Political and economic interaction: a new framework of analysis. Income distribution and economic growth.

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November 2007

Abstract. The aim of this paper is to model the interaction process between economic system and political system. In order to deal this issue a new logical structure is elaborated by integrating the "influence functions approach" (Becker, 1983), which concerns the strategic interaction among interest groups, and the "interest function approach" (van Winden, 1983), which concerns the political decision process; all framed in a suitable conceptual framework representing the economy. This logical structure can be used to study issues involving interaction processes between political and economic system
The paper also explores how economic interests linked to the distribution between profits and wages can influence political decisions and how in turns such decisions can influence the economy; in order to go into these issues, the neokaleckian approach (Rowthorn, 1982) is chosen for describing the operation of economy. The analysis shows that the necessary conditions, so that political decisions takes into account both the wage interest and the profit interest, are also necessary conditions for the balanced evolution of economy over time.

JEL Classification: D72; E12; E25; E62; O40.
Keywords: pressure; post keynesian; fiscal policy; income distribution; growth.

1. Introduction

The aim of this paper is to model the interaction between political system and economic system. This interaction is a circular process evolving over time, where interests guiding political decisions originate from the economic system and where decisions enforced by the political system influence economic interests. In substance, the political and the economic system continuously interact over time and their behaviour is consequently affected.
Since the seminal contribution by Buchanan and Tullock (1962), a wide strand of literature has identified "interest groups" and their "pressure" with the institutional manifestation of economic interests within the political system; the interest group is a collective agent exerting pressure for promoting an interest; the pressure is a political influence, which depends on resources employed for financing electoral campaign, supporting specific

policies and, managing the exchange of strategic information.[1] In this context, as underlined by Przeworski and Wallerstein (1988), it's worth exploring the role played by distributional issues in the interplay between political and economic system, that is, how economic interests connected with the distribution between profits and wages can influence political decisions and how in turns such decisions can influence the economy. In particular, the paper focuses on two issues: first, the necessary political and economic conditions such that both the interest group for profits and the interest group for wages are able to affect political decisions; second, the relationship between pressure for promoting the profit and the wage interest and economic growth.

The literature has devoted scant attention to the role of income distribution between profits and wages in affecting the interaction process between political and economic system; generally, its focus has been on the role played by particular economic interests connected with specific industrial sectors. However, the analysis of this literature will allow to point out some important elements with regard to the necessary conditions such that an interest group can affect political decisions and with regard to the relationship between pressure and economic growth.

In literature the first issue has been dealt few times. Some contributions have focused on the strategic interaction among interest groups within a static framework; in this context, the low efficiency in carrying out pressure (Hausken, 2000) or the shortage of resources in comparison with access costs to the political competition (Kristov et al., 1992; Rodrìguez, 2004) can imply the exclusion of an interest group from the political competition. Note that poorer interest groups are rationally motivated to invest more in pressure because their potential loss are smaller than that one of richer groups (Hirshleifer, 1991). Other contributions have stressed the role played by the same elements in analysing the time evolution of the protection degree of a single economic interest, that is, of a specific industrial sector (Cassing and Hillman, 1986; Brainard and Verdier, 1997).

In literature the second issue has been amply discussed since the seminal contribution by Olson (1982), where pressure slows down economic growth by promoting particular interests against general interests, that is, by promoting restricted markets against competitive markets. Within endogenous growth models, this view has been elaborated by Pecorino (1992), Rama (1993), Tornell and Lane (1999), and Rodrìguez (2004), which have underlined that pressure, aimed to obtain restrictive market regulations or fiscal transfers, can decrease the growth rate because of a inefficient resource allocation; the same conclusion has been respectively found in Murphy et al. (1993) and in Grossman and Kim (1996), which analyse the competition among particular interests and the predatory activity.

[1] See Olson (1965), Mitchell and Munger (1991), van Winden (1999, 2003).

However, Mork (1993) and Sturzenegger and Tommasi (1994) have achieved the contrary conclusion because interest groups can positively affect the growth rate if their pressure aims to eliminate restrictive regulations or obtain fiscal transfers reducing capital costs. On balance, from a theoretical point of view, the relationship between pressure and economic growth is uncertain; in line with this result, the empirical evidence has shown little support for the Olson's view (Knack, 2003). On the other hand, the two perspectives are not mutually exclusive; within an endogenous growth model focusing on economic policy externalities, as in Barro (1990), the contribution by Mohtadi and Roe (1998) has showed that interest group pressure can internalise some externalities of public good by promoting their supply; therefore, the search for an optimal level of public expenditures is replaced by the search for an optimal level of pressure, so that a non monotonic relationship between pressure and economic growth is obtained.

From all this it follows that the previous literature has overlooked some elements. With regard to the necessary conditions such that an interest group is able to affect political decisions, although the literature has underlined the crucial role of available resources, efficiency in exerting pressure, and access costs to the political competition, it has omitted of exploring how the interaction process among interest groups takes place within a dynamic framework. With regard to the relationship between pressure and economic growth, although the literature has explained the non monotonic relationship in terms of variations on the supply side which follow changes in the public good supply, it has omitted of exploring how the pressure can affect economic growth by determining variations on the demand side.

This paper is a first step in trying to fill in these lacuna; in order to pursue this objective the paper is structured as follows. In section (2) a general logical structure is put forward for studying issues implying an interaction process between political system and economic system, it points out three key phases in this process: first, the interaction among interest groups for acquiring influence within the political system; second, the decisional process of political system which is affected by interest group pressure; third, the evolution of economy over time which can affect the balance of force among interest groups. The first two phase are modelled by integrating two existing theoretical approaches concerned with specific issues; the "influence functions approach",[2] which focuses on the strategic interaction among interest groups, and the "interest function approach",[3] which focuses on the political decision process. Note that in the literature the "influence

[2] See Becker (1983, 1985), Johnson (1988), Coggins, Graham-Tommasi and Roe (1991), Kristov et al. (1992), Austen-Smith (1997), Boyce (2000), Aidt (2002), Ando (2003).

[3] See Van Winden (1983), van Velthoven (1989), Mazza and van Winden (1996), Sadiraj et al. (2005).

functions approach" and the "interest function approach" have never been put together to study the impact of pressure on political decisions. The third phase is modelled by framing all in a suitable conceptual framework representing the economy. This general logical structure can be used to study every issue implying an interaction between political and economic system, the only caution will be to choose the theoretical approach for describing the operation of economy in accordance with the issue taken into consideration. For stressing this element in section (2) no functional forms is specified.
In section (3) the focus is on the role of income distribution between profits and wages; therefore, the previous logical structure is specified by choosing the neokaleckian approach[4] for describing the operation of economy. Neokaleckian models share with the post keynesian tradition the principle of effective demand, they allow to study the role of income distribution in determining economic changes in accordance with its effects on demand side; moreover, their analytic framework also allows to show some results of endogenous growth models (Barro and Xala-i-Martin, 1995). Note that within the post keynesian tradition[5], little attention has been given to determinants of the decisional process of political system.
In section (4) the relationship between the time evolution of political and the economic system is examined and the following results are obtained. First, the model explains the strategic interaction among interest groups in terms of time evolution of available resources, efficiency in exerting pressure, and access costs to the political competition. Second, taking into account the interaction between profit and wage interest, the model explains a non monotonic relationship between pressure and economic growth in terms of variations on the demand side following changes in the fiscal policy.[6]
Finally, section (5) draws same conclusions.

2. The interaction process between political system and economic system: a new logical structure

The interplay between political system and economic system consists of a circular process evolving over time, where three recurring phases can be pointed out: first, within the economic system, economic interests or interest groups emerge and interact for acquiring influence in the political system; second, the political system determines economic policy taking into account

[4] See Rowthorn (1982), Dutt (1984, 1990), Lavoie (1992, 1995, 2002), Blecker (2002), Commendatore et al. (2003).
[5] See Lavoie (1992), Setterfield (2002), Dutt (2003).
[6] For empirical evidence on the relationship between taxation and growth, see Easterly and Rebelo (1993).

interest group pressure; third, economic policy decisions influence the balance of force among economic interests by affecting the evolution of economy over time. Thus, the interaction process is defined as circular for stressing the contextual ability of the economic system to influence the political one by originating interests able to exert pressure, and of the political system to influence the economic one by determining economic changes.[7]

Both political decisions and economic variables affect economic interests; for example, the growth rate can be considered an economic interest because it is affected by political decisions as the fiscal policy and by economic variables as the propensity to save; the following expression denotes a generic economic interest:

$$(1)\quad I_{i,t} = I_i\left(\bar{d}_t, \bar{e}_t\right);$$

where	$i=1 \ldots n$	identifies an economic interest;
	t	is time;
	I	is the economic interest function;
	$\bar{d}$	is the vector for political variables;
	$\bar{e}$	is the vector for economic variables.

Explicit economic interest functions, which represent the relationship among economic interests and political and economic variables, could denote the theoretical approach used to describe the economy. In literature it is possible to identify at least two views about the operation of economy concerning growth processes. The first includes both neoclassic and endogenous growth models, where savings lead growth, while investment decisions adapt to saving decisions. The second lies within the post keynesian tradition, where investments lead growth, while saving decisions adapt to investment decisions through variations of income or of its distribution. Thus, in the analysis of economic policy effects on economic growth, the choice of theoretical approach used to describe the economy has to take into account these differences (Panico, 2003); in section (3) the neokaleckian approach will be chosen for describing the operation of economy because it shares with the post keynesian tradition the principle of effective demand and its analytic framework also allows to show some results of endogenous growth models.

The interaction among interest groups in order to gain influence within the political system can be represented by the "influence functions approach" in a simple and general way (Austen-Smith, 1997); this approach analyses the

[7] See North (1994), Dixit (1996).

interaction in terms of available resources for interest groups and efficiency in exerting pressure.

$$(2)\quad W_{i,t} = W_i\left(I_{i,t-1}\right) \quad with \quad \frac{\partial W_{i,t}}{\partial I_{i,t-1}} > 0\,;$$

where W are available resources for an interest group.

$$(3)\quad q_{i,t} = Q_i\left(z_{1,t},...,z_{i,t},...,z_{n,t};I_{i,t-1}\right);$$

where Q is the influence function;
q is the pressure;
z are the resources allocated for exerting pressure.

In equation (2) it is assumed that available resources for an interest group depend on the economic interest level at time *t-1*; in fact, it seems reasonable that an interest group will have more available resources if it was successful in promoting its economic interest at time *t-1*. Equation (3) represents the influence function, it shows that the pressure at time t (q) depends on resources allocated for exerting political influence at time t (z) and the economic interest level at time *t-1* (I). It is assumed that the economic interest level affects the pressure because it could influence the efficiency in exerting political influence; in fact, it seems reasonable that all formal and informal relationships between interest groups and political system, which have influenced the economic interest level at time *t-1*, will also affect the efficiency in exerting pressure at time t; therefore, the previous assumption aims to take into account this process by means of a reduced form.
In the "influence functions approach" the variable (q) has been usually identified with a particular political benefit or the probability to obtain this benefit. Instead, this paper identifies the variable (q) with the interest group pressure, this definition allows to model a political influence aimed to affect not only one political decision as well as to model not only a strategic interaction among interest groups. With regard to the last element, it is worth underlining that empirical evidence doesn't support the assumption that interest groups exert pressure in accordance with high strategic interaction levels (Ando, 2003); therefore, the definition of (q) as the interest group pressure, and not as the relative pressure of an interest group in comparison with the pressure of other interest groups, is a necessary condition for modelling the interaction among interest group in accordance with the empirical evidence. Note that the pressure (q) can consist of buying votes, corruption acts and, strategic information; but, the choice of the variable

used to represent the pressure is more an empirical problem than one theoretical.
The utility function for an interest group describes its preferences about the pressure, that is, its propensity to promote an economic interest taking into account the utility of resources allocated for political influence.

$$(4)\quad U_{i,t} = U_i\left(q_{i,t}, W_{i,t} - z_{i,t}\right);$$

where U is the utility function.

An interest group maximizes its utility by choosing the resources to allocate for exerting pressure (equation (4)); the first order conditions are:

$$(5)\quad \frac{\partial U_{i,t}}{\partial z_{i,t}} = \frac{\partial U_{i,t}}{\partial q_{i,t}} \cdot \frac{\partial q_{i,t}}{\partial z_{i,t}} - \frac{\partial U_{i,t}}{\partial\left(W_{i,t} - z_{i,t}\right)} = 0\,.$$

Equation (5) describes the optimal condition for the interest group choice about the resources allocated for pressure (z);[8] the first element denotes the sensitivity of interest group utility level with respect to the pressure (q), that is, it represents the interest group propensity to promote an economic interest; the second element denotes the efficiency of an interest group in exerting pressure, it can be affected by the ability of an interest group in exerting political influence, the ideological affinity between policymakers and interest groups, and the social importance of an economic interest; the third element denotes the opportunity cost of the resources allocated for pressure. In synthesis, the first two elements summarize the marginal benefit of pressure, while the third element summarizes its marginal cost; the optimal condition implies that an interest group makes equal marginal benefit and marginal cost of pressure.
The political system consists of a group of policymakers; the "interest function approach" defines the decisional process of the political system as a mediation among economic interests. The interest function is the objective function of the political system, it allows to represent its decisional process as the maximization of a weighted combination of economic interests; the political system interest function is:[9]

$$(6)\quad If_t = If_s\left(I_{1,t},...,I_{i,t},...,I_{n,t};q_{1,t},...,q_{i,t},...,q_{n,t}\right);$$

where $i=1...n$ identifies an interest group and its economic interest;

[8] It is assumed that the second order conditions are satisfied.
[9] It is assumed that the utility function is additive.

If is the interest function.

Mainly for pragmatic reasons, in the "interest function approach" it has been usually assumed that the economic interest weigh in the decisional process of political system is proportional to the people who share that one interest, for example the wage interest weigh should be proportional to the numerical strength of private sector workers; but, this assumption doesn't take into account that an economic agent can be interested in more than one economic interest, for example a worker should be also interested in the profit interest if his propensity to save is positive. This problem has been underlined by highlighting the potential role of other elements, as ideology and pressure, in affecting the interest function weights; therefore, the lack of a behaviour model for explaining the weights is an important limitation of the "interest function approach". This paper tries to fill in this lacuna by assuming that the economic interest weighs depend on the interest group pressure (q), so that the "influence functions approach" allows to model the interaction among interest groups for acquiring political influence and the efficiency in exerting political influence allows to take into account the interest group ability, the ideological affinity between policymakers and interest groups, and the economic interest social importance.
Moreover, it is assumed that policymakers work with a budget in balancing, their budget constraint is:

$$(7)\quad 0 = B\left(d_{1,t},...,d_{j,t},...,d_{m,t}\right);$$

where $j=1...m$ identifies an economic policy variable;
B is the budget constraint function.

The political system maximizes its objective function by promoting economic interests in accordance with the pressure at time t (equation (6)) and subject to the budget constraint (equation (7)); therefore, the economic policy is the optimal mediation among economic interests.[10]
The first order conditions are:

$$\frac{\partial L}{\partial d_{j,t}} = \frac{\partial U_{s,t}}{\partial I_{1,t}} \cdot \frac{\partial I_{1,t}}{\partial d_{j,t}} + ... + \frac{\partial U_{s,t}}{\partial I_{i,t}} \frac{\partial I_{i,t}}{\partial d_{j,t}} + ... + \frac{\partial U_{s,t}}{\partial I_{n,t}} \frac{\partial I_{n,t}}{\partial d_{j,t}} + \lambda \frac{\partial B}{\partial d_{j,t}} = 0;$$

[10] In Grossman and Kim (1996) and Sadiraj et al. (2005) a dynamic optimisation has not been assumed for agents; so, it is useful to proceed in the same way because it is simpler to obtain a coherent behavioural model with the results of laboratory experiments (Selten 1998) and the typical neokaleckian hypotheses about decisional process (Lavoie 1992, Dutt 2002).

in compact form:

$$(8)\quad \frac{\partial L}{\partial d_{j,t}} = \sum_{i=1}^{n} \frac{\partial U_{s,t}}{\partial I_{i,t}} \frac{\partial I_{i,t}}{\partial d_{j,t}} + \lambda \frac{\partial B}{\partial d_{j,t}} = 0\,;$$

where λ is the marginal utility of public resources.

Equation (8) describes the optimal condition for the political system choices about the economic policy;[11] the first element denotes the economic interest weight in the policymaker decisional process, it is affected by the interest group pressure at time *t*; the second element denotes the sensitivity of economic interests with respect to economic policy variables, that is, it represents the policymaker ability to affect economic interests; the third element denotes the impact of economic policy on the budget constraint. In synthesis, the first two elements summarize the marginal political benefit or cost of economic policy, while the third element summarizes the marginal worsening or improvement of public budget; the optimal condition implies that policymakers determines the economic policy by making equal marginal political benefit or cost and marginal impact on public budget.
In equation (3) the pressure at time *t* depends on resources allocated for exerting political influence at time *t*, political variables at time *t-1*, and economic variables at time *t-1*; on the other hand, in equations (5) and (8) the first two elements depend on the pressure at time *t-1*; therefore, the following dynamic system can be obtained:

$$(9)\quad \begin{cases} q_{1,t} = q_1\left(\overline{q}_{t-1}, \overline{e}_{t-1}\right) \\ \quad\quad ... \\ q_{i,t} = q_i\left(\overline{q}_{t-1}, \overline{e}_{t-1}\right) \\ \quad\quad ... \\ q_{n,t} = q_n\left(\overline{q}_{t-1}, \overline{e}_{t-1}\right) \end{cases}.$$

Dynamic system (9) describes the time evolution of interest group pressure. This system allows to represent the interaction between political and economic system because the time evolution of the balance of political force, synthesized by the pressure, is connected with the time evolution of economic policy and economic interests, as well as the time evolution of the balance of economic force, synthesized by economic variables, is also connected with the time evolution of economic policy and economic interests.

[11] It is assumed that the second order conditions are satisfied.

In conclusion, a logical structure has been put forward for analysing the interaction between political and economic system, it integrates two existing theoretical approaches concerned with specific issues; the "influence functions approach", which examines the strategic interaction among interest groups, and the "interest function approach", which examines the political decision process; all framed in a general conceptual framework representing the economy. This logical structure can be used to study issues implying an interaction between political and economic system, with the only caution to adapt the framework to describe the economy to specific issues taken into consideration.

3. Political and economic system: the role of the functional income distribution

When the role of distributional issues in the interplay between political system and economic system is explored, it is necessary to specify the previous logical structure in the following way. First, the economic interests are the after tax profit share including public services provided to capitalists and the after tax wage share including public services provided to workers; therefore, the following expressions are obtained by specifying equation (1):

$$(10)\quad \begin{aligned} I_{\pi,t} &= \left(1-\tau_{\pi,t}\right)\pi_q + G_t\varphi_t \\ I_{\pi,t} &= \left(1-\tau_{\omega,t}\right)\omega_q + G_t\left(1-\varphi_t\right) \end{aligned};$$

where
- π refers to profit economic interest;
- ω refers to wage economic interest;
- π_q is the income share of profits;
- ω_q is the income share of wages;
- τ_π is the rate of profits tax;
- τ_ω is the rate of wages tax;
- G is the public expenditure;
- $0<\varphi<1$ is the public service share of capitalists.

The profit tax rate (τ_π), the wage tax rate (τ_ω), the amount of public services (G) and the capitalist public service share (φ) are the fiscal policy variables. Second, the neokaleckian approach is chosen as framework for describing the operation of economy; the neokaleckian model will allow to obtain explicit expression for the income share of profits and wages as well as the equilibrium solution for the growth rate.

3.1 Characteristics of the economic system

This subsection presents a simple neokaleckian model.[12] The neokaleckian approach shares with the post keynesian theory the principle of effective demand, which states the autonomy of investment decisions of firms with respect to savings decisions of households. The equilibrium condition, for which the growth rate of savings must equal the growth rate of capital, is guaranteed by means of production and employment variations affecting the effective profit rate; the key hypothesis is that firms, operating in oligopolistic markets and having overcapacity, face unexpected demand changes by varying production levels and not price levels.
The neokaleckian framework has the following characteristics. The economy is closed, produces an homogenous good, which is used both for consumption and production, and is capitalistic, so that firms produce for profits employing workers.
The economy uses two factors of production: labour and physical capital. The state of the technology is represented by the production function with fixed technical coefficients, for in neokaleckian models the labour-capital ratio doesn't change varying factor prices. Constant return of scale and no capital depreciation are assumed; moreover, wages are a variable production cost.

$$(11)\quad y^* = \min\left\{\frac{L_f}{x_l}, \frac{K}{x_k}\right\} \text{ with } \frac{K}{x_k} < \frac{L_f}{x_l};$$

$$(12)\quad x_k = \bar{x}_k$$

where Y^* is the full capacity production level;
L_f is the labour level corresponding to full employment;
K is the physical capital stock;
x_l is the inverse of the average labour productivity;
x_k is the ratio between physical capital and full capacity production level.

In expression (11) it is assumed that the capital is the only productive factor limiting the production and the labour supply is perfectly elastic for any real wage level; both these assumptions are necessary so that production variations guarantee the equilibrium between savings and investments. In

[12] See Lavoie (1992).

equation (12) it is assumed that the ratio between capital and full capacity production level is given.
Within the economy exist two social classes: workers, whose only income source are wages that are totally consumed, and capitalists, whose only income source are profits that are not entirely consumed; therefore, only capitalists save.

(13) $g_i = g_s = s(1-\tau_\pi)r$;

where $g_s=S/pK$ is the growth rate of savings;
$g_i=I/K$ is the growth rate of capital stock;
p is the price level;
S are savings;
I are investments;
s is the average and marginal propensity to save;
r is the profit rate.

Equation (13) shows the equilibrium condition of economy: the growth rate of savings must always equal the growth rate of capital; therefore, in equilibrium saving decisions of capitalists are always enough to finance investment decisions of firms.
Investments are affected by three factors: the "animal spirits" of firms, that is their expectations about the future course of the economy; the after tax profit rate, since, beyond representing an incentive for firms, it helps to find more easily financial resources for investments; the degree of capacity utilisation, since it is an index of the possibility of the potential productive capacity to satisfy a given demand level.

(14) $g_i = \eta + \eta_r(1-\tau_\pi)r + \eta_u u$;

where $0<\eta$ represents the "animal spirits";
$0<\eta_r$ is the sensitivity of investment decisions with respect to the profit rate;
$0<\eta_u$ is the sensitivity of investment decisions with respect to the degree of capacity utilisation;
$u=Y/Y^*$ is the degree of capacity utilisation.

All firms are identical, in an oligopolistic market they fix the price level by applying a mark-up to variable unitary costs of production, that is, to the labour cost for unit of product. The mark up level is influenced by economic variables as the concentration degree of an industrial sector, the elasticity of

demand with respect to price, the growth objective of firms, and the contractual power of workers.[13]

(15) $p = (1+m)w_n x_l$;

where m is the mark up level.
w_n is the nominal wage level;

Expressions for the wage share and the profit share are:

(16) $\omega_q = \frac{w_n L}{pY} = w x_l$;

(17) $\pi_q = \frac{rpK}{pY} = r \cdot \frac{x_k}{u}$;

where w is the real wage rate.

For the accounting identity dividing the income into wages and profits, it is possible to obtain the following expression:

(18) $1 = x_l w + r\frac{x_k}{u}$.

Equation (18) is a distributive relation, since it shows the link between profit rate and real wage rate, given the degree of capacity utilisation and the technical production conditions.
On the basis of equations (15)-(18), the equilibrium solutions for the profit share and the wage share are:

(19) $\pi_q = \frac{m}{(1+m)}$;

(20) $\omega_q = \frac{1}{(1+m)}$.

Equations (19) and (20) show that within the neokaleckian approach the income distribution is only affected by the mark up level[14], that is, by the

[13] See Lavoie (1992, 2002), Lee (1994).

concentration degree of markets, the elasticity of demand, the growth objective of firms and the contractual power of workers; in other words, the mark up synthesizes the balance of economic force affecting the income distribution.
On the basis of equations (12)-(18), the equilibrium solutions for the profit rate, the degree of capacity utilisation, and the growth rate are:

$$(21)\quad r = \frac{\eta \pi_q}{(s-\eta_r)(1-\tau_\pi)\pi_q - \eta_u \bar{x}_k};$$

$$(22)\quad u = \frac{\eta \bar{x}_k}{(s-\eta_r)(1-\tau_\pi)\pi_q - \eta_u \bar{x}_k};$$

$$(23)\quad g = \frac{\eta \pi_q s(1-\tau_\pi)}{(s-\eta_r)(1-\tau_\pi)\pi_q - \eta_u \bar{x}_k} \quad for \quad u < 1;$$

$$(24)\quad g = s(1-\tau_\pi)\frac{\pi_q}{\bar{x}_k} \quad for \quad u \geq 1.$$

When the degree of capacity utilisation is less than one (equation (22)), that is, when the productive capacity is not fully utilised, equations (21)-(23) describe a neokaleckian economy where investments lead economic growth; the neokaleckian economy is characterised by two economic processes. The first, called paradox of production costs, shows how every increase in costs, as an increase in the ratio between capital and full capacity production level, is always translated in an increment in the profit rate, the degree of capacity utilisation and the growth rate; this happens because greater production costs imply a greater demand level and so a greater production level. The second economic process, called paradox of savings, shows how income redistribution favouring economic agents with a higher propensity to consume is favourable for economic growth; therefore, a reduction of the profit share favours growth by transferring purchasing power from capitalists to workers, so as it could happen in the event of a reduction in the propensity to save of capitalists.
When the degree of capacity utilisation is equal or more than one (equation (22)), that is, when the productivity capacity is fully utilised, equation (24) describes a neoclassical economy where savings lead economic growth; note

[14] The result holds until labour costs are only variable costs of production, see Lavoie (1992, 1995).

that equation (24) makes equal the growth rate to savings for capital unit, so as it occurs in the AK model with a constant marginal productivity of capital. In this context, an increase in production costs is always translated in a reduction in the growth rate, because greater production costs imply a lower profit rate and a lower saving level. An income redistribution favouring economic agents with a higher propensity to save is favourable to economic growth; in fact, an increase in the profit share favours growth by transferring purchasing power from workers to capitalists, so as it could happen for an increase in the propensity to save of capitalists.
In conclusion, the neokaleckian and neoclassical economy are characterised by different economic processes; therefore, it will be interesting of analysing the relationship between pressure and economic growth by taking into account how these processes affect the impact of economic policy on the demand and supply side.

3.2 Interaction between the interest groups

In this subsection the "influence functions approach" will allows to model the interaction between interest group for profits and interest group for wages; these interest groups aim to promote their interests within the decisional process of political system by exerting pressure.[15]
The "influence functions approach" describes the interaction between the interest groups in terms of available resources and efficiency in exerting pressure.
The after tax wage share and the after tax profit share at time *t-1* determine the available resources for interest groups at time *t*; specifying equation (2), the following expression is obtained:

$$(25)\quad \begin{matrix} W_{\omega,t} = Y(1-\tau_{\omega,t-1})\omega_q \\ W_{\pi,t} = Y(1-\tau_{\pi,t-1})\pi_q \end{matrix};$$

Now, it is useful to introduce the concept of power share. The power share is defined by the ratio between pressure of an interest group and pressure of all interest groups; it is an index of the political system propensity to promote more or less the one or the other interest and it is closed among zero and one; the power share of profits is:

[15] Note that it is assumed that both interest groups have a formal or informal organization to avoid a free riding behaviour from their own members.

$$(26)\quad \widetilde{q}_t = \frac{q_{\pi,t}}{q_{\pi,t} + q_{\omega,t}}.$$

The influence function shows that the interest group pressure is affected by the resources allocated for political influence and the power share at time *t-1*; specifying equation (3), the following expression is obtained:[16]

$$(27)\quad \begin{aligned} q_{\pi,t} &= \widetilde{q}_{t-1}^{\mu}(\gamma_{\pi} z_{\pi,t} - z_{\omega,t}) \\ q_{\omega,t} &= (1-\widetilde{q}_{t-1})^{\mu}(\gamma_{\omega} z_{\omega,t} - z_{\pi,t}) \end{aligned};$$

where γ is the ability in exerting pressure;
μ=*-1,1,0* is the effect negative, positive or null of the power share at time *t-1*.

In equation (27) the parameter (γ) denotes the interest group ability in exerting pressure, it is also affected by the ideological affinity between policymakers and interest groups and the economic interest social importance; the parameter (μ) and the power share at time *t-1* denote the influence of the economic interest level at time *t-1* on the pressure at time *t*; the resources of the other group represent the minimal effort to exert for being in a position to affect the political system, that is, these resources represent the access cost to the political arena.
The utility function for an interest group shows its preferences about pressure; specifying equation (4), the following expression is obtained: [17]

$$(28)\quad U_{i,t} = \alpha \lg q_{i,t}(z_{i,t}, z_{j,t}; \widetilde{q}_{t-1}) + (1-\alpha)\lg(W_t - z_{i,t});$$

[16] The choice of functional form is explained by the following motivations: first, coherently with empiric literature (Ando 2003), it respects conditions for describing not only a competitive strategic behaviour of interest groups; second, it describes a coherent behavioural model with the results of laboratory experiments (Selten 1998) and the typical neokaleckian hypotheses about decisional process (Lavoie 1992; Dutt 2002); third, it allows the analysis of strategic interaction among interest groups by taking into account the access cost to the political arena; fourth, it includes the results obtained by adopting a more traditional influence function $\left(q_{i,t} = z_i^{\gamma_i}\right)$.

[17] The choice of functional form is explained by the following motivations: first, it respects necessary conditions to describe a competitive strategic behaviour of interest groups (Aidt 2002; Boyce 2000; Jhonson 1988); second, it has been already employed in literature (Mazza and van Winden 1996); third, it allows to obtain more simple analytical expressions.

where $i \neq j = \omega, \pi$

$0 < \alpha < 1$ is the preference for pressure.

In equation (28) the parameter (α) denotes the propensity to exert pressure, it represents the interest group propensity to provide themselves with an informal or a formal organization in order to use their resources for exerting political influence[18].

An interest group maximizes its utility by choosing the amount of resources to allocate for pressure; therefore, the optimisation problems of interest groups are:

$$(29)\quad \begin{matrix} \max\limits_{z_{\pi,t}} U_{\pi,t} = \alpha \lg \tilde{q}_{t-1}^{\mu}\left(\gamma_{\pi,t} z_{\pi,t} - z_{\omega,t}\right) + (1-\alpha)\lg\left(W_{\pi,t} - z_{\pi,t}\right) \\ \max\limits_{z_{\omega,t}} U_{\omega,t} = \alpha \lg(1-\tilde{q}_{t-1})^{\mu}\left(\gamma_{\omega,t} z_{\omega,t} - z_{\pi,t}\right) + (1-\alpha)\lg\left(W_{\omega,t} - z_{\omega,t}\right) \end{matrix};$$

First and second order conditions are:

$$(30)\quad \frac{\partial U_{i,t}}{\partial z_{i.t}} = \frac{\alpha\gamma_i}{\gamma_i z_{i,t} - z_{j,t}} - \frac{(1-\alpha)}{W_{i,t} - z_{i,t}} = 0;$$

$$(31)\quad \frac{\partial U_{i,t}}{\partial z_{i,t}\partial z_{i,t}} = -\left[\frac{\alpha\gamma_i^2}{\left(\gamma_i z_{i,t} - z_{j,t}\right)^2} + \frac{(1-\alpha)}{\left(W_{i,t} - z_{i,t}\right)^2}\right] < 0;$$

the reaction function is:

$$(32)\quad z_{i,t} = \alpha W_{i,t} + \frac{(1-\alpha)}{\gamma_i} \cdot z_{j,t}.$$

Equation (32) shows that an interest group usually select competitive strategies; but, the competition intensity decreases with an increase in the ability to exert political influence (γ), that is, with a decrease in the relevance of access cost to the political competition; therefore, an interest groups could also select dominant strategies when (γ) increases. Equilibrium solutions with positive values for the resources allocated for pressure exist if the slope of reaction function is smaller than one ($1-\alpha<\gamma$); the optimal level of the resources allocated for pressure is:

[18] Since it is not important to the aim of examined issues, it is assumed that the interest groups do not differ regarding this parameter.

$$(33)\quad z_{i,t}=\frac{\alpha\gamma_i\gamma_j W_{i,t}+(1-\alpha)\alpha\gamma_j W_{j,t}}{\gamma_i\gamma_j-(1-\alpha)^2}.$$

Equation (33) describes the optimal choice of interest groups about the resources allocated for political influence; these resources are positively related to the available resources (W) and, usually, the preference for pressure (α), while they are negatively related to the ability in exerting pressure (γ).[19] Note that an interest group could not be in a position to affect the political system because of an elevated access cost to the political competition; in fact, its available resources could not be enough to implement the optimal choice about the resources allocated for pressure if there is an elevated inequality in available resources, an elevated preference for the pressure or a low ability in exerting pressure.[20] In particular, when the interests groups are identical for available resources, preferences and skilful, the ability in exerting pressure grater than one ($\gamma>1$) is the necessary condition for the political existence of both interest groups.[21]

3.3 Characteristics of the political system

In this subsection the "interest function approach" will allow to model the decisional process of political system; this process is defined as a mediation among economic interests.
The interest function is the objective function of the political system, it allows to represent its decisional process as the maximization of a weighted combination of economic interests. Specifying equation (6), the following expression is obtained:[22]

$$(34)\quad \begin{aligned} If_t &= q_{\pi,t}\left[\beta_\pi \lg G_t\varphi_t+(1-\beta_\pi)\lg(1-\tau_{\pi,t})\pi_q\right]+\\ &+q_{\omega,t}\left[\beta_\omega \lg G_t(1-\varphi_t)+(1-\beta_\omega)\lg(1-\tau_{\omega,t})\omega_q\right];\end{aligned}$$

where $0<\beta<1$ is the preference for public services.

Policymakers work with a budget in balancing, where tax revenues, coming out from the profit tax rate and the wage tax rate, finance the public

[19] See Becker (1983).

[20] The relationship between (α) and (z) could be negative if the access cost is elevated.

[21] For analytical details, see the mathematical appendix; where it is assumed that ($\gamma_i>1$) in order to obtain clear proof, .

[22] This functional form is used in Mazza and van Winden (1996).

expenditure, which are used to provide public services to capitalists and workers; both the tax revenues and the public expenditure are expressed in terms of income. Specifying equation (7), the following expression is obtained:

(35) $G = \tau_{\pi}\pi_{q} + \tau_{\omega}\omega_{q}$.

The political system maximizes its objective function by promoting the economic interests in accordance with the interest group pressure at time *t* (equation (34)) and subject to the constraint of the balanced budget (equation (35)); thus, the choice of the fiscal policy is the optimal mediation between the economic interests, that is, the optimal choice about the profit tax rate, the wage tax rate, and the public service level and allocation is the optimal mediation between economic interests.
The first order conditions are:

(36) $$\frac{\partial U_{s,t}}{\partial \tau_{\pi,t}} = -\frac{q_{\pi,t}(1-\beta_{\pi})}{(1-\tau_{\pi,t})} + \lambda\pi_{q} = 0$$

(37) $$\frac{\partial U_{s,t}}{\partial \tau_{\omega,t}} = -\frac{q_{\omega,t}(1-\beta_{\omega})}{(1-\tau_{\omega,t})} + \lambda\omega_{q} = 0;$$

(38) $$\frac{\partial U_{s,t}}{\partial \varphi_{t}} = \frac{q_{\pi,t}\beta_{\pi}}{\varphi_{t}} - \frac{q_{\omega,t}\beta_{\omega}}{(1-\varphi_{t})} = 0;$$

(39) $$\frac{\partial U_{s,t}}{\partial G_{t}} = \frac{q_{\omega,t}\beta_{\omega}}{G_{t}} + \frac{q_{\pi,t}\beta_{\pi}}{G_{t}} - \lambda = 0;$$

(40) $$\frac{\partial U_{s,t}}{\partial \lambda} = \tau_{\omega,t}\omega_{q} + \tau_{\pi,t}\pi_{q} - G_{t} = 0.$$

Applying the theorem of Weierstrass, since the objective function is concave and continuous and the constraint is compact, the optimisation problem of political system admits solution; on the basis of the first order conditions, the optimal solutions for the fiscal policy variables are:

(41) $G_{t} = \beta_{\pi}\tilde{q}_{t} + \beta_{\omega}(1-\tilde{q}_{t})$;

$$(42)\quad \varphi_t = \frac{\beta_\pi \tilde{q}_t}{\beta_\omega (1-\tilde{q}_t) + \beta_\pi \tilde{q}_t};$$

$$(43)\quad \tau_{\pi,t} = 1 - \frac{(1-\beta_\pi)}{\pi_q}\tilde{q}_t;$$

$$(44)\quad \tau_{\omega,t} = 1 - \frac{(1-\beta_\omega)}{\omega_q}(1-\tilde{q}_t).$$

Equations (41)-(44) allow to deal with various issues. The political system, that is, the public sector, exists if at least one of the following conditions is satisfied: first, capitalists or workers attribute a positive value to public services ($\beta_i>0$ in equation (41) or (42)); second, there is a divergence between the balance of economic force, summarized in the income distribution, and the balance of political force, summarized in the power share, ($\tilde{q}_t \neq \pi_q$ in equation (43) and (44)). In general, in line with the literature, the existence of public sector is justified by the necessity of a different resource allocation by providing public services or by the necessity of a different income distribution by modifying the balance of economic force synthesized in the mark up level.[23]

About the fiscal policy variables, the public service level and allocation only depend on preferences and political power, the greater is the preference for public services the greater is the public expenditure level, the greater are preference and political power of an interest group the greater is its public service share (equation (41) and (42)). The income tax rates oscillate between zero and a negative value implying a subsidy; they also depend on income shares, such that the economic power offsets the political power; in fact, the greater are preference for public services and political power or the lower is economic power, the greater are income tax rates (equation (43) and (44)). In conclusion, the fiscal policy must account for economic and political variables in finding of resources, whereas it must only consider political variables in their exploitation.

4. Political and economic evolution

The time evolution of political system, that is, the evolution of strategic interaction between interest groups, is synthesized by the evolution of power

[23] See Mueller (2003).

share (equation (26)). The power share affects the optimal choice of income tax rates (equations (43) and (44)); therefore, it's worth analysing the time evolution of political system because it affects the growth rate of economy, that is, the time evolution of economic system, by modifying the income tax rates (equations (23) and (24)).

The power share at time *t* depends on the pressure at time *t* (equations (26) and (27)); the pressure at time *t* is affected by the available resources at time *t* (equations (27) and (33)), which depend on the fiscal policy at time *t-1* (equations (33) and (25)); on the other hand, the fiscal policy at time *t-1* is affected by the power share at time *t-1* (equations (25), (43) and (44)). Thus, replacing equations (25)-(27), (33) and (43)-(44) into equation (26), the following difference equation is obtained:

$$(45)\quad \tilde{q}_t = \frac{\tilde{q}_{t-1}^{\mu}\left[(1-\beta_\pi)\left(\gamma_\pi \frac{1-\alpha}{\gamma_\omega}\right)\tilde{q}_{t-1} - (1-\beta_\omega)\alpha(1-\tilde{q}_{t-1})\right]}{\tilde{q}_{t-1}^{\mu}\left[(1-\beta_\pi)\left(\gamma_\pi \frac{1-\alpha}{\gamma_\omega}\right)\tilde{q}_{t-1} - (1-\beta_\omega)\alpha(1-\tilde{q}_{t-1})\right] + (1-\tilde{q}_{t-1})^{\mu}\left[(1-\beta_\omega)\left(\gamma_\omega \frac{1-\alpha}{\gamma_\pi}\right)(1-\tilde{q}_{t-1}) - (1-\beta_\pi)\alpha\tilde{q}_{t-1}\right]}.$$

Equation (45) describes the time evolution of power share in accordance with the interest group preference for pressure (α), the interest group ability in exerting pressure (γ), the influence of force balance between interest groups at time *t-1* on the pressure at time *t* (μ), and the preference for public services (β). Note that, the overall effect of mark up on the power share is nil; on the one hand, the income share positively influences the available resources for interest groups (equation (25)); but, on the other hand, it negatively influences the available resources by increasing the income tax rates (equations (25), (43) and (44)).

Figure (1) depicts a phase diagram for the difference equation (45) by taking into account the different values of parameter (μ) (μ*=1,0,-1*).

4.1 Political evolution and equilibrium states

In order to study the time evolution of political system, it is useful to define an equilibrium state for the political system (*EPS*) as a position of rest of the power share, such that it doesn't change from a period to the other; an equilibrium state is asymptotically stable (or instable) in the small according to whether sufficiently small deviations from it generate (or do not generate) a time path of the power share which leads back to such state. In figure (1), all equilibrium states are identify by intersections between the 45° line and the graph of difference equation (45).

When the power share at time *t-1* doesn't negatively influence the pressure at time *t* (μ*=1,0*), there are three equilibrium states: the instable equilibrium in point (*e*), where the slope of phase line is more than one, and the stable equilibriums in one and zero values of the power share, where the political process confines the time path of power share because it must be closed between zero and one. The convergence to one or to the other stable equilibrium depends on the initial state for the political system (*IPS*), that is, the initial condition of power share; the time path of power share converges towards one if the initial state is on the right of point (*e*), while it converges towards zero if the initial state is on the left.

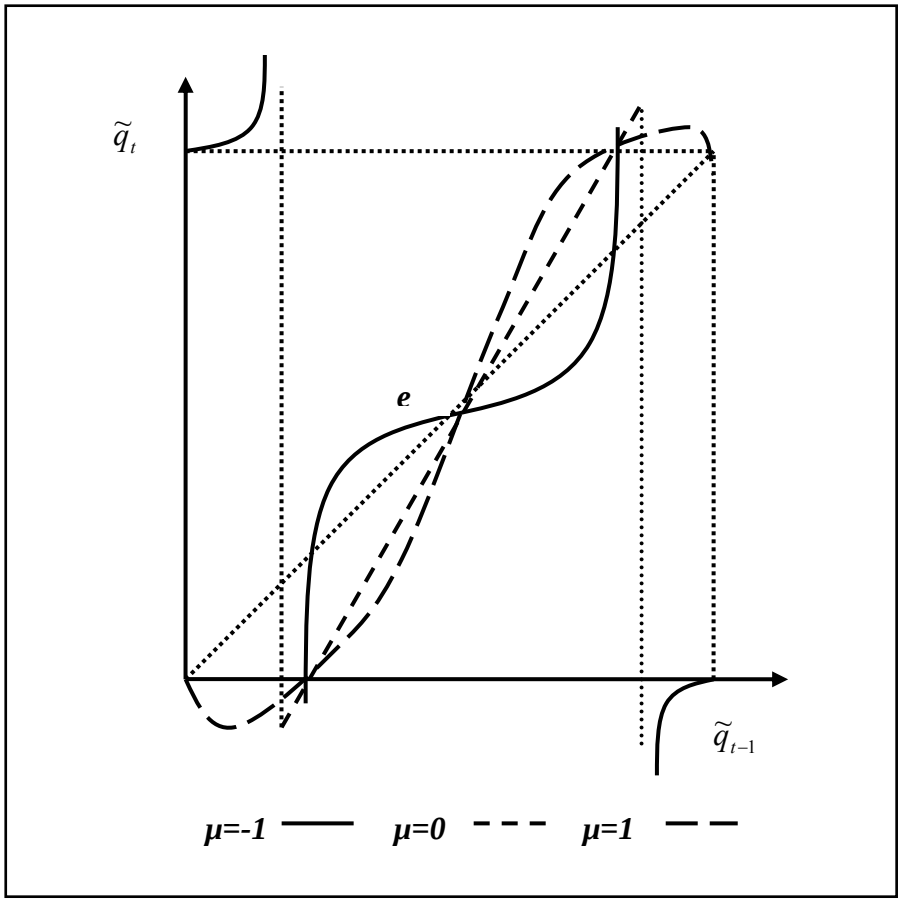

Figure 1: Political changes and equilibrium states.

When the power share at time *t-1* negatively influence the pressure at time *t* (μ*=-1*), there are four equilibrium states: the first is the stable equilibrium in point (*e*), where the slope of phase line is less than one; the second and the

third are the instable equilibriums to the sides of the point (*e*), where the slope of phase line is more than one; the fourth is the cyclical stable equilibrium of period two in one and zero values of the power share, where the political process confines the time path of power share because it must be closed between zero and one. The convergence to one or to the other stable equilibrium depends on the initial state for the political system; the time path of power share converges towards the stable equilibrium in point (*e*) if the initial state is closed between the instable equilibriums, while it converges towards the cyclical stable equilibrium if the initial state is to the sides of the instable equilibriums.

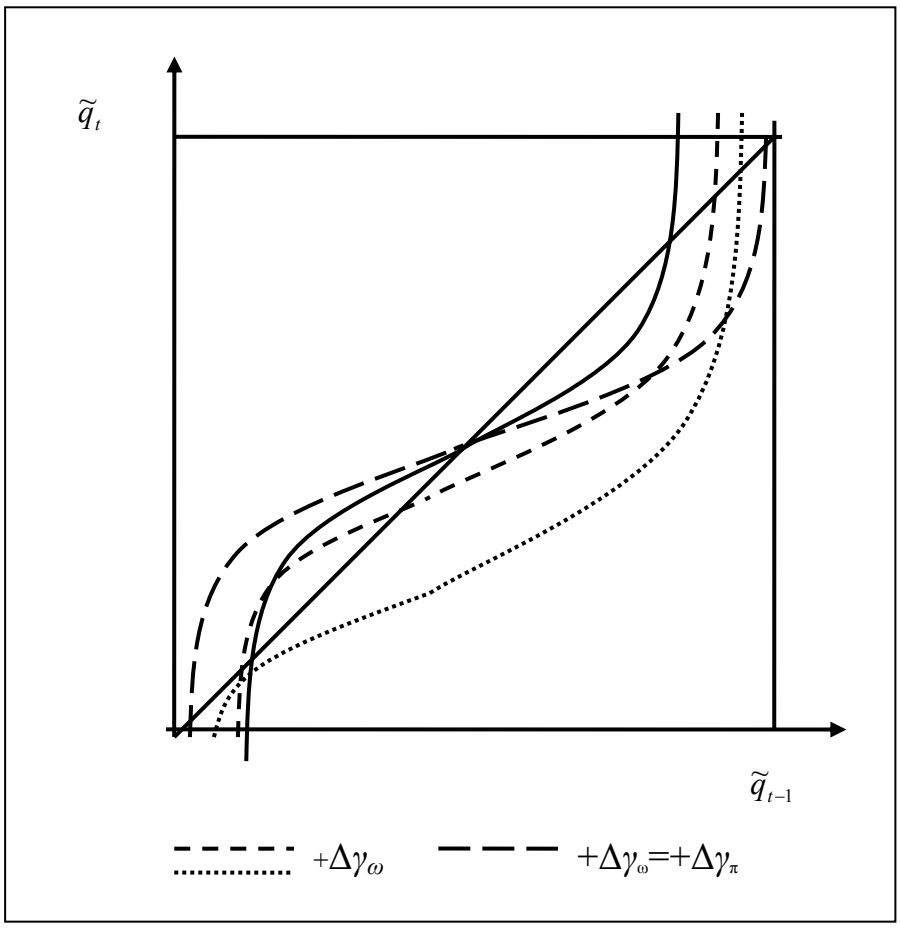

Figure 2: Co-existence of the interest groups.

Figure (2) depicts for (μ=*-1*) the effect of variations in the ability to exert pressure (γ) and in the preference for public services (β)[24]. An equal increase in the ability of both interest groups symmetrically shifts outwards the vertical asymptotes and it extends the region where the initial state implies a time path of power share converging to the stable equilibrium in point (*e*).[25] Instead, an increase in the ability of one interest group asymmetrically shifts outwards the asymptotes, with the stable equilibrium moving in favour of the interest group became more skilful; but, aside the cyclical stable equilibrium, it is possible that the stable equilibrium disappears and only one unstable equilibrium remains if the difference in the ability becomes very large. Similar results are obtained by varying the preference for public services; in fact, an increase in the preference implies an increase in the income tax rate and a decrease in the available resources for an interest group.[26]

In general, both interest groups coexist in the stable equilibrium, such that policymakers take into account both the economic interests, if the following conditions are satisfied: first, the interest group ability is great enough, but it is not too different between interest groups; second, the power share at time *t-1* negatively influence pressure at time *t*; third, the preference for public services is not too great and different between workers and capitalists; fourth, the initial state is not too close to one or to zero. The role of access cost to the political competition helps to explain these conditions; when there is an elevated inequality in terms of efficiency in exerting pressure, the first two conditions, or available resources, the third and fourth condition, then, sooner or later, the time evolution of resources will imply that an interest group could not be in a position to affect the political system because of elevated access cost to the political competition.[27] In substance, a low inequality between interest groups in terms of efficiency in exerting pressure and available resources are the necessary conditions for the political existence of wage interest and profit interest, that is, they are the necessary political and economic conditions such that the political system takes into account both the wage and the profit interest within the decisional process of fiscal policy.

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[24] When (μ=*0,1*), an increase in the ability (γ) or a decrease in the preference (β) of an economic interest moves the unstable equilibrium in favour of the other interest, so that it is more likely that the time path of the power share penalizes just the latter.

[25] The same would happen if the preference for the pressure (α) decreases.

[26] For analytic details, see the mathematical appendix.

[27] Note that when the time evolution of the resources is considered, it is not sufficient, as in section (3.2), that the ability of only an interest group is great.

4.2 Economic evolution

In order to analyse the relationship between time evolution of power share and time evolution of economic system, it is useful to define the critical state for the political system (*CPS*) as the power share implying full utilisation of the productive capacity. Replacing equation (43) into equation (22) and setting the degree of capacity utilization equal to one, the following expression is obtained:

$$(46)\quad \tilde{q}_t^c = \frac{(\eta_u + \eta)\bar{x}_k}{(s - \eta_r)(1 - \beta_\pi)}.$$

Equation (46) identifies the power share prevailing in a critical state, for this power share the profit tax rate guarantees full utilisation of the productive capacity. The profit tax rate has two effects on the economy: on the one hand, it increases demand by influencing saving decisions via an income redistribution from capitalists, whose propensity to save is positive, to the public sector, whose propensity to save is nil (equation (13)); on the other hand, it reduces demand by influencing investment decisions (equation (14)); however, the former effect always dominates the latter and the degree of capacity utilisation is positively related to the profit tax rate (equation (22)). Thus, when the power share is less than its critical level, there is full utilisation of the productive capacity because demand level is sufficiently high; otherwise, when the power share is more than its critical level, there is overcapacity because demand is too low. Note that variations in the wage tax rate doesn't affect the critical state because workers and public sector have the same propensity to save.

The critical state is affected by political variables, as the capitalist preference for public services, and economic variables, as the capitalist propensity to save, the firm propensity to invest, and production costs. These elements synthesize the overall propensity of public sector and private sector to sustain the demand level; therefore, the critical power share is negatively related to this propensity. Note that, the overall effect of the mark up on the critical state is nil; on the one hand, it negatively influences demand by redistributing income from workers to capitalists (equation (22)); but, on the other hand, it positively influences demand by increasing the rate of profits tax and redistributing income from capitalists to the public sector (equations (22) and (43)).

The relationship between time evolution of power share and time evolution of growth rate depends on how the equilibrium state, the critical state, and the initial state for the political system are placed within the political space; this space is identified by the set of power share values closed between zero and one.

In figure (3) the equilibrium state and the initial state are respectively represented by the y-axis and the x-axis; therefore, the cartesian axis and the more external parallel lines to them include all combinations of equilibrium and initial states. In figure (1), the time path of power share is monotonic and convergent towards the equilibrium because the phase diagram always describes a monotonically increasing function; therefore, in figure (3) the time path of power share is represented by a succession of points along the dotted arrows ending on the 45° line where the equilibrium state is achieved.

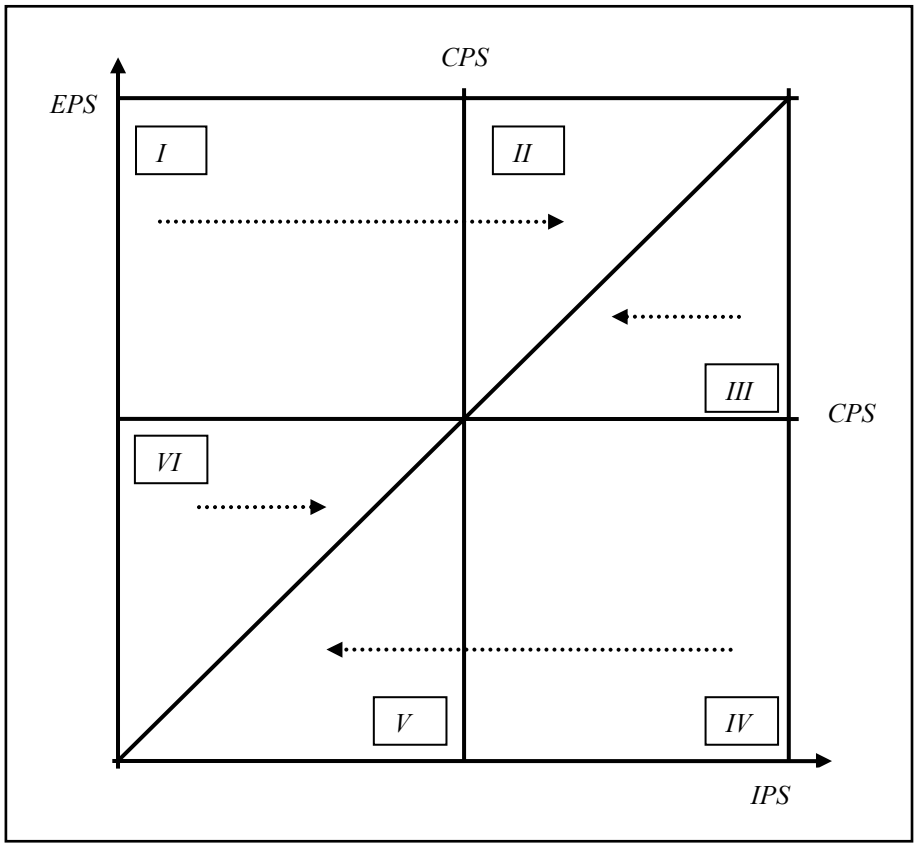

Figure 3: Interaction between political and economic dynamics.

The more internal parallel lines to the cartesian axis represent the critical state for the political system; when a combination of equilibrium and initial states is on the right of the parallel line to the y-axis, the time path of power share starts in the neokaleckian region where there is overcapacity and investments drive growth (equation (23)); when the combination of equilibrium and initial states is on the left, the time path starts in the neoclassical region where there is full utilisation of the productive capacity

and savings drive growth (equation (24)). In the same way, when the combination lies above the parallel line to the x-axis, the time path ends in the neokaleckian region, while when it lies below the time path ends in the neoclassical region. Obviously, an increase in the overall propensity of public sector and private sector to sustain the demand level shifts outwards the lines representing the critical state and it extends the neoclassical region; contrarily for a decrease in the overall propensity.

In figure (3) each region identifies a specific relationship between power share and growth rate, that is, between the time evolution of political system and the time evolution of economic system. In region (*I*) (*EPS*>*CPS*>*IPS*), the time path of power share implies a decreases in the profit tax rate because the power share increases; in the neoclassical region the growth rate is positively affected by this process (equation (24)), while in the neokaleckian region it is negatively affected (equation (23)); when the demand level is exactly equal to the productive capacity, the growth rate is maximum because the saving effect of the profit tax rate dominates its investment effect. In region (*IV*) (*IPS*>*CPS*>*EPS*), the time path implies an increase in the profit tax rate because the power share decreases; in the neokaleckian region the growth rate is positively affected by this process (equation (23)), while in the neoclassical region it is negatively affected (equation (24)). In the other regions, the time path of power share is entirely contained in the neokaleckian region or in the neoclassical region, such that an increase or a decrease in the power share is only connected with an increase or a decrease in the growth rate.

With regard to the impact of variations in the political and economic variables; the ability to exert pressure and the worker preference for public services directly affect the equilibrium state of power share and, indirectly, the growth rate by modifying the power share. The capitalist propensity to save, the firm propensity to invest, and the production costs only affect the critical state of power share, that is, they only influence the growth rate. More interestingly, the capitalist preference for public services affects both the equilibrium and critical state of power share, so that its variations influence both the power share and the growth rate.

In general, in region (*I*) and (*IV*) the time path of power share implies a non monotonic relationship between power share and growth rate, while in the other regions this relationship is monotonic; the intensity of political and economic changes depends on the difference between equilibrium and initial state of power share. Variations in the political or economic variables modify the equilibrium and/or critical state of power share, so that a new political convergence process or only economic changes can occur. In subsection (4.1), the model has allowed to show that the interest group for profits and the interest group for wages coexist in the stable equilibrium for the political system and they are able to affect policymakers in determining the fiscal policy, if the necessary political and economic conditions are

satisfied; in this context, it is likely that the difference between demand level and productive capacity is low depending on the value of profit tax rate, so that more smooth economic changes occur in the economy. When these conditions are not satisfied, it is likely that the difference between demand level and productive capacity becomes large, so that the economy can experiment extreme economic situations as inflation or stagnation. In substance, the conditions for the political existence of wage and profit interest are also the necessary political and economic conditions for a balanced evolution of the economy over time:

> "… polarization of the political process and consequent political instability is precisely what one aspects when distributional issues are the focal point of political competition. …
> … capitalism must inevitably raise redistributional issues, which the system's major interest groups – business and labor – will take to the political arena. If the pluralist political process is incapable of resolving these redistributional issues without sapping the efficiency of the market-oriented, capitalist system, …, then one or the other has to go." (Mueller 1983, pp. 276).

5. Conclusion

This paper puts forward a new theoretical approach for studying the interplay between political and economic system. The logical structure integrates the "influence functions approach", concerning the strategic interaction among interest groups, and the "interest function approach", concerning the political decision process; all framed in a suitable conceptual framework describing the operation of the economy. This logical structure can be used to study issues implying an interplay between political and economic system, with the only caution to adapt the framework for describing the economy to issues taken into consideration; when the role of the income distribution is explored, the neokaleckian approach is chosen as framework. Note that in the literature the "influence functions approach" and the "interest function approach" have never been put together to study the impact of pressure on political decisions; note also that within neokaleckian approach, little attention has been given to determinants of the political decision process.
With regard to the strategic interaction between interest groups, the model has allowed to explain their interaction in terms of the time evolution of available resources, efficiency in exerting pressure, and access costs to the

political competition. Moreover, the model has shown that a low inequality between interest groups in terms of efficiency in exerting pressure and available resources is the necessary condition so that the time evolution of interest group resources allows to bear the weight of access costs to the political competition.

With regard to the relationship between pressure for promoting the profit and wage interest and growth rate, that is, between pressure and economic growth, the model has allow to explain the non monotonic relationship in terms of variations on the demand side depending on changes in the profit tax rate. Moreover, the model has shown that the condition for the political existence of profit and wage interest is also the necessary condition for a balanced time evolution of the economy over time; otherwise, it is likely that the fiscal policy determines extreme economic situations, as inflation or stagnation, by implying a large difference between demand level and productive capacity.

In future researches two specific issues could be explored: first, the role of mark up when its effects on of interest group resources and demand do not balance each other out; second, the role of productive public expenditure, that is, the role of public investments. In conclusion, it is hoped that this paper has allow a greater understanding of the reality by going into issues connected with the interplay between political and economic system,.

Mathematical appendix.

On the basis of equation (33) it is possible to describe the strategic behaviour of an interest group:

$$\text{(a1)}\quad \frac{\partial z_{i,t}}{\partial \gamma_i} = \frac{-\gamma_j (1-\alpha)^2 \alpha W_{i,t} - \gamma_j^2 (1-\alpha)\alpha W_{j,t}}{\left[\gamma_j \gamma_i - (1-\alpha)^2\right]^2} < 0;$$

$$\text{(a2)}\quad \frac{\partial z_{i,t}}{\partial \gamma_j} = \frac{-(1-\alpha)^2\left[\gamma_i \alpha W_{i,t} - (1-\alpha)\alpha W_{j,t}\right]}{\left[\gamma_j \gamma_i - (1-\alpha)^2\right]^2} < 0;$$

$$\text{(a3)}\quad \frac{\partial z_{i,t}}{\partial \alpha} = \frac{\gamma_i \gamma_j W_{i,t}(\gamma_i \gamma_j + \alpha^2 - 1) + \gamma_j W_{j,t}\left[\gamma_i \gamma_j (1-2\alpha) + (1-\alpha)^2\right]}{\left[\gamma_j \gamma_i - (1-\alpha)^2\right]^2} \gtrless 0;$$

$$\text{(a4)}\quad W > \frac{\alpha\gamma^2 W + (1-\alpha)\alpha\gamma W}{\gamma^2 - (1-\alpha)^2} \Rightarrow \gamma > 1.$$

Equations (a1)-(a2) show that an increase in the ability in exerting pressure reduces the resources allocated for this activity; equation (a3) shows that the relationship between preference for pressure and resources allocated for exerting pressure is not monotonic; equation (a4) shows the necessary condition for the political existence of identical interest groups.
When the following notations are chosen:

$$\begin{matrix} (1-\beta_\pi)\left(\gamma_\pi - \dfrac{1-\alpha}{\gamma_\omega}\right) = \bar{\gamma}_\pi \quad and \quad (1-\beta_\pi)(1-\alpha) = \bar{\alpha}_\pi \\ (1-\beta_\omega)\left(\gamma_\omega - \dfrac{1-\alpha}{\gamma_\pi}\right) = \bar{\gamma}_\omega \quad and \quad (1-\beta_\omega)(1-\alpha) = \bar{\alpha}_\omega \end{matrix};$$

on the basis of equation (45), it is possible to obtain:

$$\text{(a5)}\quad \mu = -1 \Rightarrow \tilde{q}_t = \frac{(\bar{\gamma}_\pi + \bar{\alpha}_\omega)\tilde{q}_{t-1}^2 - (\bar{\gamma}_\pi + 2\bar{\alpha}_\omega)\tilde{q}_{t-1} + \alpha}{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\tilde{q}_{t-1}^2 - (\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)\tilde{q}_{t-1} + \bar{\alpha}_\omega};$$

$$\text{(a6)}\quad \mu = 0 \Rightarrow \widetilde{q}_t = \frac{\bar{\gamma}_\pi \widetilde{q}_{t-1} - \bar{\alpha}_\omega (1 - \widetilde{q}_{t-1})}{(\bar{\gamma}_\pi - \bar{\alpha}_\pi)\widetilde{q}_{t-1} + (\bar{\gamma}_\omega - \bar{\alpha}_\omega)(1 - \widetilde{q}_{t-1})}\ ^{28};$$

$$\text{(a7)}\quad \mu = 1 \Rightarrow \widetilde{q}_t = \frac{(\bar{\gamma}_\pi + \bar{\alpha}_\omega)\widetilde{q}_{t-1}^2 - \bar{\alpha}_\omega \widetilde{q}_{t-1}}{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\widetilde{q}_{t-1}^2 - (2\bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\widetilde{q}_{t-1} + \bar{\gamma}_\omega}.$$

The conditions for the political existence of profit and wage interest imply that (μ=*-1*), so it is more interesting of studying this case. When the denominator is null, the function (a5) shows two vertical asymptotes:

$$\text{(a8)}\quad \begin{aligned} q_{n,t-1} &= \frac{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega) - \sqrt{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)^2 - 4\bar{\alpha}_\omega(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)}}{2(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)} \\ q_{n,t-1} &= \frac{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega) + \sqrt{(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)^2 - 4\bar{\alpha}_\omega(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)}}{2(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)} \end{aligned}.$$

These asymptotes approximate to zero and one if the parameters (α) and (β) decrease and the parameter (γ) increases. The function (a4) shows also an horizontal asymptote:

$$\text{(a9)}\quad \lim_{\widetilde{q}_{t-1} \to {}^{+}_{-}\infty} \widetilde{q}_t(\widetilde{q}_{t-1}) = \frac{\bar{\gamma}_\pi + \bar{\alpha}_\omega}{\bar{\gamma}_\pi + \bar{\alpha}_\omega + \bar{\gamma}_\omega + \bar{\alpha}_\pi}.$$

The sign of the function is studied by comparing the signs of numerator and denominator; therefore, along the x-axis from minus to more infinite, the function is positive, negative for values greater than zero, positive, negative for values lower than one and positive for values greater than one.
First derivative is:

$$\text{(a10)}\quad \frac{\partial \widetilde{q}_t}{\partial \widetilde{q}_{t-1}} = \frac{\left[(\bar{\gamma}_\pi + \bar{\alpha}_\omega)\bar{\alpha}_\pi + (\bar{\gamma}_\omega + \bar{\alpha}_\pi)\bar{\alpha}_\omega\right]\widetilde{q}_{t-1}^2 - 2\bar{\alpha}_\omega(\bar{\gamma}_\omega + \bar{\alpha}_\pi)\widetilde{q}_{t-1} + \bar{\alpha}_\omega\bar{\gamma}_\omega}{\left[(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\widetilde{q}_{t-1}^2 - (\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega)\widetilde{q}_{t-1} + \bar{\alpha}_\omega\right]^2} > 0;$$

it is more than zero because the numerator is always greater than zero.
Second derivative is more or less than zero in accordance with the following inequality:

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[28] When the interest groups are equal for all the variables this function is linear, but, if the interest groups are not equal the function is concave or convex.

$$\frac{\partial q_t}{\partial q_{t-1}} \gtrless 0 \quad if \quad -[(\bar{\gamma}_\pi + \bar{\alpha}_\omega)\bar{\alpha}_\pi + (\bar{\gamma}_\omega + \bar{\alpha}_\pi)\bar{\alpha}_\omega](\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\tilde{q}_{t-1}^3 +$$

$$+3(\bar{\gamma}_\omega + \bar{\alpha}_\pi)\bar{\alpha}_\omega(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega)\tilde{q}_{t-1}^2 - [2\bar{\gamma}_\omega(\bar{\gamma}_\pi + \bar{\gamma}_\omega + \bar{\alpha}_\pi + \bar{\alpha}_\omega) +$$

(a11)

$$+(\bar{\gamma}_\omega + \bar{\alpha}_\pi)(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega) - (\bar{\gamma}_\pi + \bar{\alpha}_\omega)\bar{\alpha}_\pi - (\bar{\gamma}_\omega + \bar{\alpha}_\pi)\bar{\alpha}_\omega]\tilde{q}_{t-1} +$$

$$+[\bar{\gamma}_\omega(\bar{\gamma}_\pi + \bar{\gamma}_\omega + 2\bar{\alpha}_\omega) - \bar{\alpha}_\omega(\bar{\gamma}_\omega + \bar{\alpha}_\pi)] \gtrless 0$$

therefore, along the x-axis from minus to more infinite, the function is convex, concave, convex and concave.
Moreover, the following critical points are useful for describing the shape of function:

$$\tilde{q}_t = 0 \Rightarrow \tilde{q}_{t-1} = \left[\frac{\bar{\alpha}_\omega}{\bar{\gamma}_\pi + \bar{\alpha}_\omega}, 1\right]$$

(a12) $\tilde{q}_t = 1 \Rightarrow \tilde{q}_{t-1} = \left[0, \frac{\bar{\gamma}_\omega}{\bar{\gamma}_\omega + \bar{\alpha}_\pi}\right]$.

$$\tilde{q}_{t-1} = \frac{1}{2} \Rightarrow \tilde{q}_t = \frac{\bar{\gamma}_\pi - \bar{\alpha}_\omega}{\bar{\gamma}_\pi - \bar{\alpha}_\omega + \bar{\gamma}_\omega - \bar{\alpha}_\pi}$$

In figure (2) the more external dotted line also represents the case when the influence function of an interest group is:

(a13) $q_{i,t} = z_{i,t}^{\gamma_i}$.

Equation (a12) implies as difference equation:

(a14) $\tilde{q}_{t-1} = \frac{(\bar{\gamma}_\pi' \tilde{q}_{t-1})^{\gamma_i}}{(\bar{\gamma}_\pi' \tilde{q}_{t-1})^{\gamma_i} + \left[\bar{\gamma}_\omega'(1 - \tilde{q}_{t-1})\right]^{\gamma_j}}$;

where $\bar{\gamma}_\omega' = \frac{\alpha\gamma_\omega\rho_\omega(1-\beta_\omega)}{(1-\alpha+\alpha\gamma_\omega)}$ and $\bar{\gamma}_\pi' = \frac{\alpha\gamma_\pi\rho_\pi(1-\beta_\pi)}{(1-\alpha+\alpha\gamma_\pi)}$.

Bibliography

Aidt Toke S. 2002, *"Strategic political participation and redistribution."*, in Economics and Politics, vol. 14, n. 1, pp. 19-40.

Ando Amy Whritenour 2003, *"Do interest groups compete? An application to endangered species."*, in Public Choice, vol. 114, pp. 137-159.

Austen-Smith David 1997, "*Money, information,and influence."*, in Perspectives on public choice, edited by Denni C. Mueller, Cambridge University Press, pp. 296-321.

Barro Robert 1990, *"Government spending in a simple model of endogenous growth."*, in The Journal of Political Economy, vol. 98, n. 5, (october), pp. 103-125.

Barro Robert and Sala-i-Martin Xavier 1995, *"Economic growth."*, McGraw-Hill, USA.

Becker Gary 1985, *"Public policies, interest groups, and dead weight costs."*, Journal of Public Economics, vol. 28, pp. 329-347.

Becker Gary 1983, *"A theory of competition among interest groups for political influence."*, in The Quarterly Journal of Economics, vol. 98, n. 3 (august), pp. 371-400.

Blecker Robert 2002, *"Distribution, demand and growth in neo-kaleckian macro-models."*, in The economics of demand-led growth, edited by Setterfield Mark, Edward Elgar, Cheltenham UK, pp. 129-152.

Boyce John 2000, *"Interest group competition over policy outcomes: dynamics, strategic behavior, and social costs."*, in Public Choice, vol. 102, pp. 313-339.

Brainard L. and Verdier T. 1997, *"The political economy of declining industries: senescent industry collapse."*, in Journal of International Economics, vol. 42, pp. 221-237.

Buchanan James and Tullock Gordon 1962, *"The calculus of consent. Logical foundations of constitutional democracy."*, The University of Michigan Press, USA.

Cassing James and Hillman Arye 1986, *"Shifting comparative advantage and senescent industry collapse."*, in The American Economic Review, vol. 76, n. 3, pp. 516-523.

Coggins Jay, Graham-Tomasi Theodore and Roe Terry 1991, "*Existence of equilibrium in a lobbying economy."*, in International Economic Review, vol. 32, n.32 (August), pp. 533-550.

Commendatore P., D'Acunto S., Panico C. and Pinto A. 2003, *"Keynesian theories of growth"*, in The theory of economic growth, edited by Salvadori Neri, Edward Elgar, Cheltenham UK, pp.103-139.

Dixit Avinash 1996, "*The making of economic policy: a transaction-cost politics perspective."*, The MIT Press, Cambridge, Massachusetts.

Dutt Amitava 2003, *"New growth theories, effective demand, and post-keynesian dynamics"*, in Old and new growth theories, edited by Salvadori Neri, Edward Elgar, Cheltenham UK, pp.67-100.

Dutt Amitava 1990, *"Distribution, Growth and Uneven Development"*, Cambridge University Press, Cambridge UK.

Dutt Amitava 1984, *"Stagnation, income distribution and monopoly power."*, in Cambridge Journal of Economics, vol. 8, pp. 25-40.

Easterly William and Rebelo Sergio 1993, *"Fiscal policy and economic growth."*, in Journal of Monetary Economics, vol. 32, pp. 417-458.

Grossman Herschel and Kim Minseong 1996, *"Predation and accumulation."*, in Journal of Economic Growth, vol. 1, pp. 333-351.

Hausken Kjell 2000, *"Cooperation and between-group competition."*, in Journal of Economic Behavior & Organization, vol. 42, pp. 417-425.

Hirshleifer Jack 1991, *"The paradox of power."*, in Economics and Politics, vol.3, n. 3, pp. 177-200.

Johnson Edward 1988, *"On the theory of political competition: comparative statics from a general allocative perspective."*, in Public Choice, vol. 58, pp. 217-235.

Knack Stephen 2003, *"Groups, growth and trust: cross-country evidence on the Olson and Putnam hypotheses."*, in Public Choice, vol. 117, pp. 341-355.

Kristov Lorenzo, Lindert Peter and McClelland Robert 1992, *"Interest groups and redistribution."*, in Journal of Public Economics, vol. 48, pp. 135-163.

Lavoie Marc 2002, "*The kaleckian growth model with target return pricing and conflict inflation."*, in The economics of demand-led growth, edited by Setterfield Mark, Edward Elgar, Cheltenham UK, pp. 172-188.

Lavoie Mark 1995, *"The kaleckian model of growth and distribution and its neo-ricardian and neo-marxian critiques."*, in Cambridge Journal of Economics, vol. 19, pp. 789-818.

Lavoie Mark 1992, *"Foundations of post-keynesian analysis."*, Edward Elgar, Aldershot UK.

Lee Frederic 1994, *"From post-keynesian to historical price theory, part I: facts, theory and empirically grounded pricing model."*, in Review of Political Economy, vol. 6, n. 3, pp. 303-336.

Mazza Isidoro and van Winden Frans 1996, *"A political economic analysis of labor migration and income redistribution."*, in Public Choice, vol. 88, pp. 333-363.

Mitchell William and Munger Michael 1991, *"Economic models of interest groups: an introductory survey."*, in American Journal of Political Science, vol. 35, n. 2 (may), pp. 512-546.

Mohtadi Hamid and Roe Terry 1998, *"Growth, lobbying and public goods."*, in European Journal of Political Economy, vol. 14, pp. 453-473.

Mork Knut 1993, *"Living with lobbying: a growth policy co-opted by lobbyist can be better than no growth policy at all."*, in Scandivian Journal of Economics, vol. 95, n. 4, pp.597-605.

Mueller Dennis 2003, *"Public choice III."*, Cambridge University Press UK.

Mueller Dennis 1983, *"The political economy of growth and redistribution."*, in The political economy of growth, edited by Dennis C. Mueller, Yale University Press, New Haven, pp.261-276.

Murphy Kevin, Shleifer Andrei and Vishny Robert 1993, *"Why is rent-seeking so costly to growth?"*, in The American Economic Review, vol. 83, n. 2 (may), pp.409-414.

Olson Mancur 1982, *"The rise and the decline of nations. Economic growth, stagflation and social rigidities."*, Yale University Press, New Haven.

Olson Mancur 1965, *"The logic of collective action. Public goods and the theory of group."*, Harvard University Press, Cambridge Mass..

Panico Carlo 2003, *"Old and new growth theories: what role for aggregate demand?"*, in Old and new growth theories, edited by Salvadori Neri, Edward Elgar, Cheltenham UK, pp.53-66.

Pecorino Paul 1992, "*Rent seeking and growth: the case of growth through human capital accumulation."*, in The Canadian Journal of Economics, vol. 25, n. 4 (november), pp. 944-956.

Przeworski Adam and Wallerstein Michael 1988, *"Structural dependence of the state on capital."*, in The American Political Science Review, vol. 82, n. 1 (march), pp. 11-29.

Rama Martin 1993, *"Rent seeking and economic growth."*, in Journal of Development Economics, vol. 42, pp. 35-50.

Rodrìguez Francisco 2004, *"Inequality, redistribution, and rent-seeking."*, in Economics & Politics, vol. 16, n. 3, pp. 287-320.

Rowthorn Robert 1982, *"Demand, real wages, and economic growth."*, in Studi Economici, vol.18, pp. 3-53.

Sadiraj Vjollca, Tuinstra Jan and van Winden Frans 2005, *"Interest group size dynamics and policymaking."*, in Public Choice, vol. 125, n. 3-4 (december), pp. 271-303.

Selten Reinhard 1998, *"Features of experimentally observed bounded rationality."*, in European Economic Review, vol. 42, pp. 413-436.

Setterfield Mark 2002, *"Introduction: a dissenter's view of the development of growth theory and the importance of demand-led growth."*, in The economics of demand-led growth, edited by Mark Setterfield, Edward Elgar, Cheltenham UK, pp. 1-16.

Sturzenegger Federico and Tommasi Mariano 1994, *"The distribution of political power, the costs of rent-seeking, and economic growth."*, in Economic Inquiry, vol. 32, april, pp. 236-248.

Tornell Aaron and Lane Philip 1999, *"The voracity effect."*, in The American Economic Review, vol. 89, n. 1, pp. 22-46.

van Velthoven Ben 1989, *"The endogenization of government behaviour in macroeconomic models."*, Springer-Verlag, Berlin Heidelberg.

van Winden Frans 2003, *"Interest group behaviour and influence."*, in Encyclopedia of Public Choice, edited by C. K. Rowley e F. Schneider, Kluwer Academic Publishers, Boston.

van Winden Frans 1999, "*On the economic theory of interest groups: towards a group frame of reference in political economics."*, in Public Choice, vol. 100, pp. 1-29.

van Winden Frans 1983, *"On the interaction between state and private sector."*, North-Holland Publishing Company, Amsterdam.