



STUDIECENTRUM VOOR ECONOMISCH EN SOCIAAL ONDERZOEK

VAKGROEP PUBLIEKE ECONOMIE

ECONOMIC THEORIES OF STATE
with empirical applications

for Belgium

Ilse JANSSENS

December 1988

Report 88/223

The popularity indices used in the second sector were gathered by DIMARSO GALLUP Belgium. Those indices represent the vote intentions for the general elections as if they were being held at the moment of the enquiry ($n = \pm 1000$). We thank DIMARSO for its cooperation.

We thank the various persons who have given useful comments during conversations about the subject. Any remaining errors are the responsibility of the author.

Universitaire Faculteiten St. Ignatius

Prinsstraat 13 - B 2000 Antwerpen

D/1988/1169/19

A b s t r a c t

The paper deals with the political influence on economics and vice versa. It consists of two parts. Part I is an overview of theoretical models of economic theories of state. Special attention is paid to the different actors, their behaviour and their interaction.

In part II, some of the theoretical models are implemented for Belgium. New estimations are compared with previous publications. In Belgium, only few systematic relations between economic and political indicators seem to exist. Maybe, its small open economy is mainly ruled by international influences. Further research is needed to determine them.

Table of contents

Introduction	1
Section 1 : Economic Theories of State	
1.1. Definition and method	3
1.2. The political business cycle	11
1.2.1. The Nordhaus method	12
1.2.2. The behaviour of voters	18
1.2.3. The behaviour of government	23
1.2.4. The interaction space	25
1.3. The model of Van Winden	30
Section 2 : Empirical Evidence	
2.1. Election functions	
2.1.1. Literature	38
2.1.2. Own Estimations	44
2.2. Popularity functions	
2.2.1. Literature	47
2.2.2. Own estimations	50
2.3. A simple macro-economic framework	
2.3.1. Estimations	54
2.3.2. Simulations	62
Conclusions	66
References	67

List of figures

Figure 1	Interactions between economic and political agents	4
Figure 2	Some economic theories of state	5
Figure 3	Displacements in levels of public spending	9
Figure 4	Short-(S) and long-run(L) Phillips relations	13
Figure 5	Iso-vote lines	13
Figure 6	Discount factors	15
Figure 7	Optimal policy	16
Figure 8	Dynamics in a democratic system	17
Figure 9	Situations of interaction	29

List of tables

Table 1	Equations for the three parties	39
Table 2	Equations for the Catholic Party	41
Table 3	Pooling models	43
Table 4	Results for Dummy 1, Errorcomp 1 Dummy 2, Errorcomp 2	46
Table 5	Evaluation for Belgium	49
Table 6	Data for the popularity functions	50
Table 7	Popularity function for Belgium	52
Table 8	Two periods	53
Table 9	Definition and source of the variables	57
Table 10	Results for the Van Winden model	58
Table 11	The model of Klein	60
Table 12	Data and sources for the simulations	63
Table 13	Simulations of the parameters	63
Table 14	Results for the simulated λ_i 's	65

INTRODUCTION

In science, the assumptions made about the behaviour of the agents and the structural characteristics of the system in which they act, are of strict importance for the state of the discipline.

In economics, the paradigm of the producer and consumer rationalities is well-established and forms the basis of many extensions of the theory.

Originally, the social-economic reality was one object studied in political philosophy, which covered social-economic actions of consumers, producers, the state and their interrelations.

As early as 1776, Adam Smith described a state with three basic responsibilities to stimulate the economic game, in addition to his famous 'invisible hand' mechanism, which concerts individual actions to collective welfare.¹

Later on, economics concentrated on the market and price rationalities. The basic theorems of welfare economics define an equilibrium that is Pareto-efficient without state intervention, assuming that the economy is perfectly competitive, that there are full information, a full set of markets and no externalities. Only if these - or some other - conditions are not fulfilled, state intervention is legitimated and even necessary to correct for the market failures. The incentives for the state to actual intervention are not really discussed. It is assumed that the state acts as one monolithic altruist.

The public finance tradition describes three action fields for the government to overcome market imperfections. In Musgraves' notation, these three are : efficient allocation, just distribution and stabilization². However, this

¹ The three elements are, firstly, defence of the nation, secondly, enforcement of a legal system, and thirdly the execution of public works which wouldn't be done - for the cost or other reasons - by individuals, to ameliorate the welfare of the nation.

² R.A. MUSGRAVE, *The Theory of Public Finance*, New York, McGraw Hill, Oxford University Press, 1955, chapters 1-2.

legitimation of state activities does not explain the actual behaviour. To do that, the state must be seen as an organic institution, or at least, there must be a consistent theory about the state and its actions, like in sociology and political philosophy.

In pure economics, the need for a theoretical underground for the ever increasing government sector hasn't been felt until quite recently (in comparison with the other social sciences).

James Buchanan wrote about this problem in 1972 : 'The public choices that define the structure and the constraints within which the market behaviour takes place, are assumed to be made by others than those who participate in market transactions'³. This is highly inconceivable, since the decisions of the government do not only influence consumption and labour supply, production and distribution, but also the behaviour of people as voters.

A comparatively new branch in economics is the Public Choice which formalizes the actions of social-economic agents - e.g. voters and governments - as being decisions of rational individuals, analogously to the traditional market theory.

The first section of this paper describes and analyses some economic theories of state behaviour.

The second section presents empirical results for Belgium. Own findings are confronted with the existing results.

³ A.B. ATKINSON and J.E. STIGLITZ, *Lectures on Public Economics*, New York, Mc Graw Hill, 1980, chapter 10.

SECTION 1 : ECONOMIC THEORIES OF STATE

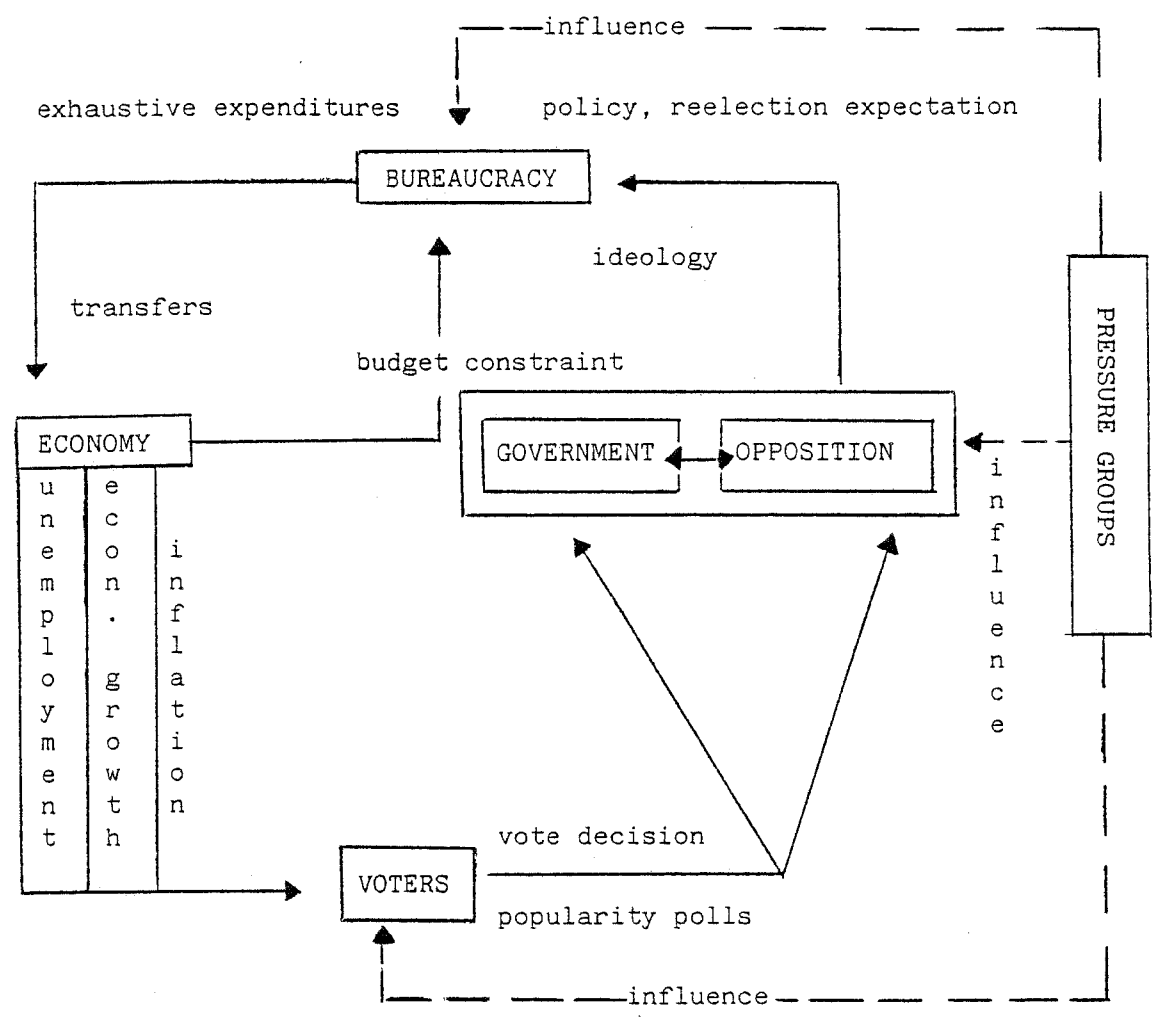
1.1. Definition and method

As indicated in the introduction, there is a need to 'close the economic system', to incorporate the state in the behavioural rationality, as a counterpart to the consumers' and producers' rationalities.

In order to deepen out and clarify the social-economic system, we try to identify the relations between the agents in this system. This is illustrated in figure 1, which only represents the newly introduced interrelations. The traditional market transactions between consumers and producers within the economy are not explicitly formalized here.

We define voters, bureaucracy, government (and opposition) and pressure groups as agents in the political-economic interaction space, with a special stress on their relation to the economy. The interaction between the agents can be directly observable, e.g. the evaluation of the government by the voters, the transfers from the government, via the bureaucracy and the economy, to the voters. These relations are indicated by full lines in figure 1. The indirectly observable interactions (dashed lines) consist mainly of the information flows between the different agents. As can be seen, the figure is restricted to western democratic systems.

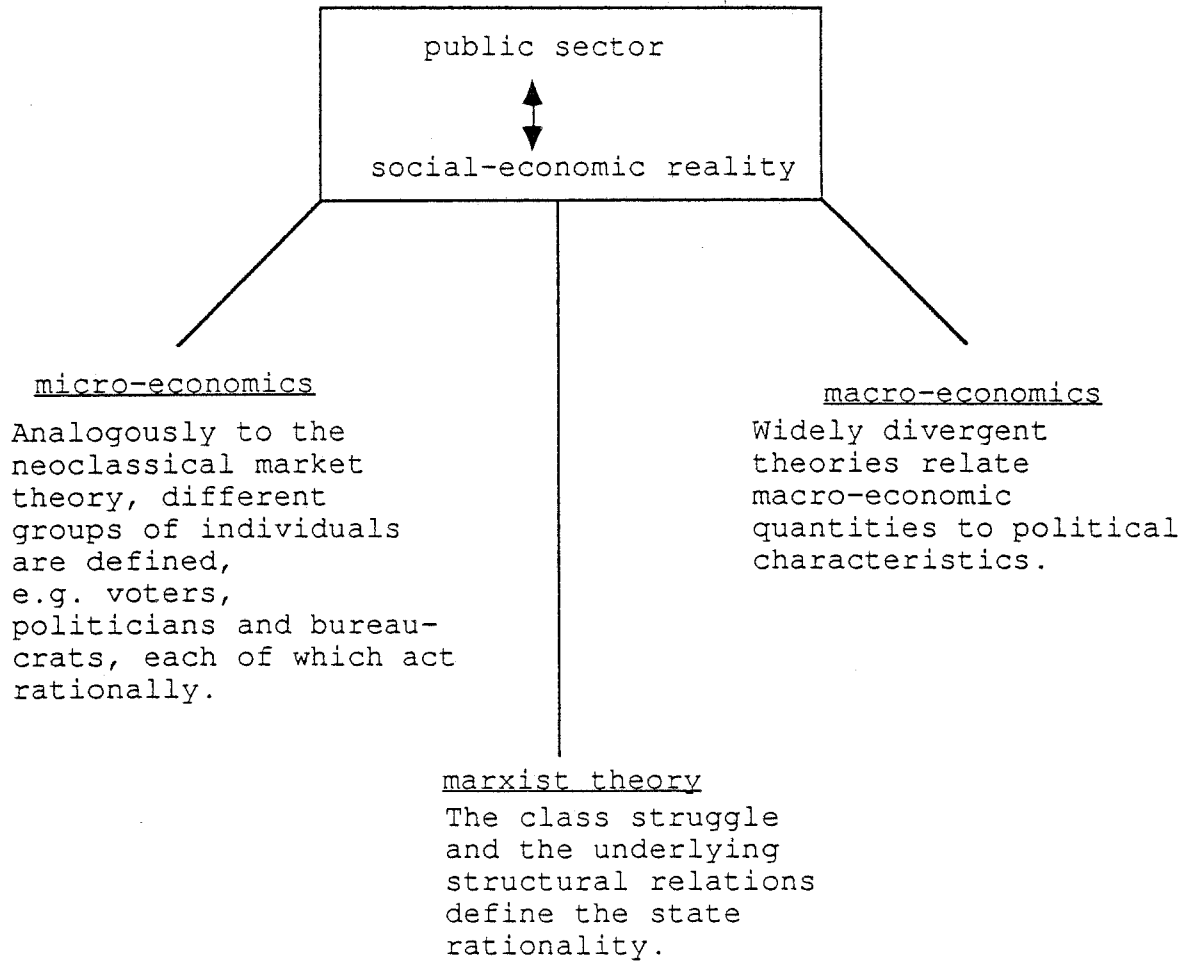
Figure 1 : Interactions between economic and political agents



Since the Public Choice branch is developed quite recently, it is clear that there is no generally accepted paradigm. This implies the existence of different methodological approaches of the behavioural and relational characteristics of the agents.

The approaches are indicated in figure 2.

Figure 2 : Some economic theories of state



The micro-economic variant defines three groups of actors (in some versions four), namely voters, politicians, and bureaucrats (and pressure groups).

A major criticism relates to the unrealistic character of the underlying hypotheses. An example for the voters' behaviour : their preferences are assumed to be single-peaked and one-dimensional. Furthermore, it should be possible to aggregate individual preferences without difficulties. This leads to a very restricted picture of reality.

An important improvement however, is that also voting, governing and administrating are seen as rational occupations. Politicians are assumed to maximize their votes, to safeguard their reelection, or to pursue ideological goals under the reelection constraint. Bureaucrats

maximize the relative importance of their office, reflected in the size of the budget or in the number of fellow-workers.

There are different hypotheses about the interactions between the agents. In **voting models**, public choices are believed to be brought about by explicitly defined political processes. The most important examples are the majority voting model and the median voter model. In the last model the politicians try to safeguard their (re)election by capturing the median voter, and in the first, they try to get the majority of votes.

Well-known authors who present tests of the model, are Borcharding and Deacon⁴, Bergstrom and Goodman⁵, Pommerehne and Schneider⁶ and Frey⁷.

In **bureaucratic models**, it is emphasized that the government has only a limited capacity to fulfill the wishes of the majority since they depend on the administration for the concrete execution of their policy measures. Rational bureaucracy combines the execution of government policies with own utility maximizing behaviour. Wildawsky launches the notion 'incrementalism', since the budget of year t equals the budget in year $t-1$ augmented by an increment.⁸

Niskanen refers to the bureaucrats, as the main responsables for the ever increasing state budgets since they control the agenda-settings.⁹

⁴ T.E. BORCHERDING and R.T. DEACON, 'The Demand for the Services of Non-Federal Governments', in *the American Economic Review*, vol. 62, 1972, p. 842-853.

⁵ T.C. BERGSTROM and R.P. GOODMAN, 'The Private Demands for Public Goods' in *the American Economic Review*, vol. 63, 1973, p. 280-296.

⁶ W.W. POMMEREHNE and F. S. SCHNEIDER, 'Fiscal Illusion, Political Institutions and Local Public Spending' in *Kyklos*, vol. 31, 1978, p. 381-408

⁷ W.W. POMMEREHNE and B.S. FREY, 'Two Approaches to Estimating Public Expenditures' in *Public Finance Quarterly*, vol. 4, 1976, p. 395-407.

⁸ B.S. FREY, *Modern Political Economy*, Martin Robertson, 1978, p. 100-101.

⁹ W.A. NISKANEN, 'Bureaucrats and Politicians', in *Journal of Law and Economics*, vol. 18, 1975, p. 617-643.

Also Romer and Rosenthal discuss the hypothesis of agenda-controlling bureaucrats.¹⁰

A still more advanced variant incorporates **interest groups** which influence voters, government and bureaucracy. It can be assumed that pressure groups compare the costs of lobbying and campaigning with the benefits.¹¹

Here, it is easy to draw a link between the pressure group variant and the marxist theory.

The **marxist** theory can be seen as a special case of the interest group models. Marx identified only two classes : the capitalists and the workers. Their relations in the production process determine the structure of the state. In general interest group models, more classes are recognised.

The relations voters-politicians and politicians-bureaucrats are shaded by the pressure groups' influence.

In western democracies, the marxist theory of society is not widely recognised as an explanation of the ins and outs of the western politics. An important feature of this theory is the attention paid to the structural relations within the state, which can have indeed a very decisive impact on the economic situation and evolution.

A very interesting adaptation of this theory is made by the author F. Van Winden.¹² He defines four interest groups in his 'interest group theory' : public sector workers, private sector workers, capitalists and dependents (e.g. unemployed, retired). Their influence, measured by different factors, is assumed to determine the government policy.

¹⁰ FILIMON, R., T. ROMER and H. ROSENTHAL, 'Asymmetric Information and Agenda Control', in *Journal of Public Economics*, vol. 17, 1982, p. 51-70.

¹¹ G.S. BECKER, 'Public Policies, Pressure Groups and Dead Weight Costs', in *Journal of Public Economics*, vol. 28, 1985, p. 329-347.

¹² F.A.A.M. VAN WINDEN, *On the Interaction between State and Private Sector*, 's Gravenhage, 1981, 319 p.

In **macro-economic** variants, the actual state expenditures are traditionally assumed to be an exogenous factor. The state income on the contrary - in the various forms of direct and indirect taxation - has been the object of many investigations and theories.

The important growth of the government sector and its involvement in the market economy turns out to be an input in most of the models. Some authors have individually stressed this shortage and have presented an alternative.

A very early contribution in this respect is that of **Wagner**, which relates the growing state activity to the underlying structural changes in a developed economy.¹³

The development of industrial society raises increasing political pressure for social progress and state expenditures, to facilitate and support the industrial environment.

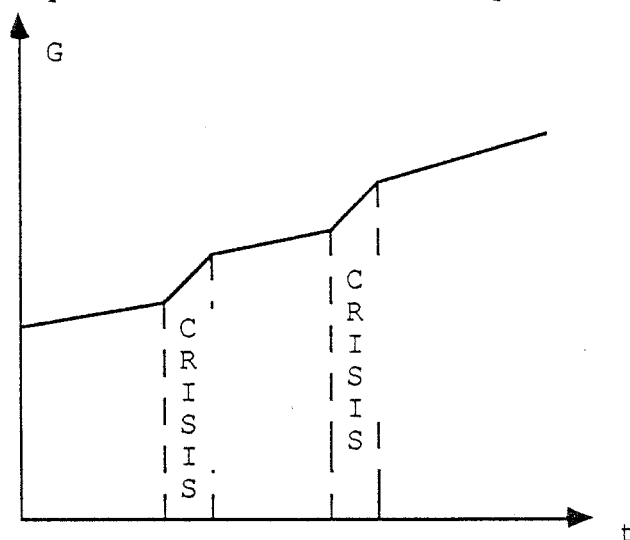
W. Baumol developed an analogous theory, but he based it explicitly on the relative costs of the public and the private sector.¹⁴ According to him, the production of public services and goods is less receptive to technological innovations, in comparison with the private production. The relative price of the public goods rises and consequently, an ever increasing fraction of the GNP is spent on this category of goods, on condition that there exists no substitution between public and private goods. The recent flow of privatisation and liberalisation, makes this statement fairly uncertain. The crucial factor turns out to be the elasticity of demand. Only when the demand for public goods is inelastic, the public share of the GNP will increase.

¹³ R.A. MUSGRAVE and P.B. MUSGRAVE, *The Theory of Public Finance*, New York, Mc Graw Hill, 1984, p. 136-140.

¹⁴ W. BAUMOL, 'Macroeconomics of Unbalanced Growth': the Anatomy of Urban Crisis', in *the American Economic Review*, vol. 57, 1967, p. 415-426.

Rather close to the exogenous tradition, Peacock and Wiseman introduced the 'displacement' theory.¹⁵ They found that the government budget 'jumped' upwards in periods of crisis. Only then people tolerate more state intervention than before. After the crisis, the same level of expenditures is endured. Exogenous shocks shift or 'displace' the normal level of expenditures, as indicated in figure 3.

Figure 3 : Displacements in levels of public spending



These theories are frequently quoted in the public finance handbooks to indicate possible explanations for the ever increasing government budget.

Other information, - in addition to the budget size -, is used in **vote, popularity and policy** functions.

In these variants, economic indicators and political information are integrated to explain the political-economic reality.

Examples of political indicators are the popularity indices (as obtained by popularity polls) and the position of the parties in previous legislations (government versus opposition). Generally used economic variables are the unemployment level, inflation, income growth, transfers and

¹⁵ A. PEACOCK and J. WISEMAN, *'The Growth of Public Expenditures in the United Kingdom'*, New York, Princeton University Press, 1961.

exhaustive expenditures. Theoretical and empirical articles are presented by Nordhaus, Frey, Schneider and Fair. Their theories are variants on the political business cycle, which is presented in the next paragraph.

Incorporating these functions in total macro-economic models is the next step. **General politico-economic models** are built with an endogenous government sector, parallel to the traditional macro-models with an exogenous government.

For France, Lafay and others constructed a complete model with interaction between popularity of the government, unemployment and other variables in the framework of a complete macro model with three blocs : a public sector bloc (explaining taxes, transfers and other expenditures), a private sector bloc (explaining the distribution of the surplus, consumption, etc.) and the interactive bloc between the two sectors.¹⁶

Another example of a complete model is the interest group theory of Van Winden and Van Velthoven, to which we will turn later in this section.¹⁷ Their approach enables us to unite the traditional economic models, the influence of pressure groups and an endogenous government sector.

This short introduction to the economic theories of the state indicates that the variants can't be strictly separated, since they have important common features. In the next paragraphs, we turn to a description and a judgment of two theories within the macro-economic variant : the political business cycle and the general politico-economic model.

¹⁶ J.D. LAFAY, e.a., *A Complete Politico-Economic Model for the French Economy*, Poitiers, Institut de Recherche et d'Analyse Politico-Economique.

¹⁷ F. VAN WINDEN and B. VAN VELTHOVEN, 'Een eenvoudig politiek-economisch model', in *Statistische Berichten*, 1982, p. 1196-1206.

1.2. The political business cycle

The notion of the political business cycle suggests that the cycles of economic quantities are tied to political (or election) cycles. It is assumed that governments manipulate the economy, so that peaks (or troughs) are synchronised with the timing of elections. This theory relies on the rational behaviour of the governments and it implies that the incumbents use the economic interactions to create favourable economic conditions at election time to reassure their reelection.

This definition of political business cycles relies on the following presumptions.

- 1) Governments aim to win the elections.
Therefore, they attempt to maximize votes.
- 2) Voters have preferences for economic outcomes that are reflected in their voting behaviour.
- 3) Governments manipulate the economy to improve their reelection chances.

All these statements are controversial and subject to discussion. The empirical investigations don't present much convincing evidence to support these presumptions.

Nordhaus was one of the first authors who presented theoretical and empirical background for the political business cycle.¹⁸

Since his article, many supplements and reactions have been formulated. Firstly, the Nordhaus method is introduced and secondly, an overview is given of the implicit hypotheses and comments about them.

¹⁸ W.D. NORDHAUS, 'The Political Business Cycle', in *Review of Economic Studies*, vol. 12, 1975, p. 169-190.

1.2.1. The Nordhaus Model

Nordhaus starts from a government of democratically chosen politicians who pursue policies to maximize their votes at the next elections. They know the voters preferences for some economic quantities, in this case employment and price stability.

The economy is formalized in an expectations-augmented Phillips curve.

$$\pi(t) = f(u_t) + \lambda v_t \quad (f.1)$$

with $\pi(t)$ the rate of inflation

u_t the rate of unemployment

v_t expected inflation

The current expected inflation is function of the difference between inflation and previous expectations. Expectations rise whenever actual inflation exceeds the expected inflation.

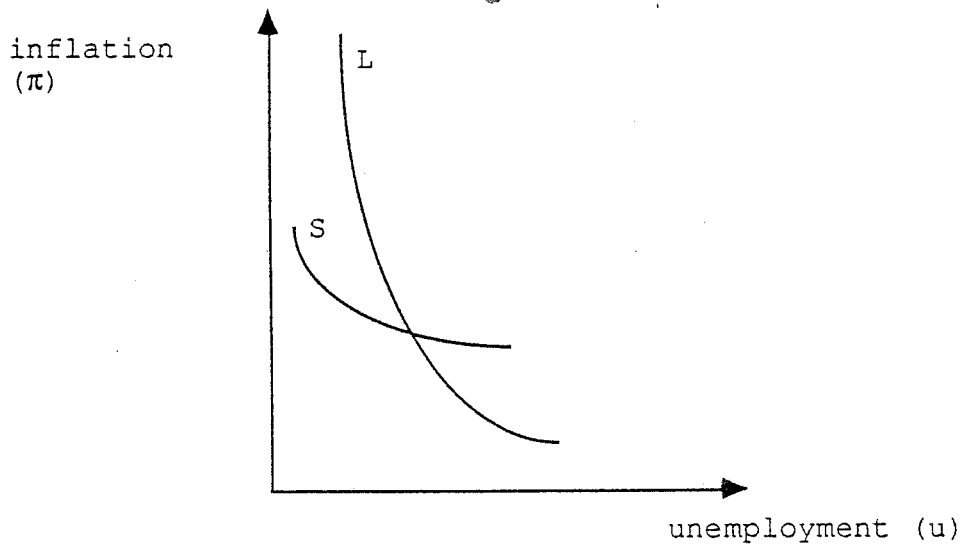
$$\dot{v}_t = \gamma(\pi_t - v_t) \quad (f.2)$$

with π_t

$$\dot{v}_t = \frac{dv}{dt}$$

In the short run, the relation is not stable because it depends on inflation expectations. The long-run Phillips curve is characterised by the fact that the expectations and the actual rates of inflation match exactly. Figure 4 illustrates the short- and long-run variants of the Phillips relation.

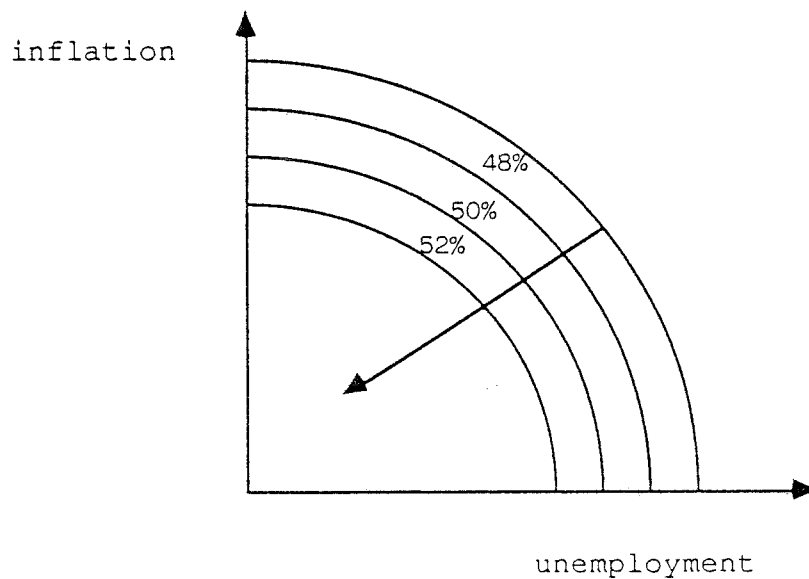
Figure 4 : Short- (S) and long-run (L) Phillips relation



The government is assumed to be able to determine the level of unemployment, but not the short-run trade-off between unemployment and inflation.

The evaluations by the voters of the incumbents result in vote percentages for any combination of unemployment and inflation. The line connecting the same vote percentages for the different combinations is called an iso-vote line. Iso-vote lines are assumed to be convex, as is illustrated in figure 5.

Figure 5 : Iso-vote lines



Since unemployment and inflation are both evaluated negatively, the higher they are, the smaller will be the government's share of votes.

The optimal policy for the government results from the confrontation of the vote or evaluation function with the economic restriction, represented by the Phillips-relation. Formally, this is expressed as

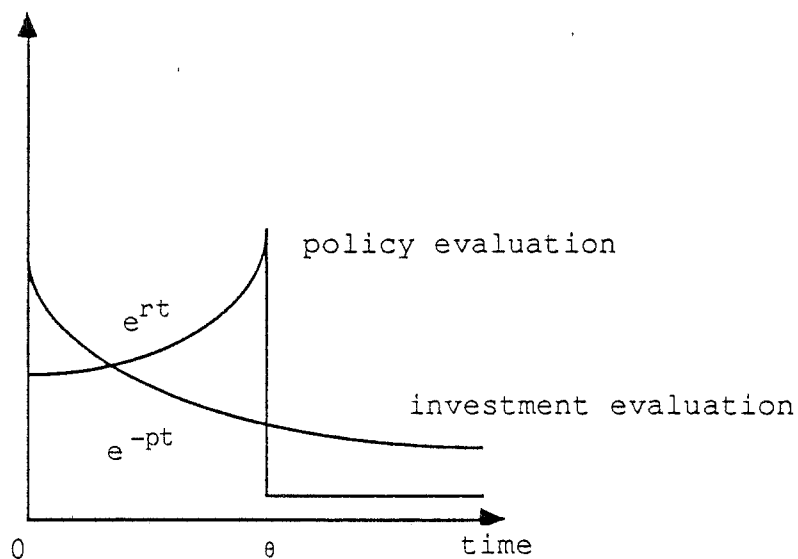
$$\max_{u_t} V_t = \int_0^{\infty} g(u_t, \pi_t) e^{-rt} dt \quad (\text{f.3})$$

$$\text{s.t.} \quad \begin{aligned} \pi_t &= f(u_t) + \lambda v_t \\ v_t &= \gamma(\pi_t - v_t) \end{aligned}$$

with V_t the vote share of the incumbents
 g the evaluation function of the economic situation
 e^{-rt} the factor to represent the decaying memory of the voters.

The factor e^{-rt} stands for the decaying memory of the voters. The weight of recent events is stronger than that of events having occurred a longer time ago, e.g. at the beginning of the previous electoral cycle. The relation with the discount factor used in investment analysis is illustrated in figure 6.

Figure 6 : Discount factors

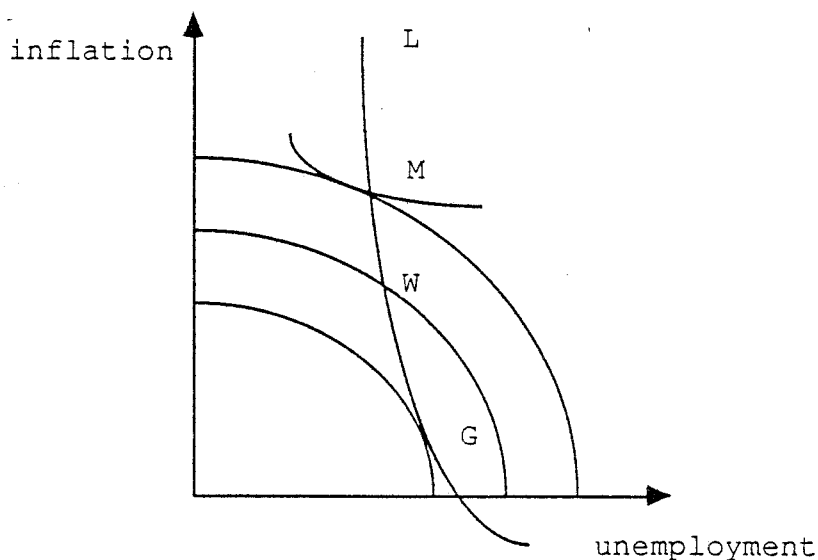


For investment studies, the relative importance of future returns declines as the time proceeds. Investors are forward looking and discount the streams of profit to the point of time on which the investment takes place (= point 0).

Voters are backward looking. They evaluate the results of the previous legislation, elected at 0 and governing until θ , at the new election time θ . The events which occurred nearly at point 0 are given smaller weights in the evaluation than events that take place just before election time. When the weighing of events only covers the past electoral period, the voters are said to be myopic.

Graphically, the policies can be summarised in two extreme cases, on figure 7.

Figure 7 : Optimal Policy



The first case is characterised by planners who use the same weights for current and future periods. There is no differentiation between generations. The outcome is point G, where the long-run Phillipscurve is tangent to the aggregate vote function. This policy is called the Golden Rule Policy.

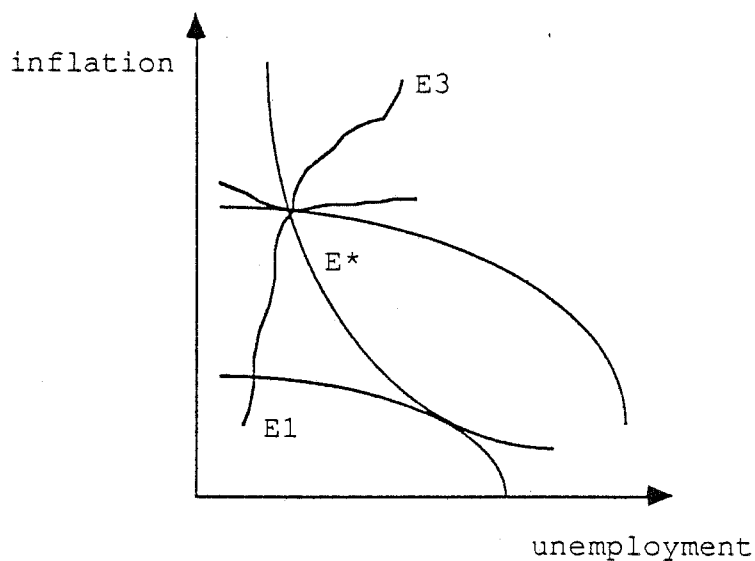
The opposite case is when planners totally disregard the future generations. This is where the short-run Phillips-curve is tangent to the aggregate vote function (M). As can be seen, myopic policies have higher inflation and lower unemployment than the Golden Rule Policy.

The general welfare optimum lies somewhere in between, as indicated by point W.

The dynamics of the system is illustrated in figure 8.

A point E_1 is chosen. Since it lies south-west of the long-run curve, the short-run curve will move up and the new economic conditions will be less popular. For point E_3 , the opposite is true. Nordhaus proves that in a democratic system the outcome is purely myopic. The equilibrium is thus reached in point E^* .

Figure 8 : Dynamics in a democratic system



Through his formal analysis, Nordhaus comes to two important conclusions :

1. Under democratic voting, the chosen policy has a lower unemployment and a higher inflation than socially optimal.

2. The unemployment rate must be falling during the entire election cycle. Immediately after the elections, the running parties will raise unemployment in order to combat inflation. As the elections approach, the unemployment level will be lowered.

Nordhaus does not present econometric estimations for his whole theory. Still, he investigates the conclusion of the continuously falling unemployment rate. To correct for possible lags, the working hypothesis states that the unemployment rate rises during the first half of the electoral period and declines during the second.

Only for three of the nine investigated countries, Nordhaus found empirical evidence (for Germany, the United States and New Zealand).

This article has been the basis of many reactions about the assumptions made for the voters, the government or the

interaction between them. These items will be discussed in the next sections.

1.2.2. *The behaviour of the voters*

The general assumption about the voters is that they are rational. This rationality means that voting is not only determined by party affiliation and social background, but also by objective factors, reflecting the economic situation.

Nordhaus states in his article that he 'focuses on voters who do not affiliate with parties for non-economic motives'.¹⁹

For this purpose, voting is considered an evaluation of the future expected utilities attainable under the different political parties.

For each individual, the utility under party k becomes U_i^k , with

$$U_i^k = U_i^k (E(u_k), E(\pi_k), E(GNP_k), \dots) \quad (f.4)$$

with $k : 1, \dots, K$ the number of political parties

$i : 1, \dots, N$ the number of voters

$E(.k)$ the expected value of the economic indicator, under party k

The key question is how the future expectations are formed. There are two extreme hypotheses, which have in common that the expectations are based on the 'usual' behaviour of the party (or parties) in the past. The length of memory and the quantity of information used differs widely.

Kramer defends that voters evaluate only the past performance of the incumbents. If they have performed satisfactory, they are reelected, if not, the opposition wins.²⁰

¹⁹ W.D. NORDHAUS, *o.c.*, p. 174.

²⁰ R.C. FAIR, 'The Effects of Economic Events on Votes for the President', in *the Review of Economics and Statistics*, vol. 60, 1978, p. 160.

In this way, voters keep information costs as low as possible.

Another theory says that the voters evaluate and compare current pronouncements and past performances of all competing parties. They choose the party from which they expect the highest utility.²¹ This theory assumes that voters are well-informed and self-interested.

The formalisation of the individual vote function is

$$V_{it}^k = \begin{cases} 1 & \text{if } U_i^k > U_i^{l \neq k} \\ 0 & \text{if } U_i^k < U_i^{l \neq k} \end{cases} \quad (\text{f.5})$$

with $k : 1, \dots, K$ the political parties
 $i : 1, \dots, N$ the number of voters
 $t : 1, \dots, T$ the moment of voting

Provided that all individual voters have the same preferences for the aggregate economic indicators, the individual vote functions can be added to obtain the global vote function V_t^k

$$V_t^k = \sum_{i=1}^N V_{it}^k \quad (\text{f.6})$$

with V_t^k the aggregate number of votes for party k .

The length of memory extends from the last available period (month, quarter, year), like e.g. in Kramer's view, to more than one legislative period. This last possibility is investigated by Fair for the presidential elections of the U.S. and by Boute and Ginsburgh for the parliamentary elections in Belgium.

Fair treats also party affiliation. He states that the voters' utility difference between the Republican (R) and the Democratic (D) party is uniformly distributed. This

²¹ G. STIGLER, 'General Economic Conditions and National Elections', in *the American Economic Review*, vol. 63, 1973, p. 160-167.

difference is not caused by any consideration about the parties' past performances.²²

He specifies the vote share of the democrats as follows

$$V_{tD} = \alpha_0 + \alpha_1 q_t + v_t \quad (f.7)$$

with V_{tD} the vote share of the Democrats

q_t a measure of the economic influence on the electorate.

The influence of the economic policy is determined by the participation of the party in previous governments and by the performance measure.

Formally

$$q_t = \beta_1 \frac{M_{td1}}{(1+p)^{t-td1}} + \beta_2 \frac{M_{td2}}{(1+p)^{t-td2}} - \beta_3 \frac{M_{tr1}}{(1+p)^{t-tr1}} - \beta_4 \frac{M_{tr2}}{(1+p)^{t-tr2}} \quad (f.8)$$

with M_j : measure of performance for the party in power during the four years prior to election j .

$ti1 = t$ if party i won the previous election
 $= 0$ if this was not the case

$ti2 = t-1$ if party i won the election before last
 $= 0$ if this was not the case.

²² R.C. FAIR, o.c., p. 165-166.

An example. The previous legislative period was governed by the democrats, the period before by the republicans. F.8 becomes :

$$q_t = \beta_1 M_t - \frac{\beta_4 M_{t-1}}{(1+\rho)}$$

The opposite signs of the β 's stand for the different influence of economic performance on the incumbents and on the opposition.

Only the two last legislative periods are taken into account. (ti1 and ti2). The last term of f.7 can be formalized :

$$v_t = \alpha_2 t + \alpha_3 Dpers + \mu_t \quad (f.9)$$

with t : time trend
 Dpers : a dummy with value 1 for a candidate with campaign experience
 μ_t : influence from other variables, e.g. vote getting ability of the candidates.

Boute and Ginsburgh start from the same formalisation as Fair. In their estimations however, they only use the last electoral period.²³ They've adapted the two-party model of Fair to the multi-party system in Belgium with its particular language problems. They incorporate a language dummy to correct for the differences in the regions and a depreciation variable to capture the effect of having participated in the last government. Their results are given in the empirical section.

²³ S. BOUTE and V. GINSBURGH, 'Performances économiques et résultats des élections législatives en Belgique' in *Recherches Economiques de Louvain*, vol. 43, 1977, p. 345-369.

Frey and Schneider work with a 'normal' popularity level for parties or presidential candidates.²⁴ They assume that voters do not consider how other parties would have done under the same conditions, neither whether the underlying economic conditions have particularly been favourable. The voters only evaluate the current or slightly lagged economic conditions.

However, purely extrapolating on the basis of past economic performance is sometimes considered to be naive. In this respect, Chappell points to the fact that the asymmetry of economic knowledge stimulates the political business cycle process, since the voters are supposed not to foresee the bad consequences of reduced unemployment before the elections in times of recession.²⁵

This suggests that the voters are completely ignorant of the economic structure, or that they are unconcerned about the future.

He presents a model in which the optimal policies are compared with the policies actually chosen. This information is incorporated in the policy function to develop new plans. His method requires the solution of a series of complex control problems.

The voters see through the economic structure and expect in periods of high inflation a severe contractionary policy, to avoid an even worse situation in the future. This 'sophisticated' voter model performs better than the 'naive' voter model, when the estimation results are compared.

A third element (in addition to the rationality and the sophisticated versus naive voter), is the definition of the performance measure and the actual weight of the past

²⁴ B.S. FREY and F. SCHNEIDER, 'An Empirical Study of Politico-Economic Interaction in the United States', in *the Review of Economics and Statistics*, vol. 60, 1978, p. 174-183.
B. S. FREY and F. SCHNEIDER, 'A Politico-Economic Model of the U.K.', in *Economic Journal*, vol. 88, 1978, p. 243-253.

²⁵ M.W. CHAPPELL, 'Presidential Popularity and Macro-Economic Performances: are voters really so naive?' in *the Review of Economics and Statistics*, vol. 65, 1983, p. 385-392.

events. In some articles the economic indicators are used in levels and in other articles they are given in growth rates. On the whole, people seem to be more sensitive to growth rates.

As already mentioned, the weight of the economic quantities relies on the principle that people have a decaying memory. Nordhaus uses a discount factor, whereas other authors use a factor g , lying between 0 and 1, raised to the power that equals the number of periods that have already passed since their actual occurrence. In both methods myopic voters can be easily represented. In the first case by a very large discount factor and in the second by a very small factor g . Some authors choose to calculate mean values of the economic quantities over the (assumed) relevant period. This approach is followed by Boute and Ginsburgh in their publication about the Belgian elections. When different periods are considered, the comparison of the estimation results can indicate the length of the voters' memory.

In a variety of studies, different interpretations of the rationality hypothesis, the naive versus sophisticated voter assumption and the concrete definition of the performance measure are tested. There's no general conclusion to be drawn out of the results.

The same problem of non-dominance exists with the theoretical reflections about the governmental behaviour.

1.2.3. Behaviour of the government

In the first public choice articles, most attention was paid to the parties' competition for votes, as an analogous process to the competition of profit-maximizing entrepreneurs. Downs presented the idea of 'spatial' party competition for two political parties. In this respect, space is to be interpreted as the positions of the party programmes on the axis left-right. The ultimate results are twofold : firstly, the two parties offer identical programmes in the centre of the vote distribution and

secondly, if the two programmes do not differ, a rational voter does not vote.²⁶

The parties offer political programmes to capture the median voter and have no strict ideology. From the pure theory of party competition, additional knowledge can't be deducted without introducing other information to implement a more realistic governmental framework.

The notion of perfect competition has been left, and it is assumed that the government's utility function also depends on ideological satisfaction.

At election time, the incumbents are subject to approval or disapproval by the majority of the electorate. It is also possible that the parliament can outvote a government during the legislative period. Therefore, governments try to pursue 'popular' policies. Their possibilities largely depend on the voters' memory. If voters forget easily, it is rational to plan the more unpopular decisions immediately after the elections to present more favourable economic conditions the year before the next elections. When voters do not forget so easily, they will remember the unpopular measures and consider them in their evaluation. When support is weak, all parties, also those who do not approve of high expenditures ideologically, pursue an expansionary policy with increasing expenditures to regain the voters' support. Frey and Schneider did the test for the U.K. and the U.S. In both countries, the coefficient of the popularity deficit is significant for growing state expenditures.

The informational problem of the government is due to the fact that the poll results are the only source of information that gives them an indication of their popularity. The polls must be assumed to reflect the vote results. This is of course not necessarily so. Some people vote differently when they know that it is for 'real'.

²⁶ B.S. FREY, o.c., p. 90-95.

To summarise, the government is constrained by the voters' behaviour and preferences and the influence by other agents on the interaction space between them.

1.2.4. *The interaction space*

In the interaction space between the government and the voters, a number of constraints restrict the actions and reactions of both agents. They are subject to the same influences from other agents, namely bureaucrats and pressure groups and from the underlying economic structure.

The first factor considered is the influence of bureaucracy. Both voters and government depend on the administration for the actual execution of the governmental decisions and measures.

The state expenditures do not only reflect the public choices made by the incumbents, but also the influence of the bureaucrats in the budgetary process.

Niskanen comes to two possible courses of action, starting from the bureaucrats' utility function²⁷

$$U = \alpha Q^{\beta} (B-C)^{\delta} \quad (\text{f.10})$$

with α , β and δ parameters

B the maximum budget of the bureaucracy that would be approved by the government review group

C minimum cost to produce the output of the bureau

Q quantity of output produced by the bureau.

The first possibility is that β equals 0. In this case, the discretionary budget (B-C) is maximised and the correct output is produced inefficiently.

In the other case δ equals 0, and twice as much output as necessary is produced efficiently.

²⁷ W.A. NISKANEN, o.c., p. 617-643.

In neither case, the government's plans are correctly carried out. This implies that the legislators should monitor bureaucracy.

This monitoring is costly since it reduces the time available for actually governing the country. The costs and benefits of time invested in the monitoring need to be compared. It is not clear to what extent the voters see through the role of the bureaucrats in the budgetary process and how the popularity results do not only relate to the government, but also to bureaucracy. Generally, bureaucrats are assumed to oppose to changes. They try to increase their previous budget.

A second common constraint is the influence of pressure groups on the available information and the preferences of the voters and the incumbents. The questions arise why economic groups are formed and what they can achieve. These issues are discussed by Olson.²⁸

His central conclusions are that lobbies of large economic groups are the by-products of organizations that have the capacity to 'mobilize' a latent group with 'selective' incentives, which are only available to organisations that

1. have the authority and capacity to be coercive, and
2. have a source of positive inducements that they can offer to the members of that latent group only.

In other words, an organization that only lobbies for a public good, cannot exist, since all citizens enjoy the advantages of the public good.

Becker models the competition between pressure groups for political influence.²⁹

Each group tries to lower its taxes and raise its subsidies, under the constraint of a balanced government budget, or formally

²⁸ M.C. OLSON, *The Logic of Collective Action, Public Goods and the Theory of Groups*, Cambridge, 1971, p. 133.

²⁹ G.S. BECKER, 'Public Policies, Pressure Groups and Dead Weight Costs', in *Journal of Public Economics*, vol. 28, 1985, p. 329-347.

$$S = T = I (p_s, p_t, n_s/n_t, x) \quad (\text{f.11})$$

with S total subsidies

T total taxes

p_s pressure by recipients of subsidies

p_t pressure by taxpayers

n_s/n_t relative number of recipients

x political system.

When recipients and taxpayers are assumed to be selfish, it is normal that

$$\frac{\partial S}{\partial p_s} = \frac{\partial I}{\partial p_s} = I_s > 0 \quad (\text{f.12})$$

and

$$\frac{\partial T}{\partial p_t} = \frac{\partial I}{\partial p_t} = I_t < 0$$

Further assumptions are that the pressure production functions depend on the total expenditures of money, time etc. for lobbying and on the number of group members, to correct for the free rider problem.

Each pressure group has to determine his expenditures on political pressure to maximize the utility of its members, subject to the overall budget constraint and the pressure production function.

The influence of pressure adversely affects the allocation of resources, since it causes dead weight or social costs (at least when taxpayers and recipients are selfish). The monetary equivalent of a dollar tax reduction exceeds a dollar, and the monetary equivalent of a dollar increase in subsidies is less than a dollar, because of the social costs involved.

Normally, dead weight costs are larger when supply is more elastic. Applied to regulated activities, this implies that the dead weight costs rise over time, since usually

substitutes arise and supply becomes less inelastic. In this respect, the recent deregulatory movement is just a natural process.

Another application is that relatively small groups are more likely to receive subsidies, since the group of taxpayers is large and as a result, the dead weight cost per taxpayer is low (and pressure also).

A third common constraint, in addition to the bureaucracy and the pressure groups, is the underlying economic structure. Originally, an expectations augmented Phillips-relation was taken to represent the economic situation. The restrictiveness of this approach has been indicated by many authors, who propose to include other variables and their interrelations, to interpret the results correctly. Lybeck includes tax, expenditures, the budget deficit, transfers, and disposable income growth.³⁰

Also with the inclusion of their interrelations (as a small macro-economic model), the results of the evaluation and policy functions are rather poor. The relations are unstable over time and the coefficients differ widely over varying periods.

The general conclusion about the political business cycle and the interactive relations, seems to be that there is no dominant theory explaining the behaviour of voters, governments and their interrelation. Alt and Chrystal present an interesting classification of different models.³¹

They differentiate between strategic and responsive governments. Strategic governments try to maximize their overall support at the elections. By doing so, they even will by-pass their own (ideological) voters. Responsive governments try to formulate policies which are expected by

³⁰ J.A. LYBECK, 'A Simultaneous Model of Politico-Economic Interaction, 1970-1982, in *European Journal of Political Research*, vol. 13, 1985, p. 135-151.

³¹ J.E. ALT and K.A. CRYSTAL, *Political Economics*, California, 1983, p. 101-120.

their voters. The ideology plays an important role in their behaviour.

Voters can have fixed or varying preferences. This leads to four possible situations, as indicated in figure 9.

Figure 9 : Situations of interaction

	government	
voters' preferences	strategic	responsive
fixed	I	II
varying	III	IV

The first case (I) is illustrated by the Nordhaus' theory. People have fixed preferences and changes in economic conditions will make them change party allegiance. It is questionable however whether people are so flexible. If not, political authorities cannot act as unconstrained agents, but are more or less forced by their supporters to implement a set of policies on the basis of which they were elected.

If the supporters can find alternative parties within their preferences, the responsiveness becomes likelier.

The changes of economic priorities arise when there are changes in incumbency. The economic conditions will thus change after, rather than before elections. These changes will produce a 'political business cycle'. An example of this second case (II) is given by Hibbs.

The possible changes of the voters' preferences, influenced by the media or government information, makes the interaction uncertain.

Tufte suggests to 'attack whatever problem the electorate considers most important'.³² According to him, the key variables are unemployment and growth. Electors are more concerned with the rate of change in these variables rather than with the levels.

Tufte neither presents convincing arguments nor empirical evidence to sustain this example of case III.

If governments respond to conditions and preferences that change over time, the behavioural rule is 'satisfying' instead of 'optimizing'. Government does not benefit from doing particularly well in general, but they do indeed from solving an economic crisis. The best policy is then to avoid bad economic conditions, since voters avert them. Mosley has presented a model of case IV.³³

1.3. The model of Van Winden

A further step is to integrate the endogenous policies into macro-economic models.

According to the author, the social-economic reality is more complex than assumed by the public choice and the marxist interpretations.

Public Choice stresses too much the individualistic behaviour. Every person is supposed to maximize his own utility.

Of course, in reality, there are supra-individual forces which influence the social-economic reality.

Public Choice incorporates this by the elections only. Still, there are other forces which are perhaps more important : the existant power structure and the pressure groups' influence.

³² T. TUFTE, *Political Control of the Economy*, Princeton, 1978, p. 65.

³³ P. MOSLEY, 'Towards a satisfying Theory of Economic Policy', in *Economic Journal*, vol. 86, 1976, p. 59-72.

The marxist theory stresses too much the structural relationships within society. There are only two classes, which form the basis of the production process and relations.

As a sort of eclectic, Van Winden stresses as well individual as structural influences.

He calls his theory 'the interest group theory'.

The state is not seen as a benevolent dictator but as an organic structure in which interests are defended by different groups.

Activities of individuals and groups are influenced by their own preferences and are subject to restrictions of the social-economic reality. Those restrictions have a twofold origin.

First, there is the structural influence, which is submitted by the structure of the reality.

Second, there is the influence of other groups, which is called pressure.

The above described influences and restrictions are also valid for bureaucrats and politicians. They are assumed to pursue their own interests subject to the social-economic reality. Only four groups are distinguished, with respect to their place in the production process :

k = 1 state workers

k = 2 private sector workers

k = 3 capital owners

k = 4 dependents

In the following formulas the parameter k stands to indicate the different social groups.

It is possible to adapt this classification according to the problem investigated.

Each group is assumed to have three basic interests :

w_k average real disposable income

e_k relative share of people in position k
 x_{sk} the bundle of state goods, available to the
 members of group k .

For each group, an elementary interest function is defined:

$$P_k(t) = P_k[P_k^*(t), P_k^*(t+1), \dots, P_k^*(t+n)]$$

$$\text{with } P_k^*(t) = w_k^{\varepsilon_{1k}}(t) e_k^{\varepsilon_{2k}}(t) x_{sk}^{\varepsilon_{3k}}(t)$$

ε_{1k} , ε_{2k} and ε_{3k} stand for the relative importance of income, numerical strength and the available bundle of public goods.

Moreover,

$$k, \varepsilon_{kg} \geq 0 \quad \sum_g \varepsilon_{kg} \leq 1$$

$$g = 1, 2, 3$$

The state tries to combine the different elementary interest functions, in one complex interest function

$$P_c(t) = \pi P_k^{\lambda_{kc}(t)}(t)$$

$$\text{with } \lambda_{kc}(t) > 0, \sum_k \lambda_{kc}(t) = 1$$

c stands for collectivity.

λ_{kc} is the relative weight in the decisionmaking given to the interests of members of group k .

Let's continue with an example.

We start from a collectivity in which the dependents do not count. In that case $\lambda_{4c} = 0$

$$\sum_k \lambda_{kc} = 1 \text{ and } \lambda_{3c} = 1 - \lambda_{1c} - \lambda_{2c}.$$

$$P_c(t) = P_1^{\lambda_{1c}}(t) P_2^{\lambda_{2c}}(t) P_3^{1 - \lambda_{1c} - \lambda_{2c}}(t)$$

Let's assume that

$$P_1(t) = [(1-\tau(t))w_1(t)]^{0.5} * [E_1(t)/E]^{0.5}$$

$$P_2(t) = [(1-\tau(t))w_2(t)]^{0.5} * [E_2(t)/E]^{0.5}$$

$$P_3(t) = [(1-\tau(t))w_3(t)]^1$$

with w_k real income.

The collectivity is restricted by the budget and the labour constraint.

The budget constraint :

$$\tau(w_1E_1 + w_2E_2 + w_3E_3) \geq w_1E_1$$

The labour constraint :

$$E_1 + E_2 + E_3 \leq E$$

The endogenous variables for the collectivity are τ and E_1 . So, the optimality problem consists of finding the best τ and E_1 , subject to the aforementioned restrictions.

There are of course some problems with this methodology.

First, people can belong to two or more social groups.

To solve this, dominant positions could be defined, or the positions could be fractionized. In both cases, a criterium is needed to classify the social positions.

For the sake of simplicity, we continue with single membership of social groups. Of course, there can be changes due to mobility and ideology or structural changes.

Another problem is that the process of decisionmaking covers different levels. To solve this, it is possible to work with so-called 'nested complex interest functions' and 'interest trees', but we do not go into this.

In the rest of this section a very simple politico-economic model is presented. The empirical results for Belgium are presented in the next section. The model is based on an article by Van Winden³⁴.

A first step is to define a macro-economic model.

$$Y = X_p + w_s E_s = C + I + G$$

The sum of private (X_p) and state production ($w_s E_s$) are used to satisfy private demand (C), private investment (I) and public demand (G).

$$C = c_1 (w_p E_p + w_s E_s) + c_2 (1-\tau) (X_p - w_p E_p) + C_a$$

$$\text{with } 0 < c_2 \leq c_1 < 1$$

Consumption depends firstly on the wage of state workers and private sector workers and secondly on the projects obtained in the private sector. There is also an autonomous component C_a .

$$I = I_a$$

The investments are assumed to be exogenous.

$$G = w_s E_s + G_m$$

The exhaustive government expenditures equal the material expenses added to the wages for the state sector workers.

³⁴ F. VAN WINDEN and B. VAN VELTHOVEN, Een eenvoudig politiek-economisch model, in *Statistische Berichten*, 1982, p. 1196-1206.

$$G_m = \gamma w_s E_s \quad \gamma > 0$$

The material expenses are proportional to wages.

$$E_p = X_p / \alpha_p \quad \alpha_p > w_p > 0$$

The number of private sector workers depends on the private product X_p and the productivity α_p .

$$T = \tau (X_p - w_p E_p)$$

Taxes are supposed to be paid only by the private sector.

A second step is to define the complex interest function of the state P_s .

$$P_s = P_1^{\lambda_1} * P_2^{\lambda_2} * P_3^{\lambda_3} * P_4^{\lambda_4}$$

with 1 : state workers
 2 : private sector workers
 3 : capital owners
 4 : unemployed

$$\begin{aligned} \text{with } \lambda_4 &= 0 \\ \lambda_k &\geq 0 \\ \sum \lambda_k &= 1 \end{aligned}$$

For each k :

$$P_k = w_k^{\varepsilon_{1k}} e_k^{\varepsilon_{2k}} x_{sk}^{\varepsilon_{3k}}$$

It is further assumed that

$$w_1 = w_s, \quad w_2 = w_p,$$

$$w_3 = (1-\tau)(X_p - w_p E_p) / E_s$$

$$x_{sk} = G = (1+\gamma)w_s E_s \quad k = 1, 2, 3$$

The third step is the maximization of the interest function under the budget restriction.

$$\text{Max } P_s = P_1^{\lambda_1} P_2^{\lambda_2} P_3^{\lambda_3}$$

$$\text{subject to } \theta G = T \quad (\theta > 0)$$

The interest function can be set to :

$$P_s = a E_s^{\delta_1} (1-\tau)^{\delta_2}$$

By solving the Lagrangian,

$$\mathcal{L} = a E_s^{\delta_1} (1-\tau)^{\delta_2} + \alpha(\theta G - T)$$

the decision variables can be calculated.

$$E_s = \frac{\tau(X_p - w_p E_p)}{\theta(1+\gamma)w_s}$$

and

$$\tau = \frac{\delta_1}{\delta_1 + \delta_2} \quad \text{or, } \tau = \delta$$

When the macro-relations are estimated, the most interesting parameters can be calculated.

At the end of this theoretical section, no general conclusion can be drawn.

In addition to the different theories mentioned, other versions are launched, but no dominating variant exists.

It is therefore useful to try out the different theories with real data, as is done in the next empirical section.

SECTION 2 : EMPIRICAL EVIDENCE

2.1. Election Functions

2.1.1. Literature

In 1977, a study for Belgium based on the political business cycle appeared (S. Boute and V. Ginsburgh).

The basic equation has the form :

$$V_t^i = b_0^i + b^i \delta_t^i M_t + e_t \quad (\text{f.13})$$

with V_t^i the fraction of votes of the
 election held at t for party i
 M_t a performance indicator
 $\delta_t^i = 1$ if party i is part of government
 during the legislation after
 election t-1
 = -1 if this is not the case

The interpretation is easy. If i has been governing during the period before the election at time t, the parameters b are positive for growth indicators, and negative for inflation and unemployment indicators.

The opposite signs are due when the opposite holds.

The main problem for the authors is the shortage of data. Therefore, they use partial quantities, this means that the data are aggregated per county, and not taken for Belgium as a whole.

Since there are nine counties, the number of additional data is important by working in this way.

The results are shown in the following tables.

Table 1 : Equations for the three parties

α	h	Party	C	LANG	PRIM	SECD	CLIB	R^2_{adj}
1			+45.22 (7.45)*	-9.32 (1.21)	+ .62 (.15)	-.23 (.16)	-8.26 (1.18)	.712
2	CATH		+46.29 (7.73)*	-9.27 (1.22)	+ .59 (.15)	-.25 (.16)	-8.50 (1.16)	.713
L			+47.31 (8.20)*	-9.22 (1.26)	+ .56 (.16)	-.27 (.17)	-8.82 (1.17)	.711
1			+11.79 (5.85)*	+6.75 (.90)	-.02 (.12)	+.68 (.12)	-11.13 (.98)	.766
2	SOC		+12.16 (6.12)*	+6.64 (.92)	-.01 (.12)	+.67 (.13)	-10.96 (1.00)	.760
L			+11.49 (6.43)*	+6.55 (.94)	+.002 (.13)	+.69 (.14)	-10.81 (.98)	.764
1			+21.02 (6.44)*	+2.15 (.91)	-.04 (.13)	-.24 (.14)	+8.37 (1.30)	.511
2	LIB		+21.70 (6.57)*	+2.16 (.91)	-.06 (.13)	-.26 (.14)	+8.36 (1.28)	.517
L			+20.84 (6.76)*	+2.21 (.91)	-.04 (.13)	-.24 (.15)	+8.32 (1.27)	.510

CATH : the catholic party

SOC : the socialist party

LIB : the liberal party

C : the constant

LANG : a language dummy with the value 1 for frenchspeaking countries

PRIM : the gross product of the primary sector

SEC : the gross product of the secondary sector

CLIB : dummy to capture the reorganisation of the liberal party

Source : Boute and Ginsburgh, o.c.

The horizon (= h) measures the memory of the voters.

For $h = 1$, only the data of the last disposable year are taken into account.

For $h = 2$, the variables of the last two years are recalculated to mean values.

For $h = L$, all disposable values of the previous legislation are used.

The regression results suggest that there aren't nearly any differences with a varying time horizon. Only the constant term has a significant coefficient. The exogenous variables don't have convincing explicative power. The language dummy and the reorganisation of the liberal party have the expected sign : the socialists have more votes in the frenchspeaking part of Belgium and the reorganisation of the liberals raised the support for them, at the expense of the support for the other parties.

The authors investigated the relation for the Catholic party more deeply. Their estimation results are partly given in table 2.

As can be seen, only few of the additional explicative variables are significant. This suggests that the relation is not accurately defined.

Table 2 : Equations for the Catholic Party

h	C	LANG	PRIM	SECD	PRICE	UNEMPL	GCATH	GSOC	GLIB	PIBR	CLIB	R ² _{adj}
1	+38.95 (8.73)*	-10.11 (1.25)	+85 (.16)	-.42 (.19)				+3.34 (1.54)	+4.66 (1.53)			0.82
	+47.08 (8.21)*	-10.09 (1.18)	+77 (.16)	-.43 (.17)		-.22 (.08)						0.83
	+56.21 (8.57)	-8.93 (1.31)	+49 (.16)	-.46 (.17)	-1.62 (.40)		-8.42 (2.41)*			+70 (.22)		0.75
2	+40.31 (8.94)*	-10.05 (1.27)	+81 (.17)	-.47 (.19)				+3.63 (1.54)	+5.07 (1.53)			0.83
	+44.25 (8.15)*	-9.29 (1.27)	+52 (.16)	-.35 (.17)	-1.19 (.21)			+2.72 (1.16)	+3.40 (1.17)			0.69
	+47.88 (8.56)*	-10.03 (1.21)	+75 (.17)	-.46 (.18)		-.21 (.08)						0.83
L	+55.98 (8.08)*	-9.14 (1.25)	+50 (.15)	-.37 (.17)						+36 (.16)	-8.34 (1.40)	0.71
	+42.74 (8.02)*	-8.80 (1.35)	+43 (.16)	-.43 (.17)	-2.76 (.46)							0.72
								+3.91 (.99)	+7.53 (1.18)	+84 (.24)		0.72

PRICE price level
 UNEMPL number of unemployed
 GCATH dummy to catch the influence of belonging to the government (expected sign :
 (GSOC, GLIB) - for the party itself, + for the other parties) during the previous legislation
 PIBR growth of the regional product

Source : Boute and Ginsburgh

The authors tried to incorporate the following Belgian characteristics :

- dutch and frenchspeaking regions (language dummy)
- a multipartysystem (estimations for the three largest parties)
- unregular timing of the elections (particular definition of M_t)
- shortage of data (data per county - cross section - and over time-timeseries -).

This implies the use of pooling models. The technical details of this methodology won't be treated.

The overview of the different methods on the next page is given to situate my estimations done for the period 1953-1985

The scheme starts from the most general model :

$$Y_{it} = B_{1it} + \sum_{k=2}^K B_{kit} x_{kit} + e_{it} \quad (\text{f.14})$$

with $i = 1, \dots, N$ referring to a cross-sectional unit

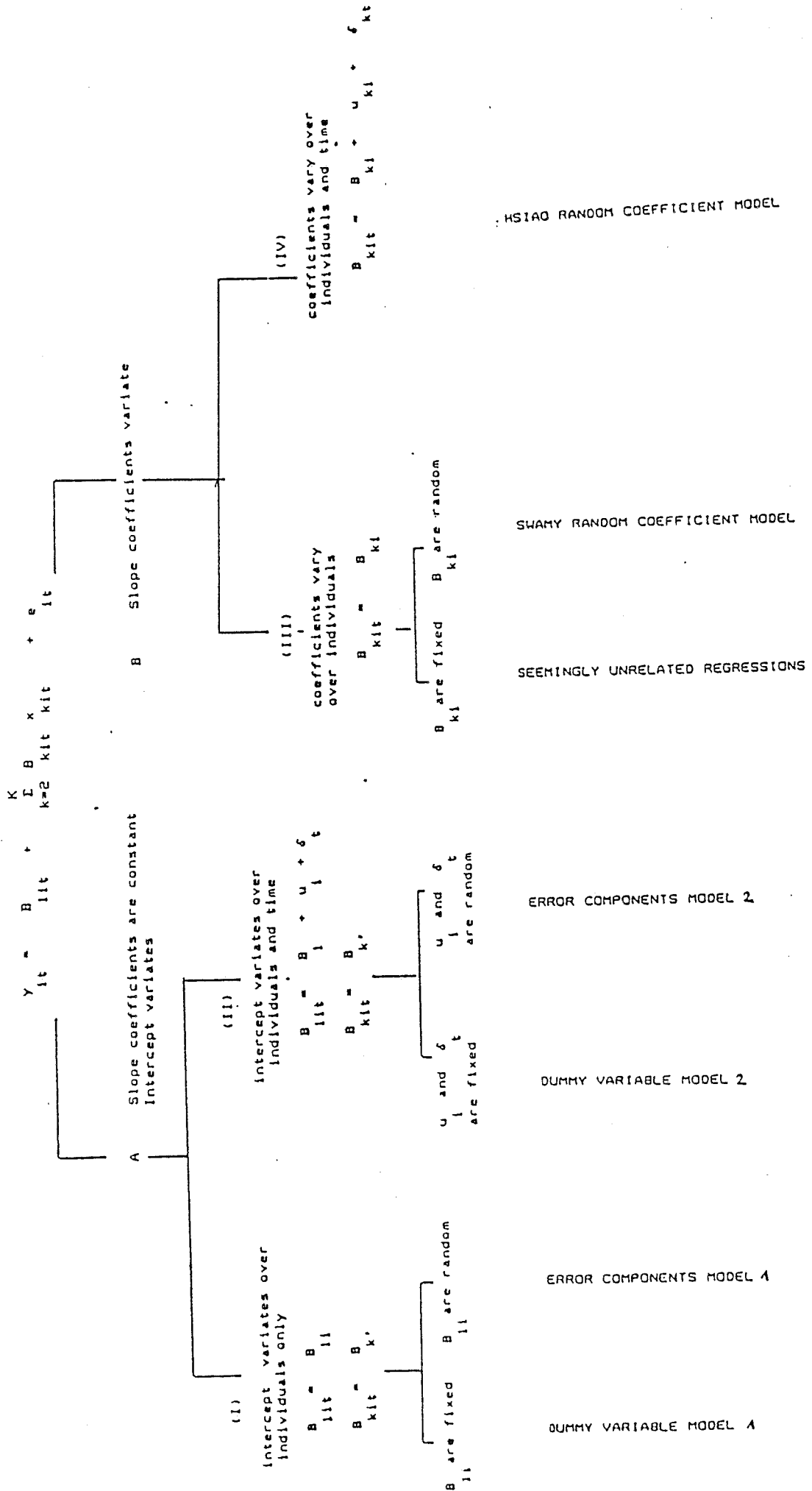
$t = 1, \dots, T$ referring to a given time period

e_{it} stochastic term

$$\text{with } E [e_{it}] = 0$$

$$E [e_{it}^2] = \sigma_e^2$$

The scheme breaks up into two important branches. The character of the slope coefficients separates between them.



In the first branch (A), it is assumed that all the coefficients of quantitative variables (slopes) are the same, whereas the coefficients of the qualitative variables (intercepts) vary over units (I), or over units and periods (II).

The second branch (B) contains models in which all the coefficients vary over units (III) or over units and periods (IV).

The further differentiation is similar for the different cases : the coefficients can be fixed or random. Concerning this last characteristic, the suggestions of Mundlak are very important³⁵.

When constructing a model, it is not always clear what kind of coefficients (fixed or random) are suitable for the relation investigated.

In the dummy variable model, the u_i 's - from e.g. $B_{1i} = B_1 + u_i$ - are specific for the given sample. This also means that the statistical inference is conditional upon the given sample.

In the Error Components Model on the other hand, it is assumed that the u_i are drawn out of the same probability distribution.

If the restrictive distributional assumption is correct and used in the estimation procedure, this estimator is more efficient. If the randomness of the u_i cannot be modeled, the dummy variable model is to be used.

2.1.2. Own Estimations

For the estimations, only two independent variables are used. One of the reasons is that the program developed for the estimations is already rather CPU-time consuming. Furthermore, to include additional variables, many adapt-

35 JUDGE G.G., e.a., Introduction to the Theory and Practice of Econometrics, New York, John Wiley, 1982, 839 p.

ations have to be made. The results are presented in the next tables. They only have an indicative value.

The general tendency is that there are significant differences between the nine counties, as indicated by the F- and λ_2 statistics.

The signs of the explicative variables differ per party. For the Catholics, the influence of inflation and unemployment is negative, whereas for the Liberals the opposite is true. For the Socialists, the case is mixed.

Table 4 : Results for Dummy1, Errorcomp1, Dummy2,
Errorcomp2

relation	R ² adj	D.W.	coefficients	
			INFL	WERKL
<u>A. CVP</u>				
Dummy1	0.34	1.05	-0.0098 (-5.72)*	-0.0081 (-3.02)*
Errorcomp1	0.32	0.99	-0.0098 (-5.50)*	-0.0081 (-2.91)*
Dummy2	-0.01	0.78	0.00089 (0.104)	0.00021 (0.064)
Errorcomp2	0.31	1.03	-0.0095 (-5.38)*	-0.0077 (-2.85)*
<u>B. SOC</u>				
Dummy1	0.18	1.28	-0.0068 (-4.72)*	0.0013 (0.58)
Errorcomp1	0.15	0.98	-0.0069 (-4.52)*	0.0014 (0.61)
Dummy2	0.076	1.20	-0.018 (-1.52)	0.012 (2.72)*
Errorcomp2	0.13	0.99	-0.0064 (-4.09)*	0.0016 (0.69)
<u>C. LIB</u>				
Dummy1	0.13	0.98	0.0018 (1.67)	0.0055 (3.15)*
Errorcomp1	0.09	0.85	0.0019 (1.63)	0.0048 (2.56)*
Dummy2	-0.006	0.75	0.0029 (0.98)	-0.0013 (-0.06)
Errorcomp2	0.11	0.97	0.0020 (1.66)	0.0052 (2.91)*

The F-statistic has [(N-1), (NT-N-K')] degrees of freedom, with
N = 9, T = 11 and K' = 2.

The hypothesis tested is : $H_0 : B_{11} = B_{12} = \dots = B_{19}$
 $H_1 : \text{the } B_{ij} \text{ are not equal}$

F(8,90), for $\alpha = 0.05$, is equal to 2.043

The $\lambda(1)$ tests $H_0 : u_i = 0$, or $\sigma_u^2 = 0$, for Errorcomp1
and $\lambda(2)$ tests $H_0 : u_i = 1_t = 0$, for Errorcomp2

CVP	SOC	LIB	test
29.206	24.71	8.49	F_1
241.83	212.032	61.50	$\lambda (1)$
138.51	39.78	33.47	F_2
71.019	67.065	40.22	$\lambda (2)$

2.2. Popularity functions

2.2.1. Literature

F. Naert published in 1987 a study about the Belgian situation.³⁶ He also starts from the function as given by Boute and Ginsburgh

$$V_{it} = b_o^i + b^i \delta_t^i M_t$$

$$\text{with } M_t = \sum_{j=0}^t a_{t-j} \varepsilon_{t-j}$$

a_{t-j} weighing of ε_{t-j} at time t

ε_{t-j} measure of the economic performance at $t-j$

$\delta_t^i = 1$ if party i is member of the government
at time t

$= -1$ if party i did not belong to the
government at time t .

The time series cover the period 1967-1984. This is possible because the author combines poll results with election results.

³⁶ F. NAERT, 'Proeve van een evaluatiefunctie voor België', in Cahiers Economiques de Bruxelles, vol. 115, 1987, p. 129-150.

He recalculates the 'vote' results by equalling the sum of the vote percentages of the catholics, the socialists and the liberals to 100 %.

He starts from the three government tasks defined by Musgrave. The stabilization efforts are indicated by real income per capita, inflation and unemployment. The allocation policy depends on the government expenditures, taxes and the deficit or surplus of the government budget. Redistribution is represented by the difference median-mean income.

His results are given in table 5.

(period 67-84, 18 observations)

Personally, I think that election outcomes and poll results are neither perfectly tailored to each other, nor appropriately tuned to be combined in a 'homogeneous' data series.

There is a difference between the vote intentions and the actual voting, as has been indicated in the first section. Positive is of course that the yearly character of the series also permits to incorporate variables which are only available on a yearly basis. Monthly series are seasonally influenced. Furthermore, for some interesting variables, no monthly indicators are calculated.

Table 5 : Evaluation function for Belgium

DEP	C	YPC	RVPC	PRICE	INFL	WERK1	RWERK1	ER	BP	TAX	EXP	DEF	YMEDMEA	PART	R _C ²	DW
1	CATH	-33.0 (-0.93)	0.8 (1.57)	0.2 (0.73)	2.1 (1.72)	0.04*	0.04*	2.0*	1.0*	0.04	0.0	-1.5*	1.0*	-64.5*	0.63	1.4
2	CATH	-40.0* (-2.97)	-0.2* (-1.81)	-0.1 (-1.20)	-1.2* (-1.97)	2.0* (2.62)	0.04*	2.0*	-1.4* (-2.20)	0.04 (1.45)	0.0	(-4.76)	(2.20)	(-2.55)	0.81	3.4
3	CATH	-32.4* (-1.97)	-0.1 (-1.15)	-0.2 (-1.65)	-1.3* (-2.03)	2.0* (2.58)	0.05*	0.5	0.2 (1.31)	0.2 (1.31)	0.2	(-0.44)	(-0.002)	(-2.43)	0.83	2.5
4	CATH	59.7* (4.09)	-0.009 (-0.05)	1.8* (2.29)	1.8* (2.65)	2.8* (3.13)	0.05*	0.7*	-0.9 (-1.57)	-0.7 (-0.70)	0.0	(-0.28)	(1.69)	(-2.32)	0.40	1.1
5	CATH	49.3* (5.60)	-0.1 (-1.51)	1.8* (2.65)	1.8* (2.65)	2.8* (3.13)	0.05*	0.5	-2.8* (-2.37)	-0.7 (-0.70)	0.0	(-0.09)	(1.69)	(-2.32)	0.43	1.3
6	CATH	11.9* (2.14)	0.007 (0.72)	-0.3** (-2.62)	2.0* (2.62)	2.0* (2.58)	0.04*	2.0*	-1.8 (-1.42)	0.04 (1.45)	0.0	(-0.69)	(2.98)	(-2.55)	0.53	2.0
7	LIB	10.6* (1.92)	0.007 (0.74)	-0.3** (-2.56)	2.0* (2.58)	2.0* (2.58)	0.05*	0.5	0.2 (1.31)	0.2 (1.31)	0.2	(-0.7)	(2.82)	(-2.43)	0.51	1.9
8	LIB	8.9 (1.61)	0.008 (0.85)	-0.4*** (-2.91)	2.8* (3.13)	2.8* (3.13)	0.05*	0.7*	-0.7 (-1.42)	-0.7 (-1.42)	-0.7	(-1.42)	(2.92)	(-2.32)	0.53	2.1
9	LIB	51.4* (3.73)	-0.6 (-1.72)	-1.3* (-3.53)	-1.3* (-3.53)	-1.3* (-3.53)	0.04*	2.0*	2.0* (2.28)	1.0* (2.56)	2.0*	(-1.84)	(-0.68)	(-0.68)	0.60	2.2
10	SOC	33.2* (7.27)	-0.0004 (-1.72)	-0.1 (-0.68)	0.6 (1.69)	0.6 (1.69)	0.05*	0.5	0.5 (1.38)	-0.04 (-0.34)	-0.2	(-1.43)	(1.62)	(1.62)	0.50	1.9
11	SOC	34.1* (3.19)	-0.0004* (-1.96)	-0.2 (-1.26)	0.5 (1.41)	0.5 (1.41)	0.05*	0.7*	0.7* (2.47)	0.7 (1.29)	0.7	(-0.5**)	(2.15)	(2.15)	0.57	2.5
12	SOC	34.5* (27.9)	-0.0004 (-1.75)	0.02 (0.98)	0.7 (1.73)	0.7 (1.73)	0.05*	0.5	0.5 (1.63)	0.7 (1.29)	0.7	(-0.02)	(-1.57)	(1.63)	0.50	1.9
13	SOC	28.4* (8.72)	-0.05* (-1.73)	-0.00003* (-2.34)	-0.00003* (-2.34)	-0.00003* (-2.34)	0.05*	0.5*	0.5* (1.41)	0.8 (1.35)	0.8	(-0.23)	(-1.57)	(1.63)	0.60	2.3

Source : F. Naert, o.c.

Equations 1, 6, 7, 8, 10, 11, 12 short time horizon
Equations 2, 3, 4, 5, 9 and 13 larger time horizon

DEP popularity level of the three most important parties
(CATH + LIB + SOC) = 100 %

C constant term

YPC real income per capita

RVPC variation of YPC (in %)

PRICE index of the consumer prices

INFL variation of PRICE

WERK1 ratio of the fully unemployed to the active population
with an unemployment insurance.

RWERK1 difference between WERK1 and WERK1-1

ER exchange rate of the BEF

BP balance of payments

TAX tax revenue (in % of GNP)

EXP governmental expenses (in % of GNP)

DEF public deficit (in % of GNP)

YMEDMEA ratio of the median income to the mean

PART participation in the coalition

* significant at 5 %

2.2.2. Own Estimations

My estimations are based on monthly series of the popularity, unemployment and inflation or price level. The voters' memory is measured by working with lags for inflation and unemployment.

Some dummies are tried out to incorporate the extra-economic influences, as indicated in table 6. COA and DPOL represent the government coalition and DEP measures the length of time since the last election. For coalition partners, a positive sign for this variable means that there is no depreciation of popularity, a negative sign means the opposite.

Table 6 : Data for the popularity functions

Name	Definition and Source
POPCATH POPSOC POPLIB	Popularity measured by polls, held by Dimarso. The series cover the period 1977-1985, but they are not complete.
INFL INFL(-3) INFL(-6)	Rate of change of the national consumer prices, also lagged for three or six months. Statistische Studiën
WERKL WERKL(-3) WERKL(-6)	Rate of unemployment at the end of the month, also lagged for three or six months. Statistische Studiën
PRIJSPEIL	Price level per month Statische Studiën
DPOL	Political dummy, 1 for a government with socialists, 0 for a government without socialists
COA	Calculated series to represent the coalition (values : 1 for the Liberals, 2 for the Catholics and 3 for the Socialists)
DEP	Series measuring the time (in number of months), since the last elections

The next tables present results for different combinations of the explanatory variables, for each of the three largest Belgian parties.

Table 7 summarises the results for the whole estimation period. In table 8, the period is divided in the centre-left (1978-1981) and the centre-right (1982-1985) legislation. The relations turn out to be fairly unstable.

Table 7 : Popularity function for Belgium

Dep	C	WERKL	INFL	POPY(-1)	DEP	DPOL	COA	R ² adj	D.W.
POPCATH	21.79	-0.65	-0.53	0.47				0.74	2.06
	(4.38)*	(-3.70)*	(-0.81)	(0.47)					
	41.35	-1.19	-0.61		-0.032			0.67	1.17
	(33.07)*	(-9.98)*	(-0.83)		(-1.35)				
POPCATH	22.86	-0.65	-0.49	0.46	-0.012			0.74	2.00
	(4.39)*	(-3.64)*	(-0.74)	(3.84)*	(-0.58)				
POPCATH	15.82	-0.31	-0.53	0.40			2.30	0.74	1.99
	(2.51)*	(-1.08)	(-0.81)	(3.28)*			(1.51)		
POPSOC	4.031	0.47	-0.53	0.091				0.85	1.98
	(2.74)*	(3.30)*	(-0.85)	(7.26)*					
	12.48	1.26	-1.96		0.041			0.74	0.83
	(10.38)*	(10.95)*	(-2.77)*		(1.88)				
POPSOC	4.40	0.44	-0.60	0.64	0.024			0.85	2.35
	(2.97)*	(3.14)*	(-1.07)	(7.02)*	(1.40)				
POPSOC	2.81	0.53	-0.47	0.65			0.32	0.85	2.39
	(0.61)	(1.97)*	(-0.84)	(7.13)*			(0.28)		
POPLIB	3.90	0.34	-1.07	0.60				0.66	1.80
	(2.70)*	(2.68)*	(-1.65)	(6.26)*					
	9.70	0.99	-1.011		-0.10			0.53	0.77
	(7.42)*	(7.94)*	(-1.31)		(-4.15)*				
POPLIB	4.67	-0.57	-0.89	0.48	-0.065			0.70	1.89
	(3.40)*	(-4.06)*	(-1.46)	(4.91)*	(-3.05)*				
POPLIB	21.86	-0.71	-1.03	0.35			-6.5	0.74	1.66
	(4.84)*	(-2.56)*	(-1.80)	(3.45)*			(-4.14)*		
Dep	C	WERKL	INFL	WERKL(-3)	POPCATH ₋₁	DPOL	COA	R ² adj	D.W.
POPCATH	28.41	-0.081	-1.51	-0.27		5.56		0.74	1.30
	(6.94)*	(-0.22)	(-1.5)	(-0.79)		(3.51)*			
	28.28	-0.11	-1.03	-0.50			3.55	0.71	1.30
POPCATH	(4.53)*	(-0.28)	(-1.39)	(-1.42)			(2.27)*		
	17.54	0.15	-0.82	-0.2	0.34	4.09		0.76	1.93
POPCATH	(3.25)*	(0.44)	(-1.24)	(-0.6)	(2.93)*	(2.58)*			
	POPSOC	5.14	0.99	-1.24	0.92		2.62		0.76
(1.19)		(2.56)*	(-1.70)	(2.51)*		(1.57)			
2.77		0.97	-1.19	0.85			2.36	0.75	0.92
POPSOC	(0.44)	(2.49)*	(-1.62)	(2.39)*			(1.44)		
	-0.157	1.01	-1.13	0.96	0.96	1.85		0.75	0.90
POPSOC	(-0.02)	(2.58)*	(-1.53)	(2.62)*	(1.32)*	(1.05)			
	POPLIB	36.25	-0.83	-1.46	-0.48		-10.86		0.66
(8.96)*		(-2.28)*	(-2.12)*	(-1.39)		(-6.81)*			
40.38		-0.58	-1.56	-0.10			-7.82	0.56	0.91
POPLIB	(6.03)*	(-1.40)	(-1.97)*	(-0.26)			(-4.65)*		
	39.51	-0.74	-1.54	-0.54	-0.13	-9.90		0.70	1.06
POPLIB	(7.39)	(2.14)*	(-2.36)*	(-1.65)	(-1.16)	(-1.65)			

t-values between brackets

Table 8 : Two periods

period 1 : 1978-1981

dep	C	INFL	WERKL	DEP	R ² adj	D.W.
POPCATH	43.93 (20.0)*	0.021 (0.018)	-1.64 (-6.44)*	0.026 (0.46)	0.60	1.45
POPSOC	17.33 (11.6)*	0.51 (0.16)	0.65 (3.90)*	-0.064 (-2.21)*	0.59	2.50
POPLIB	10.75 (2.84)*	-3.24 (-2.96)*	0.75 (1.50)	0.37 (1.98)*	0.59	1.19

period 2 : 1982-1985

dep	C	INFL	WERKL	DEP	R ² adj	D.W.
POPCATH	14.63 (2.70)*	-0.53 (-0.62)	1.031 (2.39)*	-0.11 (-5.54)*	0.53	0.93
POPSOC	singularity of the data					
POPLIB	27.21 (4.5)*	0.72 (0.75)	-0.49 (-0.97)	-0.082 (-3.62)*	0.44	1.09

participation depreciation

PART = DEP * DPOL : SOCIALISTS
 PART = DEP * (1-DPOL) : LIBERALS
 PART = DEP : CATHOLICS

dep	C	INFL	WERKL	PART	R ² adj	D.W.
POPCATH	41.35 (33.07)*	-0.61 (-0.83)	-1.19 (-9.98)*	-0.032 (-1.35)	0.67	1.17
POPSOC	13.22 (7.06)*	-1.73 (-2.35)*	1.26 (7.91)*	-0.028 (-0.60)	0.72	0.82
POPLIB	5.79 (3.56)*	-1.27 (-1.69)	1.32 (7.76)*	-0.10 (-3.79)*	0.55	0.86

t-values between brackets

From a comparison between the results for our election and popularity functions, different conclusions can be drawn.

1) The catholic Party is negatively influenced by inflation and unemployment. This tendency is quite stable for the different variants and periods, except for the coalition-specific relations (table 8).

2) The socialist Party is mainly negatively influenced by inflation and positively by unemployment, for both the election results and the popularity polls.

3) For the liberal party, the case is mixed. The election results are positively related to inflation and unemployment, the popularity levels are negatively correlated with the inflation. Unemployment has an unstable influence on the popularity levels.

A quick comparative look at the previous empirical results for Belgium is rather difficult. The most important conclusion is twofold :

- 1) Boute and Ginsburgh estimated the same negative sign for unemployment and inflation for the Catholic Party.
- 2) The method of Naert is too different to draw sensible comparisons.

2.3. A simple macro-economic framework

2.3.1. Estimations

As indicated in the theoretical section, there are three important steps in the method developed by van Winden and van Velthoven :

1. specification of the macro-economic relations;
2. identification of the state interest function;
3. solution of the maximization problem.

The government decides on E_s , the number of state workers and on τ , the tax parameter, while taking the different interest groups into account.

The solution of the maximization problem leads to the derivation of parameters which are interesting to interpret.

To repeat shortly :

1. equations

$$C = c_1 (w_p E_p + w_s E_s) + c_2 (1-\tau) (X_p - w_p E_p) + c_m$$

$$I = I_m$$

$$G = (1 + \gamma) w_s E_s$$

$$E_p = X_p / a_p$$

$$T = \tau (X_p - w_p E_p)$$

$$\text{BNP} = X_p + w_s E_s = C + I + G$$

2. state interest function

$$P_s = P_1^{\lambda_1} P_2^{\lambda_2} P_3^{\lambda_3} P_4^{\lambda_4}$$

3. maximization problem

$$\max P_s = P_1^{\lambda_1} P_2^{\lambda_2} P_3^{\lambda_3}, \lambda_4 = 0$$

$$\text{subject to} \quad \theta G = T$$

The solution of the problem leads to the following relations of the decision variables :

$$E_s = \tau (X_p - w_p E_p) / \theta (1 + \gamma) w_s$$

and

$$\tau = \frac{\delta_1}{\delta_1 + \delta_2} = \delta, \text{ from the simplified maximization problem.}$$

The complete formula gives :

$$\delta = \frac{\delta_1}{\delta_1 + \delta_2} = \frac{(\varepsilon_{12} + \varepsilon_{13})\lambda_1 + \varepsilon_{23}\lambda_2 + \varepsilon_{33}\lambda_3}{(\varepsilon_{12} + \varepsilon_{13})\lambda_1 + \varepsilon_{23}\lambda_2 + (\varepsilon_{31} + \varepsilon_{33})\lambda_3}$$

- ε_{i1} : subjective value of group i for their wage
 ε_{i2} : subjective value of group i for their number
 ε_{i3} : subjective value of group i for the
 available public goods.

There are more unknown parameters than relations, so they are not uniquely determined. Additional information has to be included. The estimations done for Belgium, cover the period 1953-1980. There are two versions : the model as presented above, and a model with a dummy to incorporate the influence of the different political parties.

In table 9 the variables are defined. Table 10 presents the results of the version, as described above.

Table 9 : Definition and source of the variables

NAME	VARIABLE DEFINITION AND SOURCE
BNPD	Deflated GNP
OSD	Deflated non-wage income of the economy
CD	Deflated private consumption
GD	Deflated government consumption
BKAPD	Deflated gross capital formation
EXPD	Deflated exports
IMPD	Deflated imports
	Nationaal Statistisch Jaarboek
Es	Number of people, employed in the state sector
Ep	Number of people, employed in the private sector
Ez	Number of selfemployed
	Nationaal Statistisch Jaarboek
Td	Deflated tax income
	Documentatieblad van Financiën
DEPD	Deflated depreciation
LOONDT	Deflated wage income in the whole economic sector
LOONDS	Deflated wage income of the state sector
INDSD	Deflated indirect taxes
	Nationale Rekeningen
RES	Reserves
DIV	Dividends
TANT	Tantiemes
WINST	RES + DIV + TANT
WINSTD	Deflated profit
KAPD	Capital stock, deflated
	$KAPD(-1) - DEP + BKAPD$
DUMMYP	Political dummy to represent the coalition, weighed with LIB:+ 1, CATH:+ 2, SOC:+ 3
DSOC	Dummy with value 1 when the Socialists participate in the government
Xp	$BNPD - LOONDS$
HULP	$BNPD - LOONDT$
DCRIS	Dummy with value 1 for $t \geq 1973$

The series are deflated to work with real quantities. This has not prevented all the possible problems, since the model has still some deficiencies.

Table 10 : Results for the van Winden model

period 1954-1980, FINL, convergence after 12 iterations

$CD = c_1 \text{ LOONDT} + c_2 (1 - \tau) \text{ HULP} + c_a$
 $GD = (1 + \gamma) \text{ LOONDS}$
 $Ep = Xp/a_p$
 $Es = \tau (Xp - \text{LOONDP}) / (\tau + \gamma) \text{ ws}$
 $Td = \tau \text{ HULP}$
 $\text{BNPD} = GD + CD + \text{BKAPD} + \text{EXPD} - \text{IMPD}$

	SSR	DW	t-values
CD	28 933	0.11	28.86
GD	12 663	0.052	9.04
Ep	12 944 300	0.29	48.84
Es	838 577	0.038	11.47
Td	184 031	0.0339	32.81
BNPD	1 086	0.26	9.06
c_1	estimation 0.57		t-values 1.83
c_2	0.78		
tau	0.47		
c_a	148.74		
gamma	0.36		
a_p	0.60		
teta	1.83		

period 1954-1980, FIML, convergence after 16 iterations

$CD = c_1 \text{ LOONDT} + c_2 (1 - \tau) \text{ HULP} + c_a$
 $GD = (1 + \gamma) \text{ LOONDS}$
 $Ep = Xp/a_p$
 $Es = \tau (Xp - \text{LOONDP}) / (\tau + \gamma) \text{ ws}$
 $Td = \tau \text{ HULP}$
 $\text{BNPD} = GD + CD + \text{BKAPD} + \text{EXPD} - \text{IMPD}$

	SSR	DW	t-values
CD	8 526.9	0.44	35.75
GD	13 796.8	0.04	4.46
Ep	17 650 900	0.018	33.91
Es	121 236	0.13	15.76
Td	185 489	0.033	24.38
BNPD	1 086	0.26	29.41
c_1	estimation 0.74		t-values 1.69
c_2	0.35		
tau	0.47		
c_a	174.79		
gamma	0.37		
a_p	0.36		
teta	1.69		

1. The D.W. statistics are very low and suggest serious autocorrelation.

2. For some equations, the fitted values differ widely from the observed series, e.g. E_p , E_s and T .

The specified relations are clearly not accurate to simulate the real processes that determine the number of private workers, of state workers and the tax level.

The interpretation of the problem is as follows :

- Parameter γ couples the material government expenditures to the government wage expenditures
- a_p is a productivity measure
- θ indicates the way in which the government expenditures are financed by tax income.

Given the quality (or rather the deficiencies of the results), it is not convenient to derive power indices from this variant.

Another version is tried out, with a political dummy to account for the participation of the socialists in the government. The construction of the model permits to identify policy differences between centre-left and centre-right governments, with respect to G , T and E_s or $LOONs$. The results are presented in table 11.

Table 11 : The model of Klein

Model of Klein, with a socialist dummy		Model of Klein, with a crisis dummy			
period 1954-1980, FIHL, failure to improve after 15 iterations		period 1954-1980, FIHL, convergence achieved after 10 iterations			
$CD = c_1 \text{ LOONDT} + c_2 (1 - \tau_1) \text{ HULP DSOC} + c_2 (1 - \tau_2) \text{ HULP (1-DSOC)} + c_a$ $GD = (1 + \gamma_1) \text{ LOONDS DSOC} + (1 + \gamma_2) \text{ LOONDS (1-DSOC)}$ $\text{BKAPD} = \text{inv}_a + \text{inv}_2 \text{ WINSTD}(-1) + \text{inv}_3 \text{ KAPD}(-1)$ $\text{LOONDS} = l_a + l_1 \text{ HULP}(-1) \text{ DSOC} + l_2 \text{ HULP}(-1) \text{ (1-DSOC)}$ $\text{LOONDP} = P_a + P_2 \text{ Xp}(-1)$ $\text{Td} = \tau_1 \text{ HULP DSOC} + \tau_2 \text{ HULP (1-DSOC)}$		$CD = c_1 \text{ LOONDT} + c_2 (1 - \tau_1) \text{ HULP DCRIS} + c_2 (1 - \tau_2) \text{ HULP (1-DCRIS)} + c_a$ $GD = (1 + \gamma_1) \text{ LOONDS DCRIS} + (1 + \gamma_2) \text{ LOONDS (1-DCRIS)}$ $\text{BKAPD} = \text{inv}_a + \text{inv}_2 \text{ WINSTD}(-1) + \text{inv}_3 \text{ KAPD}(-1)$ $\text{LOONDS} = l_a + l_1 \text{ HULP}(-1) \text{ DCRIS} + l_2 \text{ HULP}(-1) \text{ (1-DCRIS)}$ $\text{LOONDP} = P_a + P_2 \text{ Xp}(-1)$ $\text{Td} = \tau_1 \text{ HULP DCRIS} + \tau_2 \text{ HULP (1-DCRIS)}$			
CD	SSR	DW	SSR	DW	
CD	17 045	0.15	CD	3 210	
GD	10 296	0.06	GD	2 518	
BKAPD	22 409	0.62	BKAPD	25 273	
LOONDS	40143	0.04	LOONDS	10 100	
LOONP	40 984	0.23	LOONDP	7 597	
Td	157 797	0.04	Td	43 245	
	estimation	t-value		estimation	t-value
c_1	0.71	14.98	c_1	0.90	25.2
c_2	0.49	1.96	c_2	-0.015	-0.61
τ_1	0.54	18.78	τ_1	0.66	39.51
τ_2	0.56	24.15	τ_2	0.45	4.75
c_a	187	5.91	c_a	189	8.68
γ_1	0.29	5.90	γ_1	0.17	14.0
γ_2	0.25	13.58	γ_2	0.41	6.06
l_a	28.45	3.39	l_a	15.34	0.77
l_1	0.19	8.57	l_1	0.27	10.19
l_2	0.20	11.08	l_2	0.17	3.76
P_a	-2.48	-0.093	P_a	-150.84	-2.12
P_2	0.49	25.43	P_2	0.62	12.1
inv_a	110.73	3.39	inv_a	44.39	1.15
inv_2	2.028	2.25	inv_2	2.93	2.91
inv_3	0.074	5.43	inv_3	0.098	4.31

As can be seen in the coefficients, the parameters do not differ much : the largest difference is between γ_1 and γ_2 (0.29 versus : 0.25). The interpretation is that in years with socialists in the coalition, the material expenditures depassed slightly higher the state wage sum than in years with liberal participation.

Compared to the previous model, the SSR are lower, so the approximation of the observed series is better. The tax parameter does not differ between the two political regimes, neither does the state wage parameter l1 (and l2). The D.W. statistics are again very low.

As an alternative, a dummy for the crisis years is used. (For $t < 1973$, DCRIS = 0, for $t \geq 1973$, DCRIS = 1)

The results are found in table 11. This model is based on the model of Klein. The SSR are lower and become acceptable, except for BKAPD and TD. The D.W. statistics become better and the coefficients for the crisis and non-crisis years differ indeed.

1. government expenditures

	γ
crisis year	0.17
non crisis year	0.41

In crisis years, the material expenditures are lower. This can indicate that the expenditures are cut back on.

2. tax parameter

	τ
crisis year	0.66
non crisis year	0.45

In crisis years, more taxes are financed by business.

3. state workers wage total

	1
crisis year	0.27
non crisis year	0.17

In crisis years, a large part of the operating surplus of the economy is used to finance the state workers wages.

The results are still not very satisfactory. Therefore, the power indices are calculated in a simulation model, as indicated in the next paragraph.

2.3.2. Simulations

The time series do not present convincing estimations to derive power indices. In this paragraph, another method is used to calculate the parameters which permit to analyse the power structure in the belgian socio-economic structure.

The parameters are directly derived from the observed series. The series are presented in table 12. This time, the data are not deflated, since the calculations are repeated each year.

The equations behind the simulations are those from the original van Winden model. The simulated parameters are summarised in table 13.

Table 12 : Data and sources for the simulations

NAME	VARIABLE DEFINITION AND SOURCE
BNP	Gross national product
Xp	Gross national product in the private sector $X_p = \text{BNP} - \text{LOONS}$
LOONS	$w_s E_s$
C	Private consumption
G	Public consumption
LOONP	$w_p E_p$
TAX1	Corporate taxes
TAX2	Wealth taxes
TAX3	Indirect taxes
TAX4	Subsidies
TAX	$\text{TAX1} + \text{TAX2} + \text{TAX3} - \text{TAX4}$
I _c	Gross domestic investments, corrected for exports and imports
G _m	Material government expenditures $G_m = G - \text{LOONS}$ Nationale rekeningen

Table 13 : Simulations of the parameters

year	a _p	w _p	w _s	teta	gamma	tau
68	0.415056	0.170865	0.187917	1.056868	0.180739	0.412703
69	0.447069	0.184510	0.201779	1.057970	0.207648	0.406593
70	0.486336	0.206897	0.208883	1.098064	0.259320	0.406684
71	0.517742	0.231214	0.234482	1.019486	0.259992	0.411073
72	0.575950	0.260044	0.271234	0.909635	0.230270	0.395491
73	0.641865	0.295848	0.297115	0.900405	0.230422	0.390299
74	0.737149	0.349170	0.348880	0.915685	0.222810	0.394917
75	0.815272	0.412866	0.422557	0.793264	0.239422	0.428357
76	0.944696	0.471060	0.469807	0.787578	0.236572	0.413230
77	1.018781	0.522169	0.506829	0.762881	0.257634	0.420884
78	1.101255	0.560377	0.530330	0.729715	0.286783	0.409379
79	1.167404	0.599708	0.551363	0.720931	0.276414	0.414609
80	1.341146	0.699554	0.595984	0.733215	0.253483	0.430220
81	1.337600	0.705789	0.646834	0.709696	0.240110	0.452240
82	1.466910	0.736549	0.683481	0.782995	0.222210	0.453492
83	1.592182	0.771547	0.723157	0.764886	0.214308	0.414338
84	1.737203	0.832171	0.743104	0.777971	0.208972	0.401274

A quick look at the results explains the high SSR in the time series analysis. The parameter a_p is very unstable. The same holds for w_s (= LOONs/Es) and w_p (= LOONp/Ep). The downward trend of θ indicates that a larger part of G is financed by non-business taxes. γ and τ do not present important differences over the period 1968-1984.

τ , the tax parameter is equal to the power index

$$\tau = \frac{\delta_1}{\delta_1 + \delta_2} = \frac{(\varepsilon_{12} + \varepsilon_{13})\lambda_1 + \varepsilon_{23}\lambda_2 + \varepsilon_{33}\lambda_3}{(\varepsilon_{12} + \varepsilon_{13})\lambda_1 + \varepsilon_{23}\lambda_2 + (\varepsilon_{31} + \varepsilon_{33})\lambda_3}$$

- ε_{i1} : subjective value of group i for their wage
- ε_{i2} : subjective value of group i for their number
- ε_{i3} : subjective value of group i for the
available public goods.

For varying values of ε_{ik} , different values of the λ_i 's can be calculated.

Some calculations are summarized in table 14.

Table 14 : Results of the simulated λ_i 's

alternatives for ε_{ik}	results for λ_i 's				
		1970	1975	1980	1985
$\varepsilon_{11}, \varepsilon_{12}, \varepsilon_{13} = 0.33$	λ_1	0.29	0.30	0.28	0.27
$\varepsilon_{21}, \varepsilon_{22}, \varepsilon_{23} = 0.33$	λ_2	0.28	0.29	0.32	0.30
$\varepsilon_{31} = 1, \varepsilon_{32}, \varepsilon_{33} = 0$	λ_3	0.41	0.39	0.38	0.42
$\varepsilon_{11}, \varepsilon_{12}, \varepsilon_{21}, \varepsilon_{22} = 0.4$	λ_1	0.31	0.32	0.30	0.29
$\varepsilon_{13}, \varepsilon_{23} = 0.2$	λ_2	0.31	0.32	0.35	0.33
$\varepsilon_{31} = 1, \varepsilon_{32}, \varepsilon_{33} = 0$	λ_3	0.36	0.34	0.33	0.36
$\varepsilon_{11}, \varepsilon_{12} = 0.5$	λ_1	0.31	0.32	0.29	0.28
$\varepsilon_{12}, \varepsilon_{22} = 0.15$	λ_2	0.30	0.31	0.34	0.32
$\varepsilon_{13}, \varepsilon_{23} = 0.35$	λ_3	0.38	0.36	0.35	0.38

$\lambda_1 + \lambda_2 + \lambda_3 = 1$, differences are due to rounding errors.

Other simulations are possible with other starting values for the ε_{ik} 's. The tendencies for the three alternatives are the same : the power of the state workers has slightly gone up and the selfemployed have recovered their power of 1968, after a fall until 1981. The economic recession seems to be reflected in the falling power of the selfemployed. The influence of the private sector workers has risen until the 80's. Since the wage cuts, their influence has gone down again. The power of the state workers has somewhat earlier declined.

CONCLUSIONS

Reconsidering the results of the vote and popularity functions, this theory doesn't seem very satisfying for a small, open economy like Belgium.

This could be due to the fact that most of the existing articles are based on a two-party system. Furthermore, the elections in countries which present more stable results, are held at fixed points in time. This strict calendar doesn't exist in Belgium.

Our country plays only a minor roll in international economics and politics.

On the other hand, worldwide politico-economic events largely determine our own economic development and structural changes.

All these factors make it hard for a government to manipulate continuously the economic situation on its behalf (to pursue its ideology, or to maximize its votes).

The results could possibly be improved by considering general economic indicators, like world-trade and world-inflation. However, the incorporation of extra independent variables reduces the degrees of freedom. This already causes a serious problem for the vote function, as indicated in the text (limited number of observations).

The concept of a general macro-economic framework, as copied from Van Winden, cannot accurately describe the important changes in the social-economic system. The simulations illustrate the fairly changing character of the productivity, the wages and the state budget.

The simple introduction of a political- or crisis-dummy significantly improves the accuracy of the model, as shown in the version of Klein.

This suggests further research in this direction.

REFERENCES

ALT J.E. and K.A. CHRYSTAL. *Political Economics*, California, University of California Press, 1983, 275 p.

ATKINSON A.B. and J.E. STIGLITZ. *Lectures on Public Economics*, London, Mc Graw Hill, 1980, 619 p.

BAUMOL, W.J., S.A. BLACKMAN and E.N. WOLFF. 'Unbalanced Growth Revisited : Asymptotic Stagnancy and New Evidence', in *the American Economic Review*, vol. 85, 1985, p. 806-817.

BAUMOL, W.J. 'Macroeconomics of Unbalanced Growth : the Anatomy of Urban Crisis', in *the American Economic Review*, vol. 57, 1967, p. 415-426.

BECKER, G.S. 'Public Policies, Pressure Groups and Dead Weight Costs', in *Journal of Public Economics*, vol. 28, 1985, p. 329-347.

BECKER, G.S. 'A Theory of Competition among Pressure Groups of Political Influence', in *Quarterly Journal of Economics*, vol. 98, p. 371-400.

BERGSTROM, T.C. and R.P. GOODMAN. 'Private Demands for Public Goods', in *the American Economic Review*, vol. 63, 1973, p. .

BORCHERDING, T.E. and R.T. DEACON. 'The Demand for Services of Non Federal Governments', in *the American Economic Review*, vol. 62, 1972, p. 891-901.

BOUTE, S. and V. GINSBURGH. 'Performances Economiques et Résultats de Elections Législatives : une approche quantitative', in *Recherches Economiques de Louvain*, vol. 43, 1977, p. 345-369.

CHAPPELL, M.W. 'Presidential Popularity and Macro-Economic Performances : are voters really so naive ?', in *the Review of Economics and Statistics*, vol. 65, 1983, p. 385-392.

DE GRAUWE, P. 'De politieke economie van de overheidsuitgaven in België', in *Res Publica*, vol. 27, 1985, p. 269-286.

DE GRAUWE, P. 'The Growth of the Public Sector in Belgium under Center-Right and Center-Left Governments', *International Economic Research Paper*, KUL, CES, vol. 49, 1985, 15 p.

FAIR, R.C. 'The Effect of Economic Events on Votes for the President', in *the Review of Economics and Statistics*, vol. 60, 1978, p. 159-173.

FILIMON, R., T. ROMER and H. ROSENTHAL. 'Asymmetric Information and Agenda Control', in *Journal of Public Economics*, vol. 17, 1982, p. 51-70.

FREY, B.S. *Modern Political Economy*, New York, Martin Robertson, 1978, 166 p.

FREY, B.S. and F. SCHNEIDER. 'A Politico-Economic Model of the U.K.', in *Economic Journal*, vol. 88, 1978, p. 243-253.

FREY, B.S. and F. SCHNEIDER. 'An Empirical Study of Politico-Economic Interaction in the United States', in *the Review of Economics and Statistics*, vol. 60, 1978, p. 174-183.

FREY, B.S. *Democratic Economic Policy*, Oxford, Martin Robertson, 1983, 210 p.

JANSSENS, I., W. MOESEN and W. PAUWELS, 'Publieke voorzieningen : Welvaart, Politiek en Sanering', in *Cahiers Economiques de Bruxelles*, vol. 115, 1987, p. 77-111.

JUDGE, G.G. e.a. *Introduction to the Theory and Practice of Econometrics*, New York, John Wiley, 1982, 839 p.

LAFAY, J.D. e.a. *A Complete Politico-Economic Model for the French Economy*, Poitiers, Institut de Recherche et d'Analyse Politico-Economique.

LYBECK, J.A. 'A Simultaneous Model of Politico-Economic Interaction, 1970-1982', in *European Journal of Political Research*, vol. 13, 1985, p. 135-151.

MOSLEY, P. 'Towards a Satisfying Theory of Economic Policy', in *Economic Journal*, vol. 86, 1976, p. 59-72.

MUELLER, D. *Public Choice*, Cambridge, Cambridge University Press, 1979, 297 p.

MUSGRAVE, R.A. and P.B. MUSGRAVE. *The Theory of Public Finance*, New York, Mc Graw Hill, 1984, 823 p.

NAERT, F. 'Proeve van een evaluatiefunctie voor België', in *Cahiers Economiques de Bruxelles*, vol. 115, 1987, p. 129-150.

NORDHAUS, W.D. 'The Political Business Cycle', in *the Review of Economic Studies*, vol. 12, 1975, p. 169-190.

OLSON, M. *The Logic of Collective Action*, Cambridge, Harvard University Press, 186 p.

PEACOCK, A. and J. WISEMAN. 'Determinants of Government Expenditures', in *Public Expenditures Analysis*, Ed. B.S. SAHNI, Rotterdam, Rotterdam University Press, 1972, p. 163-186.

POMMEREHNE, W.W. and B.S. FREY. 'Two Approaches to Estimating Public Expenditures', in *Public Finance Quarterly*, vol. 4, 1976, p. 395-407.

POMMEREHNE, W.W. and F.S. SCHNEIDER. 'Fiscal Illusion, Political Institutions and Local Public Spending', in *Kyklos*, vol. 31, 1978, p. 381-408.

STIGLER, G. 'General Economic Conditions and National Elections', in *the American Economic Review*, vol. 63, 1973, p. 160-167.

TUFTE, T. *Political Control of the Economy*, Princeton, Princeton University Press, 180 p.

VAN WINDEN, F. and B. VAN VELTHOVEN. 'Een eenvoudig politiek-economisch model', in *Statistische Berichten*, 1982, p. 1196-1206.

VAN WINDEN, F. *On the Interaction between State and Private Sector*, Leiden, 1981, 319 p.