RESUMO

O objetivo desta pesquisa é mostrar que há uma relação positiva entre a estabilidade política-institucional, a credibilidade e a taxa de poupança privada. Parte da literatura recente sobre disparidades entre taxas de poupança usa um argumento de economia política para explicar como a instabilidade política-institucional pode afetar as decisões públicas que determinam a poupança pública, mas não sugere da mesma forma que tal instabilidade pode atingir negativamente a poupança privada. Analisar-se-á esta lacuna da teoria partindo-se do referencial teórico da *Nova Economia Institucional* (NEI), onde salienta-se, nos processos de decisão privada de acumulação de ativos, o papel do governo gartantindo (i) a estabilidade das regras de mercado e (ii) os direitos de propriedade. A pesquisa envolverá uma análise teórica microeconômica da determinação da poupança privada usando a visão da NEI. O interesse prático fundamental da pesquisa é tentar justificar, em parte, os baixos níveis de poupança na América Latina usando um argumento institucionalista e, desta forma, propor ações de governo e reformas.

PALAVRAS-CHAVE

Taxa de poupança; Poupança privada; Direitos de propriedade; Credibilidade; Instituições; Crescimento econômico; Nova Economia Institucional; Economia política; Escolha pública; Modelos de egos múltiplos.

ABSTRACT

The objective of this paper is to show that there is a positive relationship between institutional stability, credibility and the rate of private saving. The most recent literature about disparities between saving rates uses an argument of political economy to explain how and why the institutional instability could affect the public

decisions that determine the public saving. However, it doesn't suggest in the same way that such instability can affect the private saving negatively. This lack of the theory will be analysed here using the theoretical referential of the New Institutional Economics (NEI), where it is pointed out, in the processes of private decision of accumulation of assets, the role of the government enforcing (i) the stability of the market rules and (ii) the property rights. Firstly, I am going to discuss some theoretical aspects linking growth with politics and institutions. Secondly, it will be presented a multiple self model applied to savings decisions. The conclusion of the paper will suggest the necessity of empirical studies (econometric and comparative institutional cases) on the subject. The fundamental practical interest of the research, that will be the subject for further investigation, is to try to justify partly, the low levels of saving in Latin American using an institutional argument and to propose government's actions and reforms.

KEY WORDS

Savings; Property rights; Credibility; Institutions; Economic growth; New Institutional Economics; Political economy; Public choice; Multiple self decision models.

SUMMARY

INSTITUTIONS, PRIVATE SAVINGS AND GROWTH: A POLITICAL ECONOMY ANALYSIS

Marcos Fernandes Gonçalves da Silva

I. INTRODUCTION AND OBJECTIVES

The objective of this research is to show that the institutional stability can be an important factor in the determination of the rate of private saving in an economy. The institutional, and even the political stability, are fundamental, it will be argued here, to guarantee a strong and trustful financial market capable to encourage private saving.

The practical interest of the research refers to Latin America. According to World Bank (1996, p. 89), the Latin America's average saving rate in the beginning of the nineties was of just 20% of GDP, while in East of Asia it was 35%. This fact can represent part of the explanation for the growth rates differentials between the two regions. Since one of the great concerns in Brazil and for the remaining of the Latin America countries is the sustained long-term growth, the study of the determination of savings must take a central place in the economic research agenda. This research will sustain (i) that the political-institutional stability is an explanatory variable in the determination of the private saving and (ii) that the case of Latin America can be better understood using this argument.

Edwards (1995) shows, with arguments of political economy and public choice, that institutional instability can decrease public saving, but he doesn't establish any relationship between institutional instability and private saving. The central theoretical concern of this paper is exactly to show that the institutional instability can also rebound negatively in private savings. The paper intends, therefore, to

contribute for the partial fulfilling of this lack in the political economy literature about growth and savings.

The theoretical approach of the paper intends to overpass, of the point of view of its positive heuristic, the neo-classical one: it will be based in a branch of the New Political Economy (NEP), more precisely in the New Institutional Economics (NEI). Examples of similar approaches applied to growth theory are Scully (1988, 1992) and Borner, Brunetti & Weder (1995)[1].

Firstly, I am going to sum up the theories of economic growth, from Solow's model to endogenous growth theories. Secondly, it will be focused the role of institutions and its pay-off systems in the determination of path dependence growth. As I am going to explain, well-defined and enforced property rights and political-institutional stability could be important explanatory variables in growth models. Finally, I am going to do a survey about some approaches of saving behaviour. The objective of this overview is just clearing the way to the further analysis on the relationships between savings, property rights and institutional stability. Using a pure decision model of saving it will be argued that institutions are an important variable to explain private savings decisions.

II. GROWTH THEORIES: THE OLD, THE NEW AND THE INSTITUTIONAL APPROACH

1. THE SOLOW'S GROWTH THEORY

The base of the neo-classical growth theory is the Solow's model (1956, 1957). It is a model of a competitive sector that basically supposes *coeteris paribus* capital

[1] See also, for a survey about the subject, Alesina & Perotti (1997).

accumulation as the main source of the growth. Savings and productive investment continually increases the capital stock for workers in an economy and, therefore, the income in the future. Actually, this model emphasises the intimate relationship between saving and growth[2].

However, there are limits on savings in the economy. There is no possibility to change *ad infinitum* the steady State capital stock, as Solow's model supposes a traditional decreasing returns economy. Though, in the absence of the capital accumulation, that depends fundamentally of the formation of saving in an economy, other variables win space in the explanation of the phenomenon: the population dynamics, and mainly, the technical progress. They are variables characterised by the model as important factors for the economic growth. The technological progress is considered exogenous and defined empirically by the statistical residue of that it is not explained, of the point of view of the growth, only for the capital accumulation. This residue has being decomposed in several works that tried to turn the empirical analysis more precise. However, the fundamental characteristics of Solow's model are (i) exogenous technical progress and *coeteris paribus* (ii) the absence of economic growth in steady State. Actually, even savings are exogenous in the model, because it cannot explain changes in saving behaviour and in the saving propensity of the private agents. However, there is a limit to savings and in this sense, exogenous technical progress becomes the main explanation for continuous growth.

These results could be extremely uncomfortable to the model, since ultimately growth depends on the rate of technical progress, a variable that is not explained by the model. Besides this problem, the neo-classical model would has another weak point. Of the empirical point of view, the data indicate that the disparities of income among several economies are larger than the differences only explained by the rates of saving.

[2] For a comprehensive summing up of the neo-classical approach, see Grossman & Helpman (1991, pp. 22-42), Romer (1997, pp. 5-33) and Barro & Sala-Martin (1995, pp. 14-52).

Let's go further in this point. The main empirical criticism towards neo-classical model is the non-existence of data that supports the convergence hypothesis. Solow's model supposes, in a global economy with an efficient international capital market, that the economies are identical. The capital stock per worker, and consequently the *per capta* product, could grow faster in the poorest economies.

The Solow's model presupposes diminishing returns and, for this reason, convergence between countries is an expected result and an empirical fact that must be tested. However, there are at least two other criticisms about the neo-classical model. According to Barro (1997, pp.2-5), convergence hypothesis is too strong because it depends on assumptions about saving behaviour and technological progress. In a cross-country analysis, these factors are variable. Another objection to Solow's model is the fact that government policies can affect the economic decisions on savings and innovation.

The other problem is the definition of capital as a production factor. In the Solow's model, capital is just physical capital, not human capital. In this sense, there is no consideration about the externalities associated with human capital accumulation. There is some evidence that technological progress depends on a previously human capital stock (see Barro & Sala-i-Martin, 1995, pp. 212-281, and, Grosman & Helpman, 1991, pp. 112-113).

There is another important criticism to Solow's model. The enforcement of property rights and the system of pay-offs in the economy can affect decisions concerning innovations and saving. Baumol (1990) has an argument that supports this idea. Incentives and institutions matter. For example, political and institutional instability, associated with lawless environments can virtually obliterate growth in many of the poorest economies in the world (see, for example, Mbaku, 1997). Additionally, one can argue that institutions, credibility and stability of the rules of the game are fundamental explanatory variables in growth models, even in the most advanced developing economies. For example, many explanations about, the diverse

paths of growth between East Asia and Latin America are founded in this kind of argument (see Borner, Brunetti & Weder, 1995, Kasper, 1994, Islan & Chowdhury, 1997 and, Lal & Myint, 1997, pp. 213-347).

However, in developed and stable economies the government can affect the pay-offs system using policies and incentives schemes. As Barro (1997, p. 2) points out:

> "The convergence property derives in the neo-classical model from diminishing returns to capital. Economies that have less capital per worker (...) tend to have higher rates of return and higher growth rates. The convergence is conditional because the steady-State levels of capital and output per worker depend in the neo-classical model on the propensity to save, the growth rate of population, and the position of the production function - characteristics that may vary across economies. Recent extensions of the model suggest the inclusion of additional sources of cross-country variation, especially government policies with respect to levels of consumption spending, protection of property rights, and distortions of domestic and international markets."[3]

Convergence is a characteristic that could be observed among similar economies. However, the economies around the world are quite different and diverse, and the enforcement of property rights and the emergence of growth-friendly incentive structures could play a big difference in the economies performance. For this reason, the renaissance of growth theories in the Middle-Eighties departed from these supposed Achilles' Heel of the neo-classical model. As Sollow (1997, p. 82) points out comparing the Old Growth Theory (OGT) - his theory - with the New:

> "More recently, since the mid-1980s, there has emerged a New Growth Theory, which comes to more than slightly different conclusions. (...)

[3] See also Barro (1994, p. 1)

> The usual name for what is new about New Growth Theory is that the growth rate is 'endogenous', which only means that it is determined within the theory rather than taken as a given. The reference is to the fact that in Old Growth Theory, the steady-State rate of growth is always essentially given by the rate of technological progress, which is not further explained."

Let's see, with a little more detail, the core of the New Growth Theory (NGT).

2. THE NEW GROWTH THEORIES

Romer (1986, 1990a, 1990b) and Lucas (1988) present a series of new and ingenious arguments that try to work with the alleged main explanation gaps of the OGT (or the neo-classical model). The basic message of these analyses is that the capital accumulation (including the human capital) has an effect larger than captured by the neo-classical approach: considerable levels of positive externalities would follow the capital accumulation. The nucleus of the argument of the NGT is microeconomic: the investment in new equipment and in human capital done by an isolated firm not only promotes a taking over of its growth capacity. Other companies that work with equipment and similar labour would be positively affected. Even the role economy could be affected[4].

Alongside this argument, there is an important assumption generally presented in the endogenous growth models: the capital is not just physical, but human. It means that capital accumulation gains a new and different dimension. On the other hand, according the NGT, the creation of new ideas is plenty of positive externalities[5]: new technologies are in some sense public goods. These assumptions are

[4] To an extended view about NGT, see Romer (1996, pp. 95-137), Grossman & Helpman (1991, pp. 43-143), Barro & Sala - I - Martin (1995, pp. 38-51, 140-210).
[5] See, about the non-convex approach to economic growth, Murphy, Shleifer & Vishny (1989a, 1989b) and Rebelo (1991).

incompatible with the perfect competition assumption in the OGT and with the hypothesis of diminishing returns of capital. Endogenous models suggest the possibility of appearance of a growing returns economy, where technological change and increases in the rate of saving can generate a permanent increasing of the rate of growth.

> "The real novelty in New Growth Theory is that each version - and there are several - rests on a strong assumption about that gives investment decisions very great leverage on growth rates. almost always the key assumption suspends the operation of demising returns on some factor of production that can be accumulated." (Solow, 1997, p. 82)

Sometimes this is done quite directly: in some models is just assumed that there are increasing returns to capital. That means that increasing capital intensity, instead of using up the most productive and profitable opportunities for investment, actually creates more productive and profitable ones, although only a fraction of the return may be captured by the investor. (Solow, 1997, pp.82-3)

The neo-classical traditional result implies that increases of the rate of saving only imply in displacements of the steady State stock of capital, where by definition, the growth is zero, and the long-run growth can be explained just by exogenous technological change. In this sense, the NGT try to explain endogenally the main causes of the long-run growth.

> "Recent work on endogenous growth theory has sought to supply the missing explanation of long-run growth. In the main, this approach provides a theory of technical progress, one of the central missing elements of the neo-classical model. The inclusion of a theory of technological change in the neo-classical framework is difficult, however, because the standard competitive assumptions cannot be maintained." (Barro, 1997, p. 4)

The NGT basically questions the law of the decreasing returns that is the microeconomic foundation in the neo-classical model. In endogenous models (see, for example, Lucas, 1988 and Rebelo, 1991) the existence of positive externalities associated to capital accumulation implies increasing returns and the growth could continue to exist indefinitely. Actually, the basic message of Rormer (1986) it is that if the capital is not just constituted by machines, but also for complementary human capital, the law of the decreasing returns cannot be verified. In fact, there is also the necessity to suppose the existence of imperfect competition.

> "Technological advance involves the creation of new ideas, which are partially nonrival and therefore have aspects of public goods. For a given technology (...) it is reasonable to assume constant returns to scale in the standard, rival factors of production, such as raw labour, broad capital, and land. But then the returns to scale tend to be increasing if the nonrival ideas are included as factors of production. These increasing returns conflict with perfect competition." (Barro, 1997, p. 12)

Therefore, it can be affirmed that the NGT would explain the persistence of the growth in the absence of the technical progress. But, actually, the new theory tries to turn endogenous the technical progress. Once again, the nucleus of the argument is in the microeconomic foundation. Lucas and especially Rormer turn endogenous the technical progress in supposing that markets of imperfect competition (an inspiration that we could call schumpeterian) constitute the economy. In this case, the firms would have an incentive to invest in R&D that it would be associated to the possibility, given the existence of a structure of property rights, of the absorption of positive economic profit even in the long run. This theory of technical progress with an assumption of imperfect competition allowed growth to become endogenous: It becomes partially or totally determined by the investment in a very broad sense.

Actually, there is no novelty - at least in this point - about NGT. In fact, NGT departs from an old supposition about the relationships between technical advance and growth as pointed out mainly in Arrow (1962) and Usawa (1965). Especially Arrow (Idem) has been considered a landmark in this research field. As Solow (1997, p.3) points out:

> "Arrow's 1962 paper is explicitly motivated by the wish to convert the level of technology into an endogenous element in the theory of economic growth. It was hardly a novel idea that technological progress cannot be wholly exogenous."[6]

In fact, technological progress and product innovation are the core of the NGT. Crossman & Helpman (1991) and Barro & Sala -i- Martin present a series of models of endogenous technological change oriented growth. In these models, technological change and product innovations are supposed to be endogenous variables in the explanation of economic growth. However, there are at least three fundamental assumptions that are undertaken by many of the models: (i) The existence of incentives to innovate, (ii) the general enforcement of property rights and (iii) the political and institutional stability. As Romer (1997, p. 6) affirms:

> "In these frameworks [NGT with the incorporation of R&D], the long-term growth rates depends on government actions, such as taxation, maintenance of law and order, provision of infrastructure services, protection of intellectual property rights, and regulation of international trade, financial markets, and other aspects of the economy. The government therefore has a great potential for good or ill through its influence on the long-term rate of growth."

[6] Sollow (1997, p.82) defends the OGT of the criticisms about considering technological progress as exogenous: "None of the Old Growth theorists ever believed the rate of technological progress to be independent of economic decisions and events. But, having nothing very specific to say about how it is determined, they simply took it as given."

NGT aims to complement or even to refute OGT arguing that the most fundamental thing in growth, i.e. technological progress, is not explained for the model. Endogenising technological change would be the last frontier in the explanation of economic growth. However, as we can notice from the Romer's quotation above, there are a lot of missing and even, unexplained things that play a fundamental part in the game of the economic progress. Nevertheless, an important fact to be noticed is that the possibility of endogenising growth, presented by the NGT, is only possible if there is a market friendly structure of incentives. In OGT there is no explicit consideration of the existence of institutions that could guarantee the incentives for (i) the accumulation of physical capital and (ii) innovation. On the other hand, in the NGT institutions are exogenous in the explanation of (i) the investment in new technology and (ii) in human capital. Actually the criticism made by NGT to the Solow's model reveals its own fragility: dealing with the growth phenomenon without a more sound analysis of the institutions that are settled behind the economic activity.

The models of endogenous growth, because the explicit importance for them of the technical progress and the investment in *lato sensu* capital, must be worried about the role of the institutions (norms, rules, laws, politics) that guarantee incentives to the microeconomic decisions that create growth. Capital accumulation in the level of the firm and, therefore, the decisions that imply investment in machines, talents and R&D depend fundamentally on the incentive to innovate, i.e. basically, property rights.

For example, the alleged positive externalities related with capital accumulation and technical progress could only appear in an institutional environment that guarantees defined property rights, given the cost and the risk of the investment and research decisions. Romer (1990a, 1990b) considers that these factors are important for a complete model of endogenous growth. However, he doesn't explore the further implications of the institutional framework for economic growth and to explain, perhaps, the differences of income and growth between countries and the possible

existence of path dependency. The heart of the matter was missing by OGT and by NGT.

3. THE NEW INSTITUTIONAL ECONOMICS AND THE GROWTH THEORIES

There are important relationships between growth theories and New Institutional Economics (NIE). The main vision, and to say, the methodological fundamental that will be adopted in this work is founded in NIE. As we are going to see soon, convergence problems and the profound study of the economic growth phenomena demands consideration about the role of the institutions and the State. Firstly, I am going to introduce briefly some main ideas from NIE.

NIE is a branch of a boarder research program that could be defined as New Political Economy (NPE). The other branch is Constitutional Economics (CE)[7]. There is a lot of confusion regarding the possible typologies that come to organise the research field of NPE. NEI has some representatives as like as D. North, R. Thomas and B. Weingast and CE is represented, for example, by the work of J. Buchanan and G. Brennan. These two research programs could be included in a great research program due the fact of the existence of very similar heuristic concerns in the pursuit of enlarging, and not to refute or to deny, the heuristic borders of the neo-classical economics as a hole. Both the programs have the same interest: the study of the rules that are behind the operation of the ordinary markets, financial markets, and of the political market (or the State and the government).

There are convergence points between the two research programs. The first is in the study of the Constitution, the institutions, norms and the pay-off systems that emerge from them (from the Law and the Constitution *lato sensu*). Secondly, both

[7] Regarding the two researches programs see, for example, North (1990) and Brennan & Buchanan (1985).

of them are concerned with the necessity of any theory of the State to complement the neo-classical analysis (see North, and Buchanan & Tullock).

The second point in common among EC and to NEI it is the same *weltanchauung*, the same vision concerning rent seeking activities: when they are widespread and excessively disseminated in the economy, they generate inefficient results. Despite this fact, there are some differences between them.

Firstly, CE is more concerned with the study of the relationship between the constitutional incentive systems and the public agent's behaviour. On the other hand, NEI has its attention focused on the relationship between these systems and the agents' action in the market.

Secondly, NEI departs from a Coasian model wherein there are positive transaction costs. The evolution of some institutions, as the own market itself, would tend to minimise some information asymmetries and transaction costs. On the other hand, the efficiency could be affected negatively with the existence of another set of institutions. Additionally, as information is not perfect in NIE models, they usually suppose, in some sense, bounded rationality assumptions[8].

However, CE extends the *homo oeconomicus* for the public sphere without any change in the traditional rationality presupposition. Finally, the hypothesis about transaction costs is irrelevant for CE.

Although the differences between the programmes are clear, the study of the State and its relationships with economic efficiency and performance are a main and common concern of both of them.

However, what NPE and NEI have to say about economic growth?

[8] The methodological discussion about the rationality assumption is NIE models are extremely complex and this is not my purpose here actually. There are some important references about the theme as like as Rutherford (1996).

There is a straight answer to this question. North (1993, p. 61) establishes the importance of the institutional dimension of growth:

> "Why model institutions? The short answer is that they are the incentive structure of an economy and therefore fundamentally influence individual choices.
>
> Let me give you a more complete answer from neo-classical growth theory. In a recent article entitled 'A Contribution to the Empirics of Economic Growth', Mankiw, Romer, and Weil (1991) summarise and extend the earlier models of Romer (1986, 1987, 1990) and Lucas (1988), concluding that 80 percent of the variation in income per capita in 98 countries can be explained by population growth, savings, and schooling. Thus a one-percent increase in the fraction of output saved or devoted to education leads to about a one-percent increase in the level of GDP per worker. Population growth operates on the other way. So all that countries need do is follow the prescription implied by that information and they will be rich. Why don't they, if there is such a high pay-off? Because the institutional framework determines the pay-offs. Poor countries are poor because the pay-offs do not reward productive activity. All but the most myopic economists agree that institutions are important. what is missing is a way to integrate institutional analysis into economic theory."

Institutions matter. The institutions of a society represent the rules of the game in the market of goods, services, financial and in the political market. The institutions are the group of rules that restrict the decisions of the economic agents in all of these markets. They generate a pay-off structure or incentives that determines the decisions and the results of the individual actions. For example, some economists (see North & Thomas, 1973 and North & Weingast, 1989) argue - and I follow

them - that institutions have a fundamental role to explain (i) the development of the financial markets (and private saving incentives), (ii) the capital accumulation and (iii) the technological progress among economies; for them, growth must be seen as an institutional phenomenon. The main representative of this vision is Douglass North, but there are some mainstream economists who share the same approach (see, for example, Scully, 1988, Scully, 1992, and Murphy, Shleifer & Vishy, 1991).

North (1990, 1992) sustains that economic phenomena are founded in decisions of agents restrained by incentives that emerge from a set of institutional arrangements. The institutions are the rules of the game and the economic agents and the companies, the players:

> "(...) the institutions understand formal rules, informal limitations (norms of behaviour, conventions and codes of conduct solemnity-taxes) and the responsible mechanisms for the effectiveness of those two types of norms. In highest, they constitute the framework tax for the human being for its relationship with the other." (North, 1992, p. 13)

The institutions minimise the uncertainties and they define the pattern of socially desirable behaviour. For example, one of the main functions of the rules of the game would be the enforcement of the Law and of the property rights, creating the parameters for the establishment and execution of contracts, guaranteeing the return of the investments legally.

Nevertheless, there is a fundamental example about the relationships between private savings and institutions. This example will have a central role for my main argument that will be presented below. We can find in North & Weingast (1989) an analytical and historical exposition that illustrates the role of institutions in the explanation about economic growth and development. In this paper they show, with empirical evidences (behaviour of the financial markets), that the constitutional arrangements done in England after the Glorious Revolution guaranteed the

property rights on assets and eliminated the State's discretionary power to expropriate. The consolidation of the Fiscal State in England had contributed to the emerging of a trustful institutional stability. The basic argument is that these institutional reforms generated a fertile ground for the flourishing of the business, since there was a protection to the property right.

The same paper sustains, and this is by far the most important fact, that the financial market flourished in England after the reforms and that this fact would have been one of the main sources of the economic growth that would came later with the First Industrial Revolution.

For this reason, institutions could be seen as technologies - or social technologies. They can (or cannot) improve the economic output produced by the interaction of the agents who behave following the incentive structures created by them.

For example, the economic costs of a rent seeking society could be considerable. Baumol (1990) argues that the allocation of talents in activities as crime and corruption generates a cost, since these talents could be being used in innovative and managerial-productive activities that create organisational-managerial improvement and productivity gains. Of this point of view, the economic performance doesn't depend on the absolute offer of talents, but of the relative allocation of them between productive and unproductive activities (and, in general, rent seeking is an unproductive activity)[9].

But what does determine the allocation of talents between productive and unproductive activities?

[9] One can argue that there is a sort of productive rent seeking. This is partially true. Consider the case of a lobby against protectionism. In principle, the lobby is productive since its objective is founded. However, even in this case, there would be Paretian superiority if there was not the necessity of lobby action. For an extensive discussion on rent seeking activities and its costs, see Tollison (1982).

The rules of the economic game create the structure of incentives that restricts the individual choices, and therefore, determine the talent allocation. Tanzi (1995), Murphy, Shleifer & Vishny (1991) have the same argument. For example, Tanzi (1995, p.171) argues that in societies wherein corruption is endemic - and corruption is a typical unproductive rent seeking activity - the incentives to investment in human capital will be low, and this fact has bad consequences to growth. The core of the argument is: institutions could generate incentive structures that are not growth-friendly.

Economic growth depends on institutions and institutional stability. Nevertheless, a determined institutional set could be more inefficient than others. For example, one can imagine an economy with a incentive structure that determines the allocation of talents and resources mainly in unproductive activities. These incentives could emerge from stable institutions. The problem here is associated with the quality of the institutions. In this sense, growth, convergence and path dependence are phenomena linked with institutional and constitutional change (see Scully, 1992, pp. 56-105). This is one of the main faults of both growth theories, OGT and NGT.

The Solow's model sets up a relation between economic growth and exogenous technical change. Even in the case of capital accumulation there is nothing explicitly supposed in the neo-classical model about the property rights enforcement and the incentives to save and invest. The endogenous theories, including Arrow (1962), Romer (1986, 1987, and 1990) and Rebelo (1991) endogenise technological change. However, there is no consideration in these models about the role of the institutions. Scully (1992, p. 9) clearly states the importance:

> "The new institutional economics focuses attention on the social, legal, political, and economic framework that sets the range of sanctioned human behaviour and choice. The institutional framework affects the allocation of resources within society. The new institutional economics is distinguished from the old in that its proponents are not only opposed

> to neo-classical theory but frequently are neo-classical economists. Neo-classical economics and the new institutional economics have been joined most productively in the incorporation of the theory of property rights into conventional theory of the firm (...)."

Institutions are not just the Constitution and the Law, but the State also. A Stateless society in a Hobbesian natural state has a main characteristic: no property rights are enforced. For example, in a permanent civil war environment, there are not the fundamental incentives to save, invest and innovate. The property rights are essential for growth and its enforcement must be a constitutive function of the State. Contrary to neo-classical economics in general, NEI'S vision and models include the State.

The Constitution is basically the set of rules that restrict the behaviour of public agents inside of the political market (see, about this, North & Thomas, 1973 and North, 1981, pp. 20-32). For this reason, the Constitution is the set of restrictions imposed to the State as a role (Buchanan, 1968 , and Brennan & Buchanan, 1985). However, the State itself should be conceived formally as a guardian and supervisor of the enforcement of contracts and property rights in the economy. The own existence of institutional stability and credibility related to the institutions and contracts in general depends on the enforcement of the law and of the incentive structures. However, the State's discretionary power can create institutional instability.

The NPE theories of the State, all of them, with some marginal differences, consider the fact that the State is not neutral. The political market is a place wherein many competitive rent seeking groups act (see, for example, Buchanan & Tullock, 1962, Tullock, 1997, Buchanan, 1975, Becker, 1983, and Olson, 1965). Hence the economics of a rent seeking society must deal with a rent seeking State. There are

two examples of institutional environments that can illustrate the relationships among the State, rent seeking, property rights and growth[10].

Firstly, suppose that the *status quo* (the incentive set that emerge from institutions) determines, in a specific economy, the allocation of the majority of resources and human capital stock in unproductive activities. In this case, the institutions could be stable, but them could obliterate that achievement of better conditions for long run sustainable economic growth (Scully, 1992, pp. 13-4, Ramseyer, 1997). There is the possibility of economic growth in such situation, but the economy will be attached to a specific *path dependence*. One can imagine the same economy but with different institutions and government policies generating incentives to profit-seeking activities. The core of the argument here is that an institutional change towards a less rent seeking society promotes a Paretian improvement: the Constitutional and institutional changes lead the economy to a Pareto Superior Position. So, the quality of the State policies, for example, are important to explain different growth performances and absolute convergence. As Barro (1994, pp. 23-4) States:

> "A number of forces tend to raise an economy's per capta growth rate when its level of per capta income is further below its long-run target [the steady State capital stock]. These forces include diminishing returns to capital, the mobility of capital and labour, and the diffusion of technology from leader to follower economies. This type of conditional convergence does not necessary imply absolute convergence - that is, a systematic tendency for poor economies to grow faster than richer ones - because the long-run targets can differ. These differences can reflect variations in attitudes towards saving, fertility, and work effort; but the

[10]It is important to note that the relationships between economic growth and lobbing can be more complex. There are some cases where this kind of rent seeking activity could be growth-friendly, as in the case of organised pressure groups that demand growth policies.

> main source of divergence is likely to be government policies that affect the incentives to invest and to operate efficiently.
>
> The existence of absolute convergence - poor economies tending to catch up to rich ones - depends on whether the convergence property applies to government policies and other determinants of long-run target positions (...). The standard growth theory or other economic models (...) provide no basis for predicting this kind of convergence for government policies. This broader question of convergence has to be analysed by methods of political economy (...)."

We can consider a second situation, the worst one. The absence of property rights or the absence of a strong and constitutional-constrained State to enforce the law could obliterate growth and the possibility of convergence. Apparently, this is a big problem for some developing economies and there is evidence about it (see, for example, Bates, 1996, Ensminger, 1997, and Firmin-Sellers, 1996).

North & Weingast (1989) and North & Thomas (1973) consider that, for the development of the financial markets and for economic growth, the quality of the institutions that govern the public choice and, therefore, the State - and the stability of such rules - are fundamental elements to explain the economic performance, i.e. efficiency and growth. We can conclude that economic growth depends on institutions, property right and, of course, incentives. To explain absolute convergence we must consider the fact that without the right institutions and without institutional stability and credibility, the economic agent could have not incentives to engage in productive activities as technological and productivity improvements, development of new products and new organisational forms. Even we can consider the fact that without property rights enforcement there is no incentive to save. This is the case of the absence of a Fiscal State with expropriations powers not restrained by the Constitution.

The institutional framework matters because without adequate and enforced property rights, the positive network externalities that accomplish innovation and capital accumulation, as NGT predicts, will never appear. There is empirical evidence for this conception, as we can see in Barro (1997, 1996,1992), Scully (1992) , and Ramseyer (1997)[11].

The NPE and the NIE supply useful tools to analyse some questions concerning growth and development. The property rights paradigm and the consideration of the State as a *locus* of rent seeking activities are important contributions from NPE in general for not just growth theories, but also for development theories (see, for example, North, 1990, Basu, 1997, pp. 319-29, Lal & Myint, 1996, pp.10-6, Hayami, 1997, pp.21-8, Kasper, 1994, and Borner, Brunetti & Weder, 1995). The study of institutions and property rights represent a fundamental toll to understand some growth related phenomena as technological advance, capital accumulation, convergence, and *savings decisions*.

Despite the fact that technological progress is the fundamental key for economic growth, financial markets development and savings are decisive variables to explain, in an open and global economy, capital inflows, investment and growth. This point is fundamental for the subject proposed in this paper and therefore to my main hypothesis, the relationship between private saving and institutional stability. We must apply, I will argue, NIE and the property rights approach to further understanding about cross-countries differences on savings and growth. Referring to this subject, Ranseyer (1997, p. 11) affirms:

[11] Democracy also apparently has a positive relation with growth. However, this relationship can be misunderstood because the main question is property rights enforcement. In democracies, it is usual to observe the property rights enforcement by the State.
We can find an enlarging analysis of the relationship between democracy, political development and economic growth in Barro (1997, pp.49-87) and Barro (1996, pp.67-99). There is no evidence that corroborates the theses according that democracy is an important input to growth. On the contrary, the main thing here is the enforcing of property rights. Coincidentally, in Democracies prosperity rights are guaranteed by the constitution. However, one can argue that democratic regimes are more stable and institutional and political stability seems to be important variables linked with growth. About this important subject, see Weingast (1997), Cheibub & Przeworski (1997), Wintrobe (1997), Salmon (1997), and Przeworski & Limongi (1993).

> "(...) Will people save? The right answer is that it largely depends on the returns they expect, and those returns depend on property rights in place."

III. SAVINGS AND GROWTH: A POLITICAL ECONOMY SUBJECT

I am going to argue in this section that the traditional private saving studies underestimate the role of the political-institutional instability over the savings decisions[12]. Several choices done by the economic agents, as like as between consumption and saving and investment in physical and human capital or in technology involve risk and uncertainty. The institutional instability can generate uncertainty to these decisions. Additionally, it could increase the credibility lack (i) between economic agents concerning the contracts and (ii) between them and the government. In a volatile economic environment the constant changes in the rules of the economic and political game are usual.

1. SAVINGS, PROPERTY RIGHTS AND STABILITY: INSTITUTIONS MATTER

The majority of studies about saving are microfounded and empirical. There are a lot of works about the theme, mainly because savings are not just a big issue today in academic circles, but also for governments concerned with growth recovery. The recent literature about saving is concentrated in panel data studies using United

[12] An extremely useful theoretical and empirical review about savings is found in Kortlikoff (1989). In the literature there is no consideration about the relationships between institutional and political instability over private savings.

Sates, Japan, Southeast Asia and Latin America as important examples[13]. Firstly, comparisons about saving behaviour with United Sates and Japan are inevitable, since recovery and competitiveness were in the top of the American policy agenda. Secondly, there is a lot of discussion about savings differences between Latin America and Asia, and cross-section studies using these countries are fertile for theory advance and policy.

To understand the main argument presented in this paper, I will introduce a brief survey of some most recent literature about savings using the Latin American case. In this literature there is even some consideration about the negative impact of institutional and political instability over public savings. However, in the frontier of the knowledge in this field there is no mention about the fact that this kind of sistemic risk and uncertainty could affect private saving also.

One of the most recent papers about savings is Ogaki, Ostry & Reinhart (1995). They use a model of endogenous growth to evaluate the adverse impacts of changes in the real interest rate on savings and growth. The article uses data of several countries, with different levels of income, to test a model where the elasticity of substitution varies in agreement with the wealth level. The parameters are used to evaluate the impact of real interest rates changes on savings, considering economies with several development levels. The main conclusion, extracted from growth model derived from Rebelo (1991), is in poor countries, unlike the richest ones, an increase of the real interest rate doesn't increase significantly savings rates. In economies living in a virtuous circle of growth, with constant increases of the income, a financial liberalisation with a real interest rate increase can improve savings and create endogenous conditions for a larger growth in the future.

[13] See, for example, Hayashi (1997), Gavin, Hausman & Talvi (1997a, 1997b), Berethèlemy & Varoudakis (1997), Rojas-Suárez & Weisbrod (1997), Birdsall, Pinckney & Sabot (1997), Gavin & Perotti (1997), Normann & Owens (1997), Reisen (1997a, 1997b), Edwards (1997).

Edwards (1995) is a panel study crossing several developed and undeveloped economies. The article shows that the average saving rate in Latin America was, in the decade of 80 (in fact between 1983 and 1993) just 15%, and in spite of the existence of chronic public deficit in some economies, there was also in this period a considerable decreasing in the private saving. This article shows that the main causes for the existence of high saving rates are the (i) demographic structures where high dependence levels don't exist (concentrations of seniors and of youths) and (ii) accelerated economic growth.

Additionally, institutional-political instability appears as important variable for the explanation of low saving rates. Considering public saving, the article finds that governments that are confronted with chronic instability, tend to save less. This argument represents a starting point for my main argument in this paper. I will sustain that, as like as public saving, private savings can be negatively affected by institutional instability. Political and institutional instability can increase the State's discretionary power: in such a situation there is a greater risk of property rights violation. Unfortunately, the most recent literature on the theme doesn't properly consider this particular feature in the analysis of private savings decisions.

It would be reasonable to suppose the fact that the own actions of governments constituted under unstable political markets can affect (i) the stability of the basic institutional rules, (ii) the agents' credibility concerning the property rights warranty and the enforcement of the contracts, and (iii) private choices involving savings decisions.

For example, institutional and macroeconomic instability could be important factors to explain the low rates of saving in Latin America. In the case of Latin America there are historical evidences of (i) unpredictable government's intervention and (ii) no guarantee of contracts (see, for example, Edwards, 1994). These two factors indicate that the quality of the public choice institutions or the rules that govern the

public decisions can be crucial for the a more accurate analysis (theoretical and empirical) of economic agents' decisions.

It is important to notice that this lack in the literature about private savings is, at least in part, justifiable because the difficulties involving dealing with qualitative index of political and institutional instability. It is very hard to construct and to use data concerning political and institutional instability. Despite this fact, there is the possibility, as we are going to see, to construct models and even institutional comparative studies that deal with this matter.

My main argument is that the mainstream explanations about private savings decisions don't contemplate the main role of institutional and political instability, since savings decisions are choices that involve risk and uncertainty.

The institutional and political instability can be defined as the volatility of the rules of the economic game and of the basic institutional set (and constitutional set) that regulates the discretionary powers of the State. The institutional instability creates uncertainty about property rights enforcement and in radical cases it increases the risk of expropriation. Institutional instability is the situation wherein there is no guarantee of the respect of private property rights over assets in general. However, there is a kind of institutional instability that it is not so extreme. Macroeconomic instability generates, in many cases (as, for example, Brazil during the Eighties), constant policy changes and increases the possibility of random changes in the economic policy, changes that could affect contracts.

Institutional instability creates institutional uncertainty, as defined by Borner, Brunetti and Weder (1992, p. 17):

> "We define institutional uncertainty as the risks arising from a highly volatile institutional environment. Institutional uncertainty reflects the permanent danger of expropriation or limitation of property rights.

> Institutional uncertainty means that there are no clear and irrevocable rules of the game."

It may well be that Latin America's economic history does in fact tend to show that much of what was negative for financial development and even economic growth came from the institutional instability (see, for example, Marichal, 1997, Haber, 1997, Haber & Klein, 1997, and Engerman & Sokoloff, 1997). This account, it seems to me, contains two basic points, Firstly, institutional instability creates the unpredictability of government policies changes and discretionary interventions. Secondly, and derived from the first point, institutional instability doesn't guarantee the enforcement of private contracts (Broner, Brunneti & Weder, 1992, p. 19).

Institutional instability, when it is endemic and deeply rooted in the political market, can mitigate contracts and can generate informality in the financial markets. However, when we consider the private savings decisions, the main problem associated with institutional instability and uncertainty is the fact that the intertemporal preference discount rate can be affected.

Savings decisions are inherently intertemporal choices that require the institutional enforcement over future assets. Supposing the existence of a relatively developed financial market, the act of save can be seen as a intertemporal contract that demands the guarantee and enforcement of property rights in the future. The incentive structure that emerges form the institutional set and form unstable institutions can decisively drive intertemporal choices in the economy. The possibility, for example, of unpredictable and chronically discretionary interventions of the State regulating property rights and contracts can generate uncertainty towards the rights over future financial claims. The economic agents can shorten the time horizons of the decisions and, in the case of savings choices, consume more and save less. It must even be considered the theoretical possibility of no altruism in extremes situations.

One could argue that the influence of institutional instability could be not direct, because there are other factors linked with savings decisions. However, economic agents may evaluate more the present than the future, independently of the interest rate level and a priori altruistic/selfish suppositions. Even in the case of infinite horizons, if there is absolutely no guarantee of property rights enforcement over financial assets in the future, one can argue that consumption could rise permanently.

Savings decisions are, at least theoretically speaking, closely bound up with incentives. And they may, indeed, be affected by the lack of property rights enforcement. The basic absence in the traditional models used to explain private saving decisions is the simple fact that they do not contain the *a priori* supposition of property rights enforcement.

This issue can be the heart of the matter for many developing countries. The cross-section and causality evidence derived from some studies using endogenous growth models corroborates the supposition that growth causes (Granger) saving increases (see, for a debate on the theme, the collection Hausmann & Reisen, 1997). This fact could be linked to the hypothesis that some institutional changes are previous conditions to economic change and growth. My supposition in that institutional change must be seriously considered as a previous condition to private savings improvements and this approach is an attempt to bring new light in the debate.

1.1. Property rights institutions, savings and incentives: a multiple self economic agent model

It must be considered the necessity of construct a model linking incentives that came form the basic institutional set with save decisions. However, such approach is not compatible with the traditional, neo-classical view about economic agent's decisions.

Consider the consumption behaviour formula (1) bellow:

$$U = \int_0^{\infty} e^{-\rho t} u(C(t)) h dt$$

In this case, the greater is ρ less the agent values saving (or future consumption)[14]. The main question is: the lack of property rights enforcement could create uncertainty respecting the legally guaranteed benefits from saving. Political and institutional instability could affect ρ: the intertemporal preferences of the economic agents depend on how property rights are enforced by political and economical institutions.

A brief review of the most recent literature about private saving shows that there is no consideration about the impacts of institutional and political instability over consumption/saving decisions (see, for example, Hayashif, 1997). This absence in perfectly comprehensive because many papers and books about the theme are related with savings in developed economies as OECD countries. However, the importance of the property rights approach grows up when we analyse many underdeveloped economies. In many of these economies, institutional design and economic rules are not market friendly or they are fragile. For example, the brief examination of some African economies shows the relevance of endogenising institutions in economic explanations about underdevelopment (Mbaku, 1997, pp. 91-110). Even in the case of saving decisions, considerations about the quality of property rights enforcement institutions are crucial:

> "Researches have argued that economic growth in a country is affected by the security of property rights in that society. Those who provide funds for capital formation expect to be able to receive the earnings produced by their savings. Consequently, savers have to be assured, to a reasonable degree, that they will have access to the earning of their saves. Political instability has a negative impact on the security of

[14] In this case *h* is the number of individuals in a household; I am supposing *h = 1*.

> property rights and, as a result, lowers the level of domestic savings and subsequent capital formation." (Mbaku, 1997, p. 94).

The inclusion of the institutions in economic models represents a hard but necessary task. There are many ways to deal with institutions inside economic models. For example, North (1993) suggests the use of models that include belief and shared mental models (ideology) formation. In some way, many NIE theorists use bounded rationality models (see, about methodological questions concerning NIE, Rutherford, 1996).

I am going to use a multiple self decision model to explain how property rights enforcement can affect saving decisions. The introduction of incentives schemes into the traditional decision theory represents a very hard but necessary task. The literature about saving and incentives is restrict to experimental economics and psychology and basically works with rationality failure models. On the other hand, incentives in this literature are not taken in the same sense as in NIE. However, it is interesting to highlight some aspects from these models.

Ainslie (1975, 1982, 1994), Schelling (1984), Thaler & Shefrin (1981, 1988) are some examples of this literature. Basically, these models deal with the notion of *akrasia* and self control: the problems facing by the agents when they decide to consume more or less are seen as self-control issues. As a matter of fact, saving decisions would depend on (i) self enforcement rules or (ii) environmental influences.

Thaler & Shefrin developed insightful ideas that are relevant to the model that will be developed in this paper. They construct a multiple self model, supposing that ht e economic agents have more than one preference ordering. In this sense, an economic agent is supposed to be a set of multiple selves or egos. The selves are

conflicting ones and the economic agent has opportunity costs to choose what self will be the first one in the meta-ordering of preferences.

Thaler & Shefrin conclude that saving decisions depend on the environment: saving incentives could determine which self would be the first one in the selves ordering.

Thaler & Shefrin (1988) represents a starting point to the construction of a saving decision model conditioned to incentives structures. Psychology apart, such model supplies an important insight: the introduction of institutions and incentive structures in a saving decision theory demands some consideration about the rationality hypothesis utilised. In my view, considering agents as composed by multiple selves is a fundamental step in the construction of models that try to endogenise institutions and pay-offs systems. For example, if property rights are not sufficiently enforced, the incentive structure can represent an external variable that determines which self will remain as the first one in a saving/consumption decision.

The development of multiple selves models in economics is not a great novelty at all. Generally, these models are classified as “picoeconomics” or the study of how decisions are taken inside agents. Some references of this kind of are found in Elster (1987).

I am going to develop in this paper a multiple self model applied to saving decisions. The main purpose of this modelling is to show how institutions (specially enforced property rights) can affect saving decisions. However, I am not going to use any bounded rationality assumption. On the contrary, I am going to model the choices between selves inside the agent utilising an “as if” hypothesis: They are going to be seen as like as a social choice problem[15].

[15] There are two traditional ways to deal with a theme as the one of this study, inside of NEI’S tradition and of EC. The first - and more usual - it is the use of case studies or the induction of facts starting from historical sources. Examples of this approach are Alston, Eggertsson & North (1996) and Harriss, Hunter & Lewis (1995). NEI’S fundamental works as North & Thomas (1973) and North & Weingast (1989) are historical. Despite this fact,

The model developed here is founded on an extension to the individual agent of collective choice problems. In supposing a multiple self agent, It will be argued that the existence or not of well defined and trustful property rights institutions could change the behaviour of the agent. The agent will be seen as composed by three egos, i.e., (i) one who "will increase saving today", (ii) one who "will sustain the same saving level as yesterday", and finally (iii) another one who "will increase consumption today".

The main question is: which of the selves will be the dominant one? The answer of this question depends on (i) the assumption about how the existence of property rights creates incentives to save (and acts on agent's decisions) and (ii) how the "Arrow's Paradox is solved *inside the individual agent composed by multiple self.* Both the questions are linked and the solution to them in based on the assumption of the role of preference reversals.

The main problem in social choice and public choice theories is how to explain collective choice. The traditional convex microeconomic theory supposes individual choice as rational, i.e., transitive. However, many individuals who do not necessarily share the same values, ideologies and beliefs compose "society". The preferences orderings could generate, in a collective level, non-transitivity. So, the conclusion is that there is no any guarantee about the rationality of collective choices because preferences orderings differ among agents.

The consideration in a decision model of a multiple self agent or simply an individual agent as seen as a group of many egos introduces the Arrow's Paradox problem in the level of individual choices. Such a kind of considerations is

recently have been appearing works that try to work with the implicit vision to NEI (and also to EC) analytically, that is, with analytic-deductive and not inductive "models". The most important example of that is the collection of essays from Scully (1992).
Of the methodological point of view, the vision adopted in this research is instrumental. The nucleus of the research is analytic, since I am going to elaborate a model of decision of private saving that incorporates NEI'S basic hypotheses according to which very defined and guaranteed property rights and institutional stability generate credibility (a important factor that motivate the formation of private saving in an economy).

extremely useful when we deal with some situations involving Faustian and Salomonic choices, for example. In many cases, individual choices could involve the possibility of contradictions and "rationality failure", as *akrasia* and wishful thinking. In this paper, it will supposed that institutions can act upon multiple self agents producing rational , transitive choices even considering the existence of three potentially conflicting patterns of behaviour. Going straight to the point: the existence -or not - of property right institutions could determine whose ego or self would remain as a dominant one. For example, in the absence of well defined property rights, the self who "will save less today" can be the dominant one.

The heart of the problem is that institutions matter and they creates incentives (pay-offs) to choices. In considering a multiple self agent I am trying to include the main role of the institutional set in the explanation of how property rights could be important to explain saving decisions. Obviously, there is no consideration in this model about utility functions and intertemporal optimisation. However, it does not represent a problem at all mainly because the real problem is, when we consider the institutional set in the model, how to explain variations in ρ (function 1) caused by uncertainty and lack of confidence associated with poor property rights enforcement. To go further in the argument proposed here, I am going to analyse two important points of collective choice theory.

Firstly, I am are going to review the Arrow's "General Possibility Theorem", and secondly, the problem of preference reversals. Finally, I am going to apply the "solution" of Arrow's Paradox to agents composed by multiple selves and, at last but not least, present an example applied to savings decisions conditioned by institutions. The main principles and ideas that will be developed here are originally founded in Garcia (1994) and Garcia & Silva (1996).

Arrow's "General Possibility Theorem" establishes that there is no democratic election design that produces transitive and complete social preference relations and also satisfies Non-dictatorship (ND), Paretian Unanimity (PU), and Independence of

Irrelevant Alternatives (IIA) principles. Alternative approaches had been trying to solve this paradox. Buchanan (1954) and Tullock (1967) had made important critical comments on Arrow's Paradox. They argue that majority voting has some beneficial aspects and that Arrow's theorem does not have much to say about democratic elections schemes mainly because they are dynamical, not statical. Majority rule is an acceptable one just because it allows logrolling and vote trade from which relative unanimity emerges (Silva, 1996), and despite the conclusions of Arrow (1963), democracy really works and collective choices must be explained.

The democratic process involves bargaining, vote trade, and collusion. Self-interest, ideology, ethics, institutions, and social norms represent fundamental variables to understand how democracy really works. However, traditional binary choice theory assumes that those values can be reduced to a simple criterion usually associated to the notion of utility.

Aiming an alternative solution to this problem, it will be presented a model of decision where choice is determined by an ordered set of irreducible criteria. Originally this model was developed by Moldau (1988, 1992, and 1994) to discuss individual choices induced by social norms. This approach is denominated as choice by irreducible values model (CIVM) (see Garcia & Silva, 1996).

In the traditional binary choice theory the preference relation *R* is the primitive notion. On the other hand, CIVM is founded on the more primitive notion of the relative importance of the criterion. It is possible to derive a weak preference relation *R* (complete and transitive) from its axioms, as can be seen in Moldau (1994). Garcia (1994) proved an important property of CIVM (Theorem 1)[16]: for finite opportunity sets, individual behaviour is menu-dependent in the sense of Sen (1993, 1994, and 1995). Changes in the opportunity set can reverse individual preference over any two options. This is a possible solution to the problem founded in Arrow (1963).

[16] See Garcia & Silva (1996).

In Garcia & Silva (1996, Theorem 2) is presented the prove that any social choice function satisfies the principle of Independence of Irrelevant Alternatives, if individual behaviour is menu-dependent. Arrow's "General Possibility Theorem" is not valid when individual preferences are determined by irreducible values.

Firstly, I am going to reproduce the prove of this theorem since this literature and discussion is quite new. Secondly, I am going to apply this solution to a multiple self agent. As an example of the application of the theory, I am finally going to explain how property rights could create pay-offs systems that affect saving choices made by a multiple self economic agent constrained by institutional sets.

Choices determined by utility maximisation presupposes the reducibility of all choice criteria to a unique measure of value. In the traditional theory, the utility function has this role. The values of the agents could be reduced to a single measure and this fact creates conditions to the construction of preference relations. However, this approach does not deal with some important questions about (i) the structure and the role of individual values and (ii) the institutional set. As a matter of fact, one could argue that there is no reason to believe that multiple criteria reflecting a spread range of values and objectives must be reduced to a same denominator (See Garcia & Silva, 1996, p. 3, and Moldau, 1993). Moldau (1988,1993) presents a model considering the preferences ordering of the agents as determined by the *relative importance* of his set of irreducible criteria. This is the basis of choices involving irreducible values presented in CIVM.

IV. THE MODEL

The problem of choice involves two basic sets: the set of irreducible criteria and the opportunity set. J denotes the set of irreducible criteria and it is supposed to be formed by m elements, $m \geq 1$. The opportunity set is denoted by X and it is formed by n elements, $n \geq 1$. Both sets are supposed to be finite.

The primitive notion in CIVM is the relative importance of the irreducible criteria. The binary relation establishes comparisons of any two options from X $\dot{\succeq}$ over the product space *JxX* of pairs *(j,x)*, where *j* and *x* are variables from *J* and *X*, respectively. The proposition $(j',x')\dot{\succeq}(j'',x'')$ means that criterion j' at option x' is "at least as important as" criterion j'' at option x''. On the basis of the relative importance relation can be defined relations "more important than" and "as important as".

$$\forall j', j'' \in J \text{ and } \forall x', x'' \in X: \quad (j',x') \dot{\succ} (j'',x'') \Leftrightarrow (j',x')\dot{\succeq}(j'',x'') \wedge \neg(j'',x'')\dot{\succeq}(j',x')$$

$$(j',x') \dot{=} (j'',x'') \Leftrightarrow (j',x')\dot{\succeq}(j'',x'') \wedge (j'',x'')\dot{\succeq}(j',x').$$

Based on $\dot{\succeq}$ can be defined a non-preference relation on *X* according criterion *j* as follows: for any option and for any criterion, x' is "at least as good as" x'' according criterion *j*, if criterion *j* at x' is as important as it is at x''. From this notion follow the definitions of preference and indifference relations according *j*.

$$\forall j \in J \text{ and } \forall x', x'' \in X: \quad x' Q_j x'' \Leftrightarrow (j,x'')\dot{\succeq}(j,x')$$
$$x' P_j x'' \Leftrightarrow (j,x'') \dot{\succ} (j,x')$$
$$x' I_j x'' \Leftrightarrow (j,x'') \dot{=} (j,x').$$

Any option is preferred to another if, and only if, criterion *j* at x' is less important than it is at x''. The relative importance of any criterion raises when the necessity behind it is satisfied. According Moldau (1993, p.358, fn.): "*the preference relation according to a given criterion is defined in terms of an attempted reduction of that criterion's importance*." The proposition could be read as "criterion j' at option x' is more important than criterion j' at option x''" as follows: at option x', criterion j' is more satisfied than it is at option x''.

Relation $\dot{\succeq}$ is supposed to satisfy the following two axioms:

Axiom 1 (comparability): $\forall j', j'' \in J$ and $\forall x', x'' \in X$, $(j',x')\dot{\succeq}(j'',x'') \vee (j'',x'')\dot{\succeq}(j',x')$.

Axiom 2 (transitivity): $\forall j', j'', j''' \in J$ and $\forall x', x'', x''' \in X$,
$(j', x') \dot{\succeq} (j'', x'') \wedge (j'', x'') \dot{\succeq} (j''', x''') \Rightarrow (j', x') \dot{\succeq} (j''', x''')$.

Given Axioms 1 and 2, one can say that $\dot{\succeq}$ establishes a weak relative importance ordering and a weak-preference ordering according *j* on *X*. But it is also possible to establish an weak-importance ordering at *x* on *J*. This is the basic issue to introduce the rule which determines the overall preference relation on *X*. Let *k(j,x)* be an integer between 1 and *m* which ranks the criteria in order of importance.

$\forall j', j'' \in J$ and $\forall x' \in X$: $(j', x') \dot{\succ} (j'', x') \Rightarrow k(j', x') < k(j'', x')$.

This means that if criterion j' is more important than criterion j'' at option x', then the rank number of (j', x') is smaller than the rank number of (j'', x'): The greater the relative importance of criterion j' at option x', smaller its rank number. For the *k*th ranked criterion, one can define the relations of non-preference, preference and indifference, as follows:

$\forall k \leq m$ and $\forall x', x'' \in X$: $x' Q_k x'' \Leftrightarrow (j(k, x'), x') \dot{\succeq} (j(k, x''), x'')$

$x' P_k x'' \Leftrightarrow (j(k, x''), x'') \dot{\succ} (j(k, x'), x')$

$x' I_k x'' \Leftrightarrow (j(k, x'), x') \dot{=} (j(k, x''), x'')$.

Finally, the overall preference relation *P* on *X* can be defined as follows:

$\forall x', x'' \in X : x' P x'' \Leftrightarrow \exists g (g \geq 1 \wedge x' P_k x'') \wedge \forall k (k < g \Rightarrow x' I_k x'')$.

This definition says that any option x' is preferred to x'' if, and only if, there is some criterion *g*th ranked for which x' is preferred to x'' and, for any other criterion

ranked above g — that is, any other criterion more important than the gth —, x' is indifferent to x''. In other words, the overall preference P is determined by the least important criterion for which there is no tie. The least satisfied criterion overcomes those that are more satisfied than it. The overall indifference relation I and the weak preference relation R have the following definitions:

$$\forall x', x'' \in X : x'Ix'' \Leftrightarrow \forall k(k = 1,\ldots,m \Rightarrow x'I_k x'').$$

$$x'Rx'' \Leftrightarrow (x'Ix'' \vee x'Px'')$$

Moldau (1993, p.359-60) proves that Q_j, Q_k, and R are complete and transitive relations on X. Therefore, from a set of irreducible criteria the individual can order his opportunity set. Although basic properties of preference ordering are the same of any binary choice model, CIVM has a special feature. Menu-dependence behaviour can be defined as the occurrence of preference reversals when there is some change on agent's opportunity set (including the rules of the game or institutions). According to Sen (1994), the basic condition for internal consistency of choice fails in a situation like this. Suppose that individual i prefers option x' to x'', $x', x'' \in X$. Now, assume that we reduce his opportunity set picking up alternative x''' from X and then he says that option x'' is preferred to x'. So, we can say that his preference is menu-dependent, inasmuch changes on menu imply preference reversals.

CIVM doesn't exclude the possibility of menu-dependence behaviour. This proposition was first presented in Garcia (1994). One can notice that the mathematical structure of the function, which determines overall preferences, is quite the same of that proposed by Arrow (1963) to social decision functions. First, consider that each criterion is an individual of Arrow's system. Therefore, the overall preference would be a kind of social preference determined by individual values.

In order to study inter-menu problems it will be introduced another variable on the analysis: *t.* Menu *t* denotes a specific "situation" in which the individual must establish, based on his values J_t , their preferences P_t on X_t. Note that the set of criteria and the opportunity set are fixed on menu *t*. In this sense, any two situations can differ to each order, either because they have different opportunity sets or as a result of differences on criteria sets (changes on individual perceived pay-offs, for example). T denotes the set of all possible menus; since *X* and *J* are finite, *T* must be finite too. X_T denotes the set of all $X_{t'}$, such that $t' \in T$.

Given axioms 1 and 2, the weak preference relation according *j* is a complete and transitive non preference relation on *X*. Let's include menu specification as follows:

$\forall t \in T$, $\forall j \in J$, and $\forall x', x'', x''' \in X$: $x' Q_{jt} x'' \vee x'' Q_{jt} x'$

$$x' Q_{jt} x'' \wedge x'' Q_{jt} x''' \Rightarrow x' Q_{jt} x'''$$

Denoting the weak preference according *j* in situation *t* by R_{jt} and the weak overall preference in situation *t* by R_t , we can deduce Lemma 1.

Lemma 1 *- Given Axioms 1 and 2, for any situation* $t \in T$ *, and for any two options* $x', x'' \in X_t$*, if* $\forall j(j \in J_t \Rightarrow x' R_{jt} x'')$*, then* $x' R_t x''$*.*

Proof: Suppose that is was not the case. Then, there would be a situation $t \in T$ *and two options* $x', x'' \in X_t$*, such that* $\forall j(j \in J_t \Rightarrow x' R_{jt} x'')$*, but* $x'' P_t x'$*. We know that if* $\forall j(j \in J_t \Rightarrow x' R_{jt} x'')$*, then for any two criteria* $j', j'' \in J_t$*,* $(j'', x'') \dot{\succeq} (j'', x')$*. Let* j' *be the decisive criterion on* x'*. In this case, we know that* $(j'', x') \dot{\succeq} (j', x')$ *and, by Axiom 2, that* $(j'', x'') \dot{\succeq} (j', x')$ *Nonetheless, if* x'' *was preferred to* x'*, then there would be two decisive criteria* $j', j'' \in J_t$ *of rank number k such that* $(j', x') \dot{\succ} (j'', x'')$*, which constitutes a contradiction. Therefore, we can conclude that for any situation* $t \in T$ *, and for any two options* $x', x'' \in X_t$*, if* $\forall j(j \in J_t \Rightarrow x' R_{jt} x'')$*, then* $x' R_t x''$*.*

Lemma 1 says that CIVM satisfies the well-known *weak Paretian Unanimity* condition imposed on Arrowian system. In another situation, suppose that there is no criterion that, for any situation, is decisive in determining the preference relation between any two alternatives (*Non-dictatorship*, Arrow, 1963). This assumption implies that we explicitly exclude the possibility of lexicographic criteria in determining individual's preference. Therefore, any criterion can be satiated and, this being the case, it has its relative importance diminished. The possibility of lexicographic criteria is not excluded in CIVM, so we postulate Axiom 3, called non-dominance condition.

Axiom 3: $\neg\exists j \in J$, such that $\forall t \in T$ and $\forall x',x'' \in X_t$, $x'R_{jt}x'' \Rightarrow x'R_t x''$.

Definition of the menu-dependence condition: any function which determines overall preference based on *J* is said to be menu-dependent if, and only if, there are two situations $t',t'' \in T$ and there two options $x',x'' \in X_T$ such that criteria sets are the same in both situation $(J_{t'} = J_{t''})$, but $x'R_{t'}x'' \wedge \neg(x'R_{t''}x'')$. Therefore, menu-dependence is the negation of *independence of irrelevant alternatives*.

Theorem 1 *- Given Axioms 1, 2, and 3, individual behaviour is menu-dependent.*

Proof: The same argument used to prove Arrow's 'General Possibility Theorem'.[17]

Since comparisons are established according to the relative importance of the *k*th criteria at x' and at x'', the preference relation between any two options doesn't depend solely on x' and x''. Moreover, menu-dependence behaviour emerges as a result of choice determined by a set of irreducible values, none of them prevailing over all other criteria in any possible situation.

The basic property of menu-dependence of individual preference has important consequences on social choice: if for all individual Axioms 1 to 3 hold, then for any

[17] For this issue see Arrow (1963), Mackay (1980) and Garcia (1994).

social decision function *r*, *r* satisfies the principle of *Independence of Irrelevant Alternatives* (Arrow, 1963). I am going to show how a multiple self agent can be seen as a unit of collective choice under conditions of irreducible and non-dominant individual selves.

Let *H* be the set of all selves *i*, such that it has $h \geq 1$ elements. Now, we can say that, if Axioms 1, 2 and 3 hold for all selves *i*, then their behaviour is menu-dependent. That is to say, if for any self that composes a multiple self agent, its choice is determined by a set of irreducible and non-dominant criteria, then menu-dependence holds for all selves of the individual.

Axiom 4: $\forall i \in H$, a self behaviour satisfies Axioms 1, 2, and 3.

Given Axiom 4, we can say that $\forall i \in H$, there are two situations $t',t'' \in T$ and there two options $x',x'' \in X_{t'},X_{t''}$ such that $x'R_{t'}x'' \wedge \neg(x'R_{t''}x'')$. In the same way, we can say that if Axioms 1 to 4 hold, then we have that the following proposition also holds:

Proposition 1: $\forall i$, if $\forall t',t'' \in T$ and $\forall x',x'' \in X_T$, $x'R_{it'}x'' \Rightarrow x'R_{it''}x''$, then $i \notin H$.

In social choice theory, Independence of Irrelevant Alternatives is defined as follows: $\forall t',t'' \in T$ and $\forall x',x'' \in X_T$, if $\forall i \in H$, $x'R_{it'}x'' \Rightarrow x'R_{it''}x''$, then $x'S_{t'}x'' \Rightarrow x'S_{t''}x''$, where S_t denotes social weak-preference relation over any two options and it is supposed to be complete and transitive. To our purpose, we define IIA by its negation form:

$\forall t',t'' \in T$, $\forall x',x'' \in X_T$, if $x'S_{t'}x'' \wedge \neg(x'S_{t''}x'')$, then $\exists i \in H$, $x'R_{it'}x'' \wedge \neg(x'R_{it''}x'')$.

It is possible to State the sufficient condition for IIA. Firstly, one can notice that, if for any two situation and any two options, there is a self whose preference is menu-dependent, then if $x'S_{t'}x'' \wedge \neg(x'S_{t''}x'')$, then $\exists i \in H$, $x'R_{it'}x'' \wedge \neg(x'R_{it''}x'')$, $\forall t',t'' \in T$, $\forall x',x'' \in X_T$. Therefore, it is necessary to prove only that $\forall t',t'' \in T$, $\forall x',x'' \in X_T$,

$\exists i \in H,\ x'R_{it'}x'' \wedge \neg(x'R_{it''}x'')$, in order to prove that IIA is satisfied. In order to simplify the analysis, let proposition 2 describe the negation of the necessary condition for IIA.

Proposition 2: $\exists t',t'' \in T$, $\exists x',x'' \in X_T$, such that $\forall i \in H,\ x'R_{it'}x'' \Rightarrow x'R_{it''}x''$.

Next, Lemma 2 proves that proposition 1 is inconsistent to the negation of the necessary condition for IIA (proposition 2), which is the same thing to say that proposition 1 is a necessary condition for IIA.

Lemma 2 *- Proposition 1 implies the necessary condition for IIA.*

Proof: Suppose that was not the case. In this case, we have that propositions 1 and 2 hold simultaneously. Therefore:

$\forall i$, *if* $\forall t',t'' \in T$ *and* $\forall x',x'' \in X_T$, $x'R_{it'}x'' \Rightarrow x'R_{it''}x''$, *then* $i \notin H$ *(proposition 1) and* $\exists t',t'' \in T$, $\exists x',x'' \in X_T$, *such that* $\forall i \in H,\ x'R_{it'}x'' \Rightarrow x'R_{it''}x''$ *(proposition 2).*

From proposition 2, we have that $\forall i,\ i \in H \Rightarrow (x'R_{it'}x'' \Rightarrow x'R_{it''}x'')$ *and, from proposition 1, we have that* $\forall i,\ (x'R_{it'}x'' \Rightarrow x'R_{it''}x'') \Rightarrow i \notin H$. *Therefore, we have that* $\forall i,\ i \in H \Rightarrow i \notin H$. *From this proposition we can conclude that* $\neg\exists i, i \in H$, *otherwise there would be a contradiction such that* $i' \in H \wedge i' \notin H$. *So, H is necessarily an empty set. This proposition contradicts the premise that the number of elements from H is greater than 1, h≥1. Therefore, we can conclude that proposition 1 implies the necessary condition for IIA.*

Theorem 2 *- Given Axioms 1 to 4, for any social decision function r, r satisfies the principle of Independence of Irrelevant Alternatives.*

Proof: It is sufficient to consider that Axioms 1 to 4 imply proposition 1, which implies the necessary condition for IIA, according to Lemma 2.

Given Theorem 2, one can ask whether Arrow's 'General Possibility Theorem' remains valid in a context of self choice guided by irreducible values. In this section is analysed a democratic election design based on simple majority which satisfies principles of Unrestricted Scope (US), Paretian Unanimity (PU), and Non-dictatorship (ND). Let's introduce some definitions and premises about voter behaviour and majority rules.

Assume that any self *i* satisfy Axioms 1 to 3. For any election *t*, we assume that, for any self i, his choice on any option $x \in X_t$ is a function of his selves preferences over X_t. $V_{i,t}(x)$ denotes the value *i*'s vote on *x* in "election" *t*, such that $V_{i,t}(x)=1$ if *i* chooses the self *x*, and $V_{i,t}(x)=0$ if *i* doesn't choose the self *x*. The basic relation between multiple selves preferences and the choice made inside de individual as an unit of collective choice: $\forall i \in H$, $\forall t \in T$, and $\forall x', x'' \in X_t$, $V_{i,t}(x')=1 \Leftrightarrow x' P_{it} x''$. As a consequence, if any self has more than one option in his most preferred equivalence class, then for any option $V_{i,t}(x)=0$.

The overall value of any option-self *x*, denoted by $V_t(x)$ is the summation of $V_{i,t}(x)$, $i=1,\ldots,h$. That is: $V_t(x)=\sum_{i=1}^{h} V_{it}(x)$. For any option-self *x*, $h \geq V_t(x) \geq 0$. Given self votes on any "election" we can define relations of social weak-preference (*S*), social preference (*SP*), and social indifference (*SI*). $\forall i \in H$, $\forall t \in T$, and $\forall x', x'' \in X_t$: $x' S_t x'' \Leftrightarrow V_t(x') \geq V_t(x'')$, $x' S P_t x'' \Leftrightarrow V_t(x') > V_t(x'')$, and $x' S I_t x'' \Leftrightarrow V_t(x') = V_t(x'')$.

Given this "democratic election design" (what one can define as "the fair battle of selves inside the agent), it can be proved that S_t is a complete and transitive relation on X_t. In the other hand, this "social" or ***multiple self decision function*** satisfies Paretian Unanimity and Non-dictatorship. The proofs for Lemmas 3 to 6 are presented in Appendix 1. Since any multiple self decision function, which satisfies Axioms 1 to 4 also, satisfies Independence of Irrelevant Alternatives, one could say that this particular "election" design is an Arrovian social choice that happens inside the agent stylised as a multiple self unit.

Theorem 3 *- Given Axioms 1 to 4, the simple majority rule described above satisfies conditions IIA, US, UP, and ND.*

Proof: Directly from Theorem 2 and Lemmas 3 to 6.

1. THE ROLE OF PROPERTY RIGHTS IN SAVING DECISIONS WITH MULTIPLE SELF HYPOTHESIS

This "election" design can be applied to private savings decisions. Suppose an "election" among three options x', x'', and x'''. The first is "save hard", the second is "save the same" ("don't increase or decrease consumption"), and the third is "save less". The "voters" who appear inside the individual agent are selves i', i'', and i'''. Figure 1 shows selves' preferences. In this situation, each option receives one vote: i' votes on x', that is, "save hard", i'' votes on x''' ("save less"), and i''' votes on x'' ("save the same"). Considering the individual agent as a micro-society, it can be said that x' is "socially" indifferent to x'', which is also indifferent to x'''.

Figure 1

Multiple Self Saving Choices

Selves	i'	$x'Px''$	$x''Px'''$
	i''	$x'''Px'$	$x'Px''$
	i'''	$x''Px'''$	$x'''Px'$

The prevalence, in a selves ordering, of one self over another (or the determinant of a winner in the "battle of selves") one will depend on the pay-off structure that emerges from the institutional set. Suppose that there is sufficient private property enforcement in one economy, so the option x''' is excluded from the opportunity set because self i''' is "out of the battle". In this example, a new menu emerges such

that, if selves preferences were not changed, it will observed the "election" of x' ("save hard"), that is, $x'SPx''$. This example would illustrate the possibility of institutional menu-dependence.

Further developments in this field must be done using game theory to determine how institutional changes affects the pay-off system and selves orderings, of course. However, this is not the specific subject of this paper.

V. CONCLUSIONS

Private saving decisions are not immune to institutional instability. The majority of the works on saving neglects this fact supposing *a priori* that property rights are enforced. In effect, enforcing property rights does not represent a real problem when we consider many developed economies. Probably, for this reason many economists had ignored this matter.

However, saving increasing represents a big challenge to many developing economies, since savings are fundamental to growth. Even if one assumes that for an economic take off technological innovation is more important than previous saving formation - using for example a schumpeterian argument - the role of the property rights are not a neglectful fact.

There are many obstacles to economic growth in Latin America, Eastern Europe and Africa. Some "emerging" economies are facing problems associated with low saving rates. To many Latin American countries as like as probably the hole African Continent, political and institutional instability represent crucial obstacles to sustainable growth. In Eastern Europe, the problem is not so diverse, as many countries are facing transitions in the property rights system.

This paper intended to argue, at least theoretically, that political and institutional instability has dramatic consequences on private saving decisions. As it was shown, the recent literature on the subject pointed out that these instability factors have impact (negative) on public saving (see, for empirical evidence, Edwards, 1997, p. 147). A lack in saving studies is exactly how to link private savings decisions to institutions and pay-off systems.

The first step to solve this problem in this paper, partially at least, was to reconstruct some basic arguments on growth theory to explain how the absence of the institutional variable could affect the results and the interpretation of the mainstream models. Secondly, I intend to illuminate some crucial links between private saving decisions and institutional stability. The basic conclusion picket up from this analysis is: there is the necessity to construct models to deal with rational economic decisions and institutions.

It was presented a multiple self model applied to savings decisions. Despite the fact that multiple self models are not so popular in economics, I suggested that this is a possible strategy to deal with rationality and institutions. The model - and the application presented - shows that institutions have a fundamental role to define preference satiability and preference reversals. The prevalence of a “hard saver self” over a “hard consumer self” depends on the pay-off system that grows up from the institutional set: Property right is an important institutional variable that affects the incentives to save or not.

The next step in this research is an empirical one. There is a crescent trend to use *panel data regression* in econometric literature about savings (see, for example, Berthelemy & Varoudakis, 1997). However, there are no time data series for qualitative indexes of credibility and/or political stability. For this reason, there are two different but complementary strategies that could be adopted. The first one is the use of a traditional cross-section test and the second one is the development of an institutional comparative analysis. The objective of the second strategy is to

evaluate, considering some national economies, the institutional evolution *lato sensu* (the evolution of property rights, financial markets tools and of the State) and its impact on savings. Probably, in this case the countries selected would be Korea, Chile, Mexico, and Brazil since the main interest of this research is centred in Latin America and in a second level, Asia.

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VII. APPENDIX

Lemma 3 *- Given Axioms 1 to 4, the simple majority rule determines a complete social weak-preference relation on* X_t *for any election t.*

Proof: Suppose that it was not the case. Therefore, there would be an election t' *in which there were two options* x' *and* x''*, such that* $\neg(x'S_{t'}x'')$ *and* $\neg(x''S_{t'}x')$*. In this case, the definition of social weak-preference would imply that:* $\neg(V_{t'}(x') \geq V_{t'}(x''))$ *and* $\neg(V_{t'}(x'') \geq V_{t'}(x'))$*. This would be the same thing to say that* $V_{t'}(x') > V_{t'}(x'')$ *and* $V_{t'}(x'') > V_{t'}(x')$*, which would constitute a contradiction. Therefore, for any election* t *and any two candidates* x' *and* x''*,* $x'S_t x''$ *or* $x''S_t x'$*. So we have that* S_t *is a complete binary relation on* X_t*.*

Lemma 4 *- Given Axioms 1 to 4, the simple majority rule determines a transitive social weak-preference relation on* X_t *for any election t.*

Proof: Suppose that it was not the case. Therefore, there would be an election t' *in which there were three options* x'*,* x''*, and* x''' *such that* $x'S_{t'}x''$ *and* $x''S_{t'}x'''$*, but* $\neg(x'S_{t'}x''')$*. In this case, the definition of social weak-preference would imply that:* $V_{t'}(x') \geq V_{t'}(x'')$ *and* $V_{t'}(x'') \geq V_{t'}(x''')$*, but* $\neg(V_{t'}(x') \geq V_{t'}(x'''))$*. Nonetheless, if* $V_{t'}(x') \geq V_{t'}(x'')$ *and* $V_{t'}(x'') \geq V_{t'}(x''')$*, we would have that* $V_{t'}(x') \geq V_{t'}(x''')$*, which would constitute a contradiction. Therefore, for any election* t *and any candidates* x'*,* x''*, and* x'''*, if* $x'S_t x''$ *and* $x''S_t x'''$*, then* $x'S_t x'''$*. So we have that* S_t *is a transitive binary relation on* X_t*.*

Lemma 5 *- Given Axioms 1 to 4, we have that simple majority rule satisfies Paretian Unanimity principle.*

Proof: Suppose that it was not the case. Therefore, there would be an election t' *in which there were two options* x' *and* x''*, such that* $\forall i \in H(x' R_{it'} x'')$*, but* $\neg(x' S_{t'} x'')$*. In this case, the definition of social weak-preference would imply that* $V_{t'}(x'') > V_{t'}(x')$*, because* $\neg(V_{t'}(x') \geq V_{t'}(x''))$*. Nonetheless, if it was the case, we would have that* $\exists i \in H(x'' P_{it'} x')$*. This would contradict the Statement that* $\forall i \in H(x' R_{it'} x'')$*. Therefore, for any election* t *and any two candidates* x' *and* x''*, if* $\forall i \in H(x' R_{it'} x'')$*, then* $x' S_{t'} x''$*. So, we have that simple majority rule satisfies Paretian Unanimity principle.*

Lemma 6 *- Given Axioms 1 to 4, we have that simple majority rule satisfies Non-dictatorship principle.*

Proof: Directly from the definition of simple majority rule.