{F}^0$.

The average fitness at time 1 of the players playing the "be nice" strategy is thus autoregressive and can be written as

$$F_N^1 = F_N^0 + n_n^0 \Delta F(N,N) + n_b^0 \Delta F(N,B) + n_u^0 \Delta F(N,U) \tag{1}$$

where $n_{n,b,u}$ stands for the proportion of players playing each strategy.

For the "be bad" strategy the fitness is now

$$F_B^1 = F_B^0 + n_b^0 \Delta F(B,B) + n_n^0 \Delta F(B,N) + n_u^0 \Delta F(B,U) \tag{2}$$

And finally for the "be neutral" strategy, the fitness can now be written as

$$F_U^1 = F_U^0 + n_u^0 \Delta F(U,U) + n_n^0 \Delta F(U,N) + n_b^0 \Delta F(U,B) \tag{3}$$

Here note the similar caveat as in the previous game that, while I have not done this for the sake of simplicity since this game too is symmetrical in payoffs, it is, generally, important to write fitness equations for each country separately.

Specifically, in this game, for each country, we would have

$$\begin{aligned} F_N^t &= F_N^{t-1} + n_n^{t-1} 20 + n_b^{t-1} 10 + n_u^{t-1} 9 \\ F_B^t &= F_B^{t-1} + n_b^{t-1} 12 + n_n^{t-1} 11 + n_u^{t-1} 8 \\ F_U^t &= F_U^{t-1} + n_u^{t-1} 10 + n_n^{t-1} 15 + n_b^{t-1} 9 \end{aligned} \tag{4}$$

In this game, even if we ignore the variables on the right hand side in equations 4, it is not clear for each country which strategy provides for higher fitness. No strategy can be ruled out by observation. This impasse is another reason to look at the risk-dominance of equilibria to ascertain which equilibrium should result in asymptopia for this game.

An Empirical Analysis

The Data

King and Lowe (2002) introduces a very comprehensive dataset that is ideally suited to a richer and more detailed study of interstate interactions. The data are daily events from 1991 to 2000 that are automatically coded through trained reading software that analyze the lead in articles written by journalists. It employs an ontology called IDEA, which can then be conveniently ordered by the Goldstein conflict/cooperation index for ease of interpretation. They show that this manner of compiling data is both efficient in terms of cost and effort and effective in terms of reliability. The applicability of their dataset is boundless in the study of international politics, but a careful understanding of its nature is essential. For instance, a political event that produces an IDEA code that achieves a high Goldstein score generally does mean more cooperation and is thus presumably a positive thing, but a high Goldstein score can also be achieved for a country granting another economic aid, which, while is cooperative by nature, is not in any strict sense a measure of better or more healthy economic cooperation.

Analysis

Take the example provided in the previous section regarding politicians and the population. The figures charting the evolution of fitness of each subpopulation are of course directly

dependent on the payoffs they receive in the game, which were arbitrarily provided for the sake of illustration. It is a decent criticism to make that nothing is learned by playing a number of iterations if the game is provided and the result is known in advance. I would argue that even that illustration gives valuable insight into exactly what matters in the long run. For instance, if the proportion of reformers is low enough at the outset then even a slightly higher payoff to the reform outcome will not induce any serious gravitation towards it.

However, in this section, since we do have rich enough data (even if not very long a time horizon to see ape to man like evolutionary miracles occurring) I start by ignoring the game I suggested to see what the data says naturally as it were.

I am interested in dyadic interaction and so I picked two countries at a time. Since more than one event routinely happens in a single day in the dataset, I only took the average Goldstein score for that day. I then cluster the data into three groups by the respective group mean Goldstein scores through an iterative process of sorting the dataset according to inherent group means. These groups represent my three population strategies. I calculated fortnightly averages for each group to arrive at an estimate for the relative proportions of strategy players. A fortnight to do this was picked at random though the size of the denominator should preferably be as large as is feasible.

Figures 1 through 6 are examples illustrating the results the data produce. It suggests what fitness each strategy received in the given time period. I picked three country pairs – USA and the UK, USA and China, and India and Pakistan. The ordinate charts the levels of fitness playing each strategy provides its players numerated in terms of Goldstein scores. What is interesting to note in these figures is the average fitness the group received over the course of this observation and the variance in fitness they subsequently received.

It is not easy to see from figure 1 that the US received highest fitness by playing a strategy of bad towards UK. However this strategy had the most variance. The lowest variance in fitness came with playing a strategy of being nice, which, however, provided for lowest fitness payoff. Figure 2 does show that for the UK, it was best, on average, to play a strategy of neutrality with the US even though it had the highest variance. A strategy of bad was with lowest variance in fitness payoff, with lowest payoff to match.

With respect to the interaction of the US with China illustrated in figure 3, it is perhaps evident that the average fitness of neutral players was the highest, achieved through highest variance among all available strategies. Lowest fitness was achieved by players of a strategy of bad perhaps since they were most consistently punished. Conveniently, a similar rank ordering of strategy fitness levels and their variance existed for China's interactions with the US.

Finally, in India's interaction with Pakistan, highest fitness and lowest variance in fitness payoff is provided by a strategy of neutrality. For Pakistan, the strategy of choice was bad for highest fitness and lowest payoff.

The table below provides an alternate presentation of the data in the form of a regression in terms of proportions of strategy players. Picking the neutral strategy player group as the reference makes sense since we would expect mutations to be more likely from that group to either the nice strategy player group or the bad strategy player group. Since the independent variables are proportions, I included levels as regressors to account for nonlinear relationships. While the absolute values of the marginal effects on fitness are different it is instructive to note that mutations to a nice strategy player group raises average fitness in all cases other than India's interaction with Pakistan where it has an affect insignificantly different from zero. Note also that there seems to be some evidence pointing to a presence of diminishing returns in being nice, though, interestingly, this does not appear to be so in being bad.

Finally, I simulate the expected value of fitness for the country for the extreme cases where the entire population mutates to either playing bad, playing nice, or playing neutral with the other country. I do this using the CLARIFY program (King et. al., 2001) which generates values of interest by simply drawing simulated values of the model parameters from their asymptotic sampling distribution. Other than for India, the fitness for the country is highest when all play the nice strategy. For India, perhaps playing nice with Pakistan, for internal and external political reasons, does not achieve it higher fitness than playing a strategy of neutrality.

TABLE ONE: REGRESSION ANALYSIS OF DYADIC INTERACTION

	Country Pair					
Strategy Variable	US to UK	UK to US	US to China	China to US	India to Pakistan	Pakistan to India
Proportion of Nice Players	1.411* (0.580)	1.902** (0.364)	3.375** (0.625)	2.550** (0.719)	-0.732 (-2.662)	6.127** (1.148)
Proportion of Bad Players	-0.224 (1.287)	-2.735** (-0.509)	-2.957** (-0.644)	-4.791** (0.792)	-5.108** (-1.813)	-1.501 (2.204)
Level of Proportion of Nice Players	-1.652 (1.545)	-0.112 (0.878)	-1.276 (1.169)	-0.062 (0.942)	-0.723 (2.324)	-1.543 (0.969)
Level of Proportion of Bad Players	-1.289 (1.139)	-0.197 (2.726)	-0.709 (1.975)	1.633 (2.273)	-2.714 (2.526)	-16.127 (10.054)
Number of Observations	151	185	120	106	33	40
Simulation for Fitness if All Bad	-0.493 (0.220)	-2.830 (2.223)	-0.493 (0.220)	-2.689 (1.563)	-6.184 (0.992)	-21.587 (8.049)
Simulation for Fitness if All Neutral	1.022 (0.366)	0.226 (0.038)	0.248 (0.081)	0.429 (0.147)	1.591 (0.808)	-3.928 (0.361)
Simulation for Fitness if All Nice	4.089 (0.956)	2.020 (0.565)	2.349 (0.630)	2.895 (0.369)	0.115 (0.406)	0.646 (0.176)

Dependent variable is overall fitness of country in the interaction.
Marginal effects are with reference to proportion of neutral strategy players. Standard errors in brackets. ** denotes significance at the 1% level and * denotes significance at the 10% level

Remarks

The primary purpose of this analysis is to illustrate an easy manner in which an evolutionary game like the one I employ can be tested empirically. Even a cursory analysis such as this provides poses interesting questions. One possible avenue for further research is looking at international interactions of a single country and comparing it to stock portfolio designed in accordance with the capital asset pricing model. For instance, it might be possible for the US to play a strategy of neutrality or even bad in the short run against China, if immediate concerns so dictate, without suffering much in overall fitness if it can counter by playing nicer with the UK. A country such as India can be motivated to take a more proactive role in playing nice with a country like Pakistan if some means are found of making it worthwhile to India in terms of her fitness, perhaps by evaluating her complete portfolio with other countries.

Figure 1: Strategy Fitnesses for USA Regarding Interactions with UK

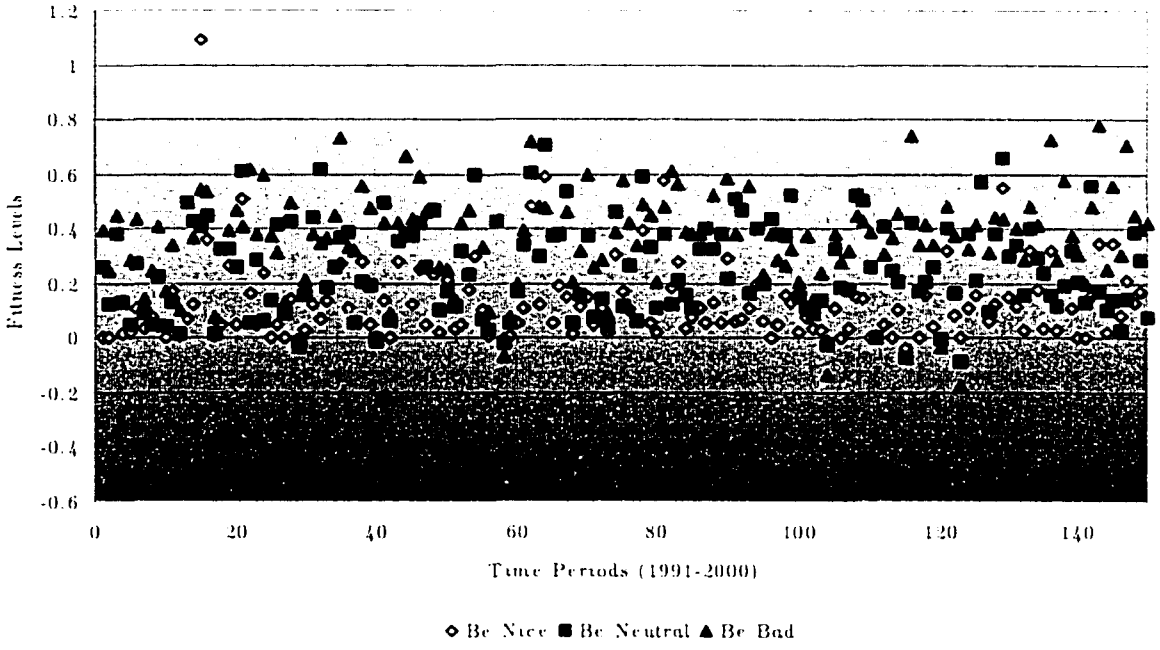


Figure 2: Strategy Fitnesses for UK Regarding Interactions with USA

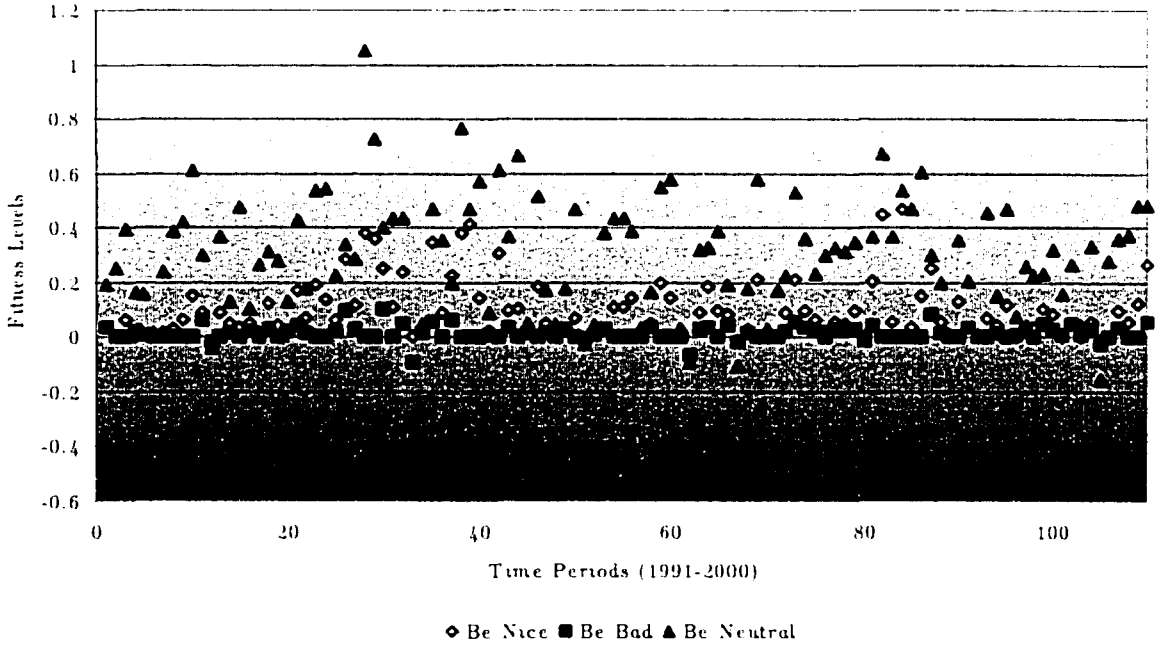


Figure 3: Strategy Fitnesses for USA Regarding Interactions with China

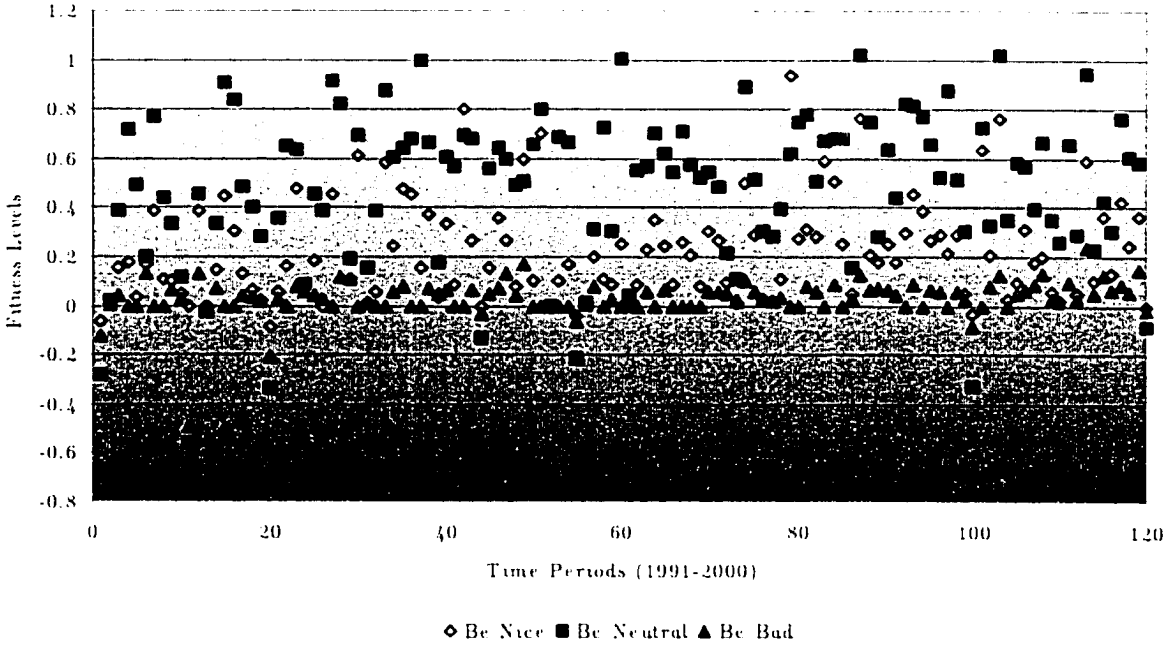


Figure 4: Strategy Fitnesses for China Regarding Interactions with USA

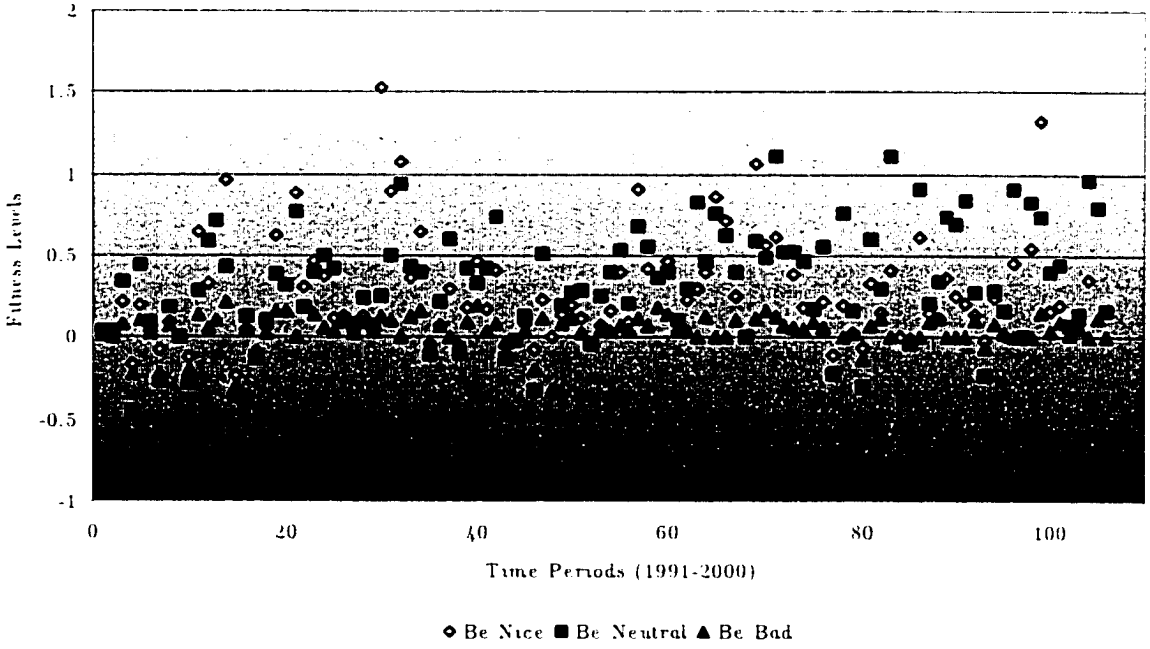


Figure 5: Strategy Fitnesses for India Regarding Interactions with Pakistan

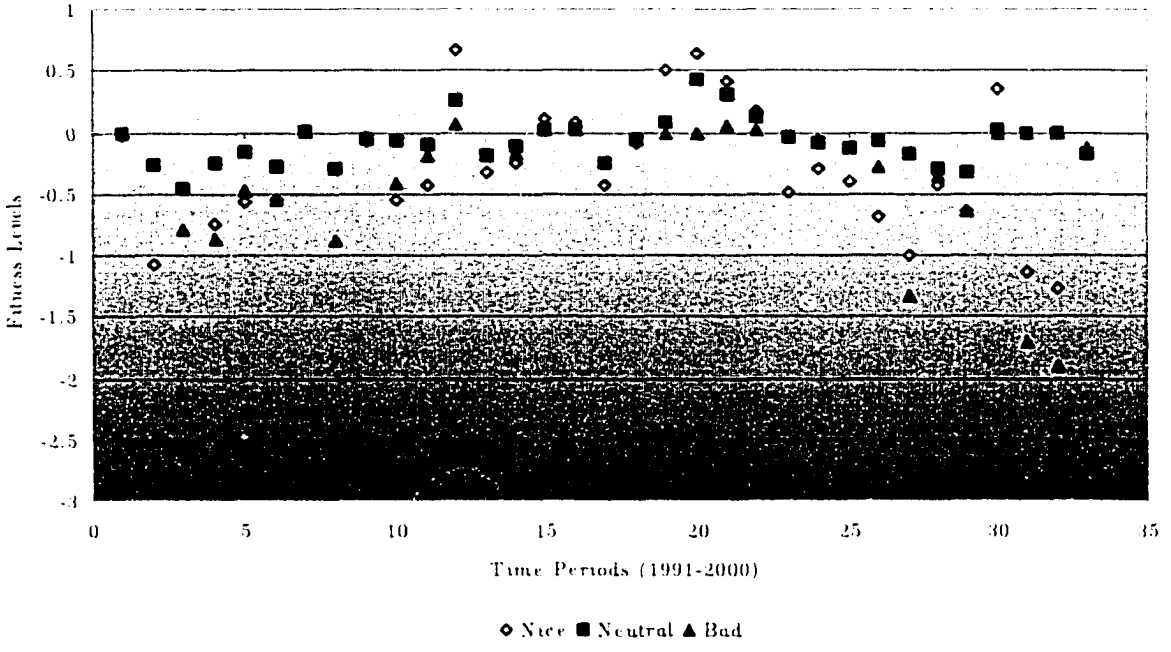
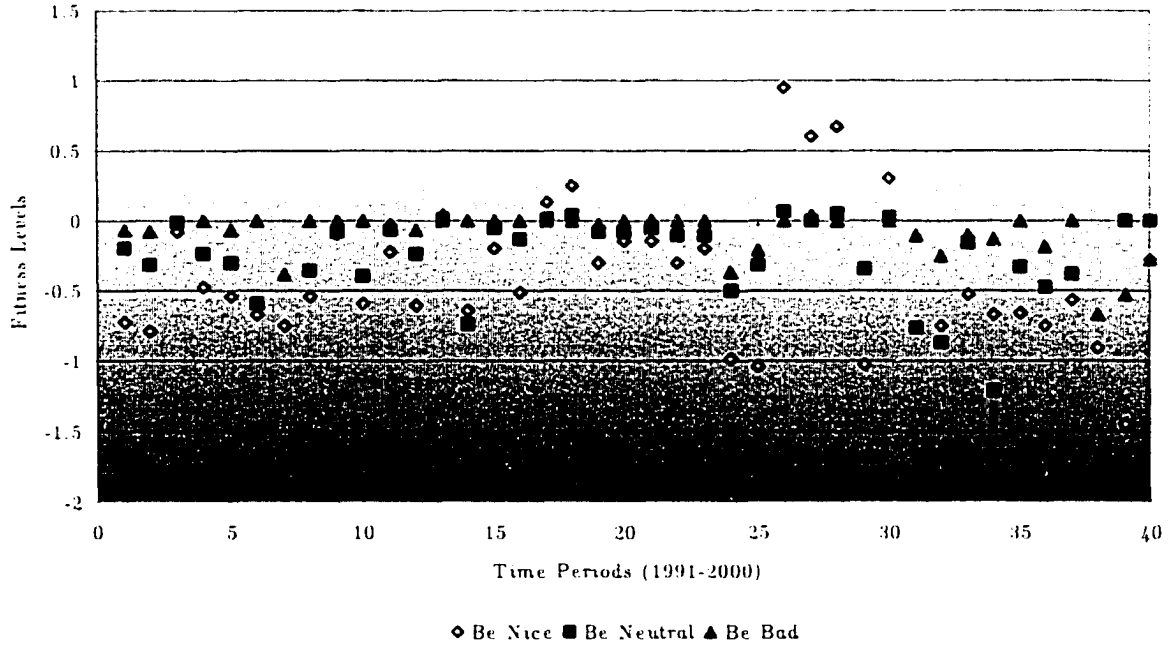


Figure 6: Strategy Fitnesses for Pakistan Regarding Interactions with India



C: The Geometry of Spatial Voting

Recall that the yolk is the circle of minimum radius that intersects all median lines. It is thus also a measure for the extent to which particular combinations of ideal points lead to a system that differs from a single unbeaten ideal point, which in turn is a yolk with radius zero.

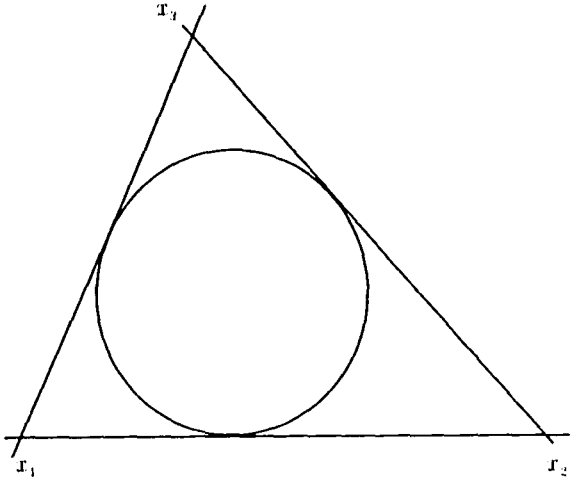


Figure A: Median lines for three ideal points are represented and the yolk is shown as inscribed within the resulting triangle. Note that the number of ideal points represented is deliberately kept odd to keep the number of median lines tractable

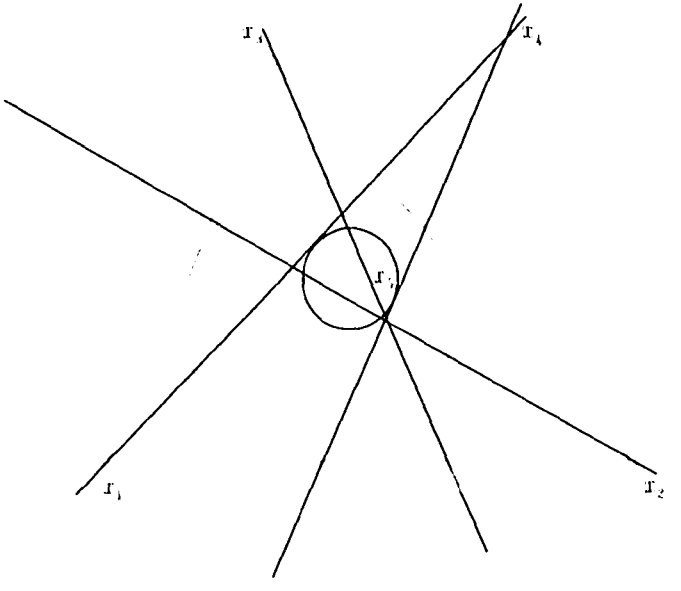


Figure B: The yolk shrinks in size as only two more ideal points are added to the issue space. Note that the initial configuration of ideal points was kept the same.

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