

THE POLITICO-ECONOMIC SYSTEM: A SIMULATION MODEL*

Economic theory and policy usually assume that the government acts in the interest of general welfare; stabilization policy in particular is based on the premise that the government is indeed willing to reduce economic fluctuations. Political writers and journalists have, however, long since realized that the opposite is also true: the government actively *creates* business cycles in its quest to stay in power. In a democracy with active competition between the parties, it is compelled to steer the economy in order to win future elections; this action may induce cycles.

This 'election' or 'political business cycle' has also been observed in descriptive studies of economic policy, *e.g.* by LINDBECK (1970) and PREST (1968). Theoreticians have only recently devoted themselves to the subject. An exception is the early article by KALECKI (1943) in the Marxian framework: capitalists force the government to undertake a restrictive policy when there is full-employment because wage-demands and prices rise, rentier real incomes dwindle and, moreover, workers get 'out of hand'. The resulting slump with low profits is reversed as the government is forced by capitalists to take expansionary measures in order to reestablish their higher income share. Another forerunner is ÅKERMAN (1947) who observes in many countries an intimate relationship between economic prosperity and government stability but fails to offer any theoretical explanation for his observations.

Most noteworthy among the recent American contributions is NORDHAUS (1972). He derives a cycle brought about by the govern-

* The author owes much gratitude to FRIEDRICH SCHNEIDER, who made many useful suggestions and performed the computations on a TR 440 from the Telefunken-Computers Company and on the smaller computer at the University of Constance. Previous versions were presented at the Universities of Basle, Linz, St. Gall and Munich; thanks are due to the discussants, as well as to JAMES COLEMAN and JOHN S. FLEMING for their written comments. Financial support for the computer work provided by the *Fonds zur Förderung der Forschung auf dem Gebiet der Sozialwissenschaften* is gratefully acknowledged.

BRUNO S. FREY

ment's choice between inflation and unemployment on a PHILLIPS-curve. The attached historical and statistical analysis for the U.S., the U.K., New Zealand and (to a limited extent) Sweden confirms the considerable importance of the political business cycle.

For once, more work in this area has been done in Europe, especially a theoretical and empirical study by GOODHART and BHANSALI (1970) and by LIEFMANN-KEIL (1970). FREY and LAU (1968) in particular derive a time path of economic activity which a utility-maximizing government should follow between elections.

The present contribution is in the tradition of the 'New Political Economy' and consists of a difference equation model whose time sequence is traced by simulation. Its goal is the study of the interaction between the political and economic sectors, especially the disequilibrium dynamics of the cycles generated. Because of its many simplifications, its purpose is mainly heuristic. At the same time it serves as a first step towards the formulation of more realistic models, which should allow the government finally to be treated as an endogenous part of econometric models. Only then are such models useful for prediction in a modern society, in which the future course of events depends so much on governmental behaviour.

Part I develops the theoretical model, *Part II* the simulation results. A summary is given in *Part III*, and *Part IV* discusses possible extensions and provides an outlook. The *Appendix* presents the complete figures of one particular simulation run.

I. THE POLITICO-ECONOMIC SYSTEM

The theoretical model is composed of two blocks, the economy and the polity, and is connected by interaction equations. Both the economy and the polity are kept as simple as possible in order to concentrate on their interdependence.

A. The Economy

Because this study concentrates on the intertemporal allocation of investment in a politico-economic setting, the seven equations describe a *real* one-sector economy without price rises or unemploy-

THE POLITICO-ECONOMIC SYSTEM

ment. The time periods refer to half a year, and the elections are assumed to take place each fourth year, *i.e.* at $t = 8, 16, \dots$

Real national income Y depends on real capital K by means of a linear-limitational production function:

$$Y(t) = \underset{(0.166)}{k} \cdot K(t) \quad (1)$$

The numbers beneath the parameters indicate the values used in the simulation; they are chosen with a view to realism (*e.g.* the capital coefficient $1/k$ is assumed to be equal to 3 per year).

Capital stock is increased by total investment TI and decreased by depreciation D which is proportional to capital stock:

$$K(t+1) = K(t) + TI(t) - D(t) \quad (2)$$

$$D(t) = \underset{(0.05)}{d} \cdot K(t) \quad (3)$$

Total investment is composed of a part undertaken *and* controlled by the private sector I and a part *directly* controlled by the government PI ('political investment'):

$$TI(t) = I(t) + PI(t) \quad (4)$$

The division between I and PI is not identical to the one between privately profitable and infrastructural investment, because the government directly influences a considerable part of investments undertaken by business firms.

Privately controlled investment is simply assumed to be a fraction of national income (plus a constant I_0) in order to minimize any endogenous fluctuations originating in this part of the economy. (These effects have, of course, been intensively studied in the traditional business cycle literature.)

$$I(t) = I_0 + \underset{(0.1)}{v} \cdot Y(t) \quad (5)$$

Consumption is in this real model residually determined as

$$C(t) = Y(t) - TI(t) \quad (6)$$

BRUNO S. FREY

Citizens have consumption expectations $EC(t)$ based on a weighted sum of past consumption levels:

$$EC(t) = (1 - \lambda) \sum_{i=0}^{\infty} \lambda^i C(t-i)$$

which can be transformed into

$$EC(t) = \underset{(0.25)}{(1 - \lambda)} C(t) + \underset{(0.75)}{\lambda} EC(t-1) \quad (7)$$

$\lambda = 0.75$ indicates that only a relatively slow adaptation of expectations to actual consumption is assumed. For the sake of realism the downward adjustment of EC is limited ($EC \geq 40$).

B. The Polity

In analogy to physical capital stock, there is the government's 'political capital stock' PK composed of all its past popularity ratings $POP(t)$ and net of 'political depreciation' $PD(t)$, which is again assumed to be proportional to capital stock. PD reflects the rate of forgetting past government achievements by the electorate.

$$PK(t+1) = PK(t) + POP(t) - PD(t) \quad (8)$$

$$PD(t) = \underset{(0.20)}{\delta} \cdot PK(t) \quad (9)$$

'Popularity' reflects the voters' evaluation of *current* government policy and thus is a *short run* concept. It is constrained between 0 and 100 and is interpreted as the percentage of the population favouring the government. The 'political capital stock' embodies the voters' *long-run* evaluation of government policy. It is a concept sometimes used in empirical political science (see *e.g.* CAMPBELL, CONVERSE, MILLER, STOKES 1960) and similar to 'good will' estimated in advertising studies (see *e.g.* PELES 1971).

The opposition—the other party or coalition—also builds up a political capital stock PKO of its own. It is accumulated over its past popularity ratings $POPO$ net of depreciation PDO :

THE POLITICO-ECONOMIC SYSTEM

$$PKO(t+1) = PKO(t) + POPO(t) - PDO(t) \quad (10)$$

$$PDO(t) = \underset{(0.20)}{\delta_0} \cdot PKO(t) \quad (11)$$

The citizens are assumed to be (reasonably) rational as they forecast the probable future performance of the party in power on the basis of the suitably depreciated past record embodied in the government's political capital stock. The government knowing this, forms its current expectation (at time t) of its *election performance* $S(t)$ on the basis of its accumulated political capital stock:

$$S(t) = S(t-1) + \underset{(0.60)}{\alpha} \cdot [PK(t) - PK(t-1)] \quad (12)$$

S is measured as the share of total votes cast and is constrained between 0 and 100. The government takes $S(t)$ as the vote percentage it expects to receive at the next elections, if it *leaves its policy unchanged*, *i.e.* if it does not increase or decrease political investment. This is a simple yet not unrealistic assumption about the government's expectation formation.

C. Interaction Between Economic and Political Sector

Thus far the economy and the polity are self-contained. At this point the two basic interaction equations are introduced: the *popularity function*, which transmits economic impulses on the polity, and the *government's reaction function*, which transmits the response of the polity on the economy.

Government popularity increases if the actual consumption level is larger than expected:

$$POP(t) = POP(t-1) + \underset{(0.50)}{\pi} \cdot [C(t) - EC(t)] \quad (13)$$

The opposition's popularity is simply the complement of the government's popularity:

$$POPO(t) = 100 - POP(t) \quad (14)$$

Popularity functions have recently received considerable attention by economists. Though there is some debate, there is good evidence that such functions can meaningfully be estimated by regression and spectral techniques¹.

The government reacts to changes in its election prospect brought about by previous changes in popularity by manipulating the investment it controls. A special hypothesis about government behaviour is advanced here which is of interest in this study of the political economy of intertemporal allocation. The government party seeks to stay in power as long as possible and therefore increases political investment when it is confident of its re-election, *i. e.* if S is larger than some exogenously given minimum vote share SM . This means that the future re-election potential of the party in power is increased by raising the future real capital stock and therewith future consumption, at the expense of the present potential, which is larger than required ($S > SM$).

If, on the other hand, the government party fears defeat because of $S < SM$, it must make an effort to increase its popularity by reducing political investment, which (in the short run) increases consumption. Political investments thus serve to *shift re-election chances over time*.

The particular form of government's reaction function is assumed to be

$$PI(t+1) = PI(t) + \underset{(0.50)}{\gamma} \cdot [S(t) - SM] \quad (15)$$

Because of capacity limits in the capital goods sector, political investments may not be changed by more than 5 units per period, which is 20 per cent of political investment of the initial period.

1. The major contribution to U.S. data is KRAMER (1971). His results are questioned in a discussion in the *American Economic Review* by STIGLER (1973), but receive support by OKUN (1973). An interesting application to the U.K. has been undertaken by GOODHART and BHANSALI (*l. c.*). The debate is continued by MILLER and MACKIE (1973) and NILSON (1973). FREY and GARBERS (1972) have in turn estimated a popularity function for Germany (and the U.K.) in which thresholds are stipulated, below which there is no voter reaction to changing economic conditions. For a discussion see ROTH (1973).

THE POLITICO-ECONOMIC SYSTEM

II. SIMULATIONS

It is easy to specify a stationary equilibrium as a starting point in which all expectations are fulfilled ($EC = C$) and the government has no incentive to change its policy, as it expects to be re-elected just by the necessary and sufficient share of votes ($S = SM$, taken to be 50 per cent).

The values of the variables in this stationary equilibrium are:

| | |
|-----------|-------------|
| $Y = 100$ | $PK = 250$ |
| $K = 300$ | $PKO = 250$ |
| $TI = 30$ | $POP = 50$ |
| $D = 30$ | $POPO = 50$ |
| $I = 10$ | $PD = 50$ |
| $PI = 20$ | $PDO = 50$ |
| $C = 70$ | $S = 50$ |
| $EC = 70$ | $(SM = 50)$ |

The model is set into motion by exogenous shocks upon this stationary equilibrium. In this paper only a few runs can be discussed. Those chosen seem to be the most interesting and realistic. These shocks consist in changes of government popularity due to non-economic internal influences, such as political scandals, or to all influences coming from outside the country. To put the model to a real test exogenous shocks in both directions are considered, namely popularity shifts upwards by 15% and 5%, and downwards by -5%, -10% and -15%, the percentages always being measured as percentage points. Altogether seven runs are discussed. As an example, the development of all the variables is given for the -5%-run in the *Appendix*.

a. No Bonus After Government Change

Run 1. Run 1 traces the reactions of the politico-economic system when the government is benefitted by an exogenous popularity increase of 15 per cent in period 1.

Being an interdependent system, no full verbal interpretation can be given. With the help of computer graphs of the most important variables—the re-election expectation $S(t)$, the consumption level $C(t)$ and political investment $PI(t)$ —and *Table 1* (see below) giving

Figure 1a

Ex. shock at $T=1$;
 increase of $POP(1) = +15$
 Change of government
 without change of consumption
 expectations

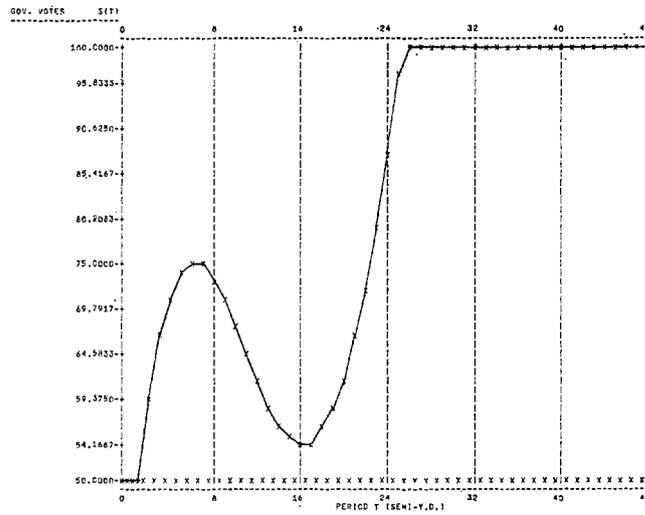


Figure 1b

Ex. shock at $T=1$;
 increase of $POP(1) = +15$
 Change of government
 without change of consumption
 expectations

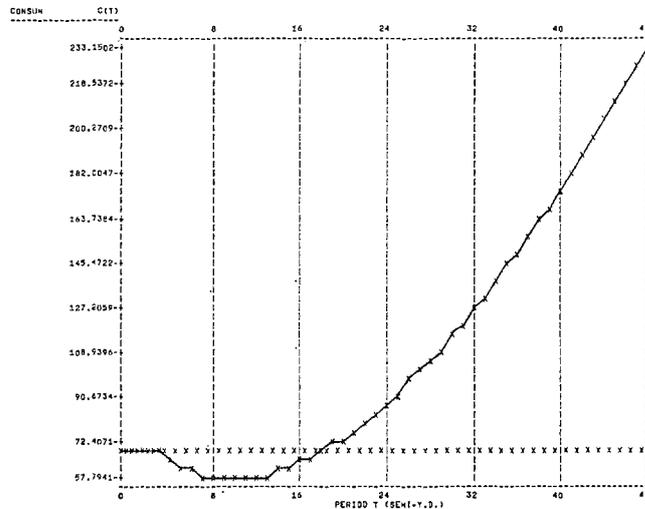
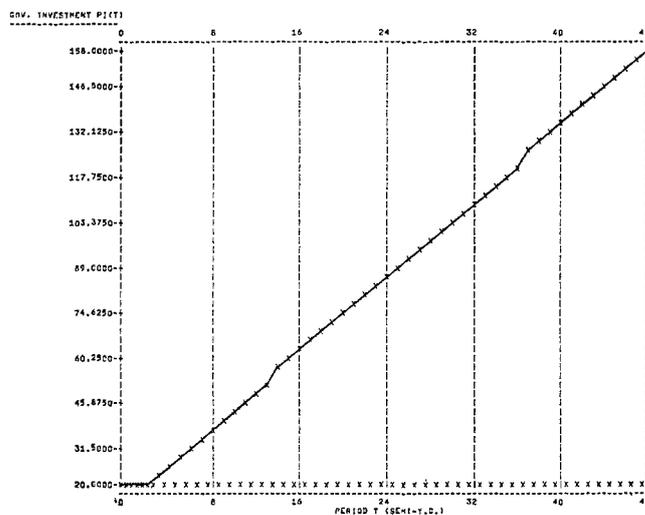


Figure 1c

Ex. shock at $T=1$;
 increase of $POP(1) = +15$
 Change of government
 without change of consumption
 expectations



THE POLITICO-ECONOMIC SYSTEM

Table 1

Vote Share (*S*), Consumption (*C*) and Political Investment (*PI*) at Election Dates
(rounded figures)

| Run | Exogenous popularity shock | Variable | Stationary equilibrium | Election dates | | | | | |
|-----|---|------------------|------------------------|----------------|------|------|------|------|------|
| | | | | 8 | 16 | 24 | 32 | 40 | 48 |
| 1 | +15% | <i>S</i> | 50 | 73 | 54 | 88 | 100 | 100 | 100 |
| | | <i>C</i> | 50 | 58 | 64 | 88 | 126 | 176 | 233 |
| | | <i>PI</i> | 50 | 38 | 62 | 86 | 110 | 134 | 158 |
| 2 | + 5% | <i>S</i> | 50 | 51 | 70 | 81 | 63 | 100 | 100 |
| | | <i>C</i> | 50 | 59 | 81 | 66 | 75 | 101 | 141 |
| | | <i>PI</i> | 50 | 37 | 20 | 44 | 68 | 92 | 116 |
| 3 | - 5% | <i>S</i> P_1 | 50 | 54 | (34) | | | | |
| | | P_2 | | | 66 | 66 | 51 | 100 | 100 |
| | | <i>C</i> | 50 | 82 | 61 | 45 | 75 | 71 | 86 |
| 4 | -10% | <i>PI</i> | 50 | 0 | 12 | 36 | 31 | 53 | 77 |
| | | <i>S</i> P_1 | 50 | (48) | 86 | 61 | (34) | 74 | (42) |
| | | P_2 | | 52 | (14) | | 66 | (26) | 58 |
| 5 | -10% (with post-election bonus) | <i>C</i> | 50 | 79 | 61 | 34 | 58 | 49 | 26 |
| | | <i>PI</i> | 50 | 0 | 0 | 24 | 0 | 0 | 23 |
| | | <i>S</i> P_1 | 50 | (48) | 51 | 93 | 83 | 100 | 100 |
| 6 | -15% (with post-election bonus) | P_2 | | 52 | (49) | | | | |
| | | <i>C</i> | 50 | 79 | 49 | 39 | 50 | 79 | 120 |
| | | <i>PI</i> | 50 | 0 | 17 | 39 | 63 | 87 | 111 |
| 7 | -10% (with post-election expectation drop) | <i>S</i> P_1 | 50 | (38) | | 65 | 58 | (46) | |
| | | P_2 | | 62 | 52 | (35) | | 54 | 53 |
| | | <i>C</i> | 50 | 79 | 47 | 64 | 36 | 60 | 36 |
| 8 | | <i>PI</i> | 50 | 0 | 24 | 0 | 24 | 0 | 15 |
| | | <i>S</i> P_1 | 50 | (48) | 53 | 52 | 51 | (45) | 72 |
| | | P_2 | | 52 | (47) | | | 56 | (28) |
| 9 | | <i>C</i> | 50 | 79 | 59 | 34 | 57 | 33 | 46 |
| | | <i>PI</i> | 50 | 0 | 1 | 25 | 0 | 20 | 29 |

Note: A vote share in parenthesis means that the government is not re-elected ($S < SM$); the corresponding vote share of the new government is given without parenthesis. The upper (lower) row shows the share received by 'party' P_1 (P_2).

the values of those variables at election dates, an attempt is made, however, to give some intuitive notion.

The large popularity increase at $t = 1$ leads after a time lag to a rise in the political capital stock and re-election expectations. The government decides to use the unnecessarily high present re-election potential ($S > SM$) to increase future re-election chances by stepping up political investment. This lowers the consumption level (in the short run) and—as consumption expectations only gradually accommodate to the new situation—popularity begins to decline (at $t = 3$). This situation persists for some time, as the government is still sure of winning the coming elections. It indeed does so with a vote share $S(8) = 73\%$, but consumption drops from 70 to 58.

The continuous increase of political investment leads to a rapid rise in real capital stock, which is further enhanced by the induced rise of privately controlled investment. This raises national income and shortly after the first election (at $t = 10$), consumption reaches its lowest level. Thereafter, the capacity effect clearly dominates the displacement effect of investment.

Now the politico-system enters a virtuous circle in which unexpectedly high consumption ($C - EC$) raises government popularity (starting with the low of 49 per cent at $t = 13$). After a lag of three periods government popularity in turn begins to raise the political capital stock and the expected election vote share. Both reach their minimum at the second election date $t = 16$, but the government still wins with 54 per cent of the vote. The third election brings a victory of 88 per cent and at the next elections the model reaches its limits with the government receiving all the votes. Once the virtuous circle has set in, the ensuing result depends to a large extent on the particular consumption expectation function used; it might also be hypothesised that the consumer-voters begin to adjust more quickly and to a rising trend.

The politico-economic system thus responds to a popularity gain of the government coming from the outside by increasing political stability (if this is measured by the government's vote share²) and exponential growth of economic well-being.

2. 'Political stability' as used here thus only refers to the fact that the government remains in power. 'Political instability' then means that the party in government changes often. For further discussion see *Part III*.

THE POLITICO-ECONOMIC SYSTEM

Run 2. Run 2 shows the effects of an exogenous government popularity increase of only 5 per cent in period 1. Again the government feels certain of winning the next elections and therefore steps up political investment. Due to displaced consumption, the expected share of votes at election time falls, beginning with $t=4$, and the government just manages to receive a majority at the first elections [$S(8) = 51\%$]. At the beginning of the new legislative period, the re-election chances look rather bleak ($S < SM$ for $t=9, 10$) because of the continuous popularity drop from period 2 on.

The government reacts quickly and reduces political investment such as to increase re-election chances. S indeed rises quickly as consumption and therewith popularity trends are reversed, but also because real capital has been considerably increased in the past. Compared to *Run 1*, the government reaches a higher vote share at the second elections [$S(16) = 70\%$, compared to 54%], as its political capital stock is mainly composed of recent high popularity-‘vintages’. The success of the effort has been paid for, however, by having a lower real capital stock (674 against 840 in *Run 1*). This results in a lower victory in the third elections [$S(24) = 81\%$ against 88% in *Run 1*]. From $t=17$ to $t=28$ consumers are dissatisfied ($C < EC$) because of the quick rise in consumption expectations brought about by the government policy favoring consumption during the second legislative period. Despite the sound economic conditions, with continually rising private and political investment and a quickly accumulating capital stock, popularity thus falls from $t=16$ to $t=28$. The fourth elections are won with a lower majority than the previous one [$S(32) = 63\%$]. Afterwards the same virtuous circle as in *Run 1* sets in.

With an initial external popularity gain of only 5 per cent, the politico-economic system shows much more marked cycles than with a larger initial popularity increase. There are quite sizeable upwards and downwards movements in both political and economic variables. It is interesting to note that these cycles are necessary in order to guarantee political stability in the sense of the government staying in power.

Run 3. This run reports the effects of an exogenous popularity decrease of 5 per cent in period 1. The development of all the variables

Figure 2a

Ex. shock at $T = 1$;
 increase of $POP(1) = +5$
 Change of government
 without change of consumption
 expectations

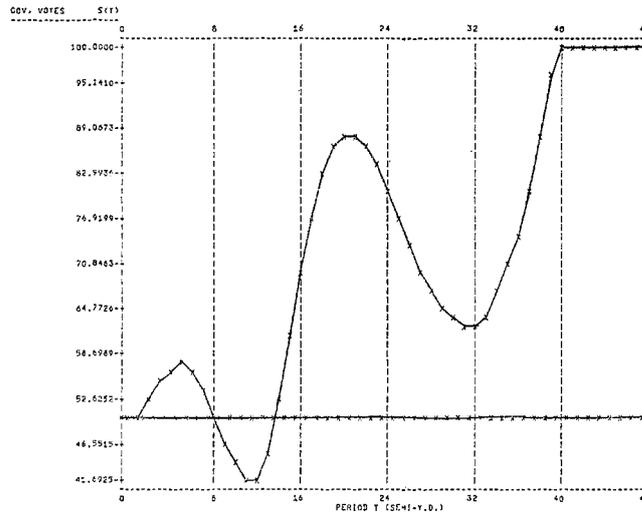


Figure 2b

Ex. shock at $T = 1$;
 increase of $POP(1) = +5$
 Change of government
 without change of consumption
 expectations

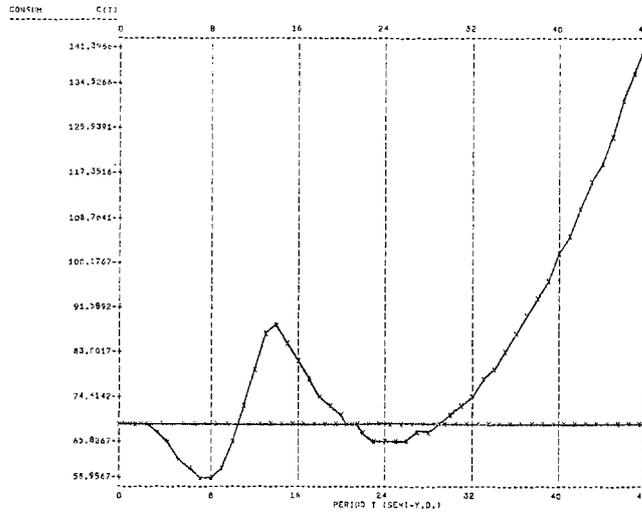
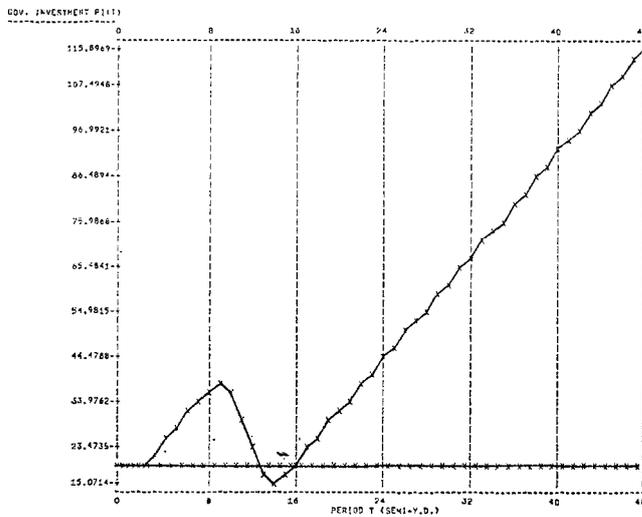


Figure 2c

Ex. shock at $T = 1$;
 increase of $POP(1) = +5$
 Change of government
 without change of consumption
 expectations



THE POLITICO-ECONOMIC SYSTEM

of this run is shown in the *Appendix*. The government is forced to undertake a consumer-friendly policy in order to avoid an election defeat. At mid-term ($t=4$), the expected election share amounts to only 43 per cent. Under this immanent danger, the government quickly lowers political investments to zero in $t=7$. Consumption is indeed boosted above the initial level, and popularity rises steadily. The party in power is re-elected with 54 per cent of the vote.

The next legislative period becomes very difficult for the government because the policy before the elections has led to a low capital stock and a correspondingly low and declining national income. Although the government tries to overcome this difficulty by increasing political investment, the real capital stock and national income drop further during this second legislative period. Consumption falls even more rapidly as the capacity and displacement effect (of political investment) are cumulative. Popularity drops sharply and the government receives only 34% of the vote at the second elections and is clearly defeated.

The new party forming the government comes in with high popularity and good re-election prospects (66 per cent of the vote). This favourable political constellation permits improvement of general economic conditions by stepping up political investments. This policy leads to a consumption and popularity drop, despite the small capacity effect of a slowly rising national income. The party wins the second consecutive election ($t=24$) with the same majority as the first one (66%).

In the next legislative period there are two conflicting forces, namely the downward pull due to low and falling consumption and the upward push due to a rising real capital stock. The government manages, however, to stay in power [$S(32) = 51\%$], and from now on the virtuous circle starts with continuously rising re-election prospects.

The politico-economic system (as modelled here) adjusts to a small exogenous popularity loss of 5 per cent, again by marked cycles in both economic and political variables. In this case, however, a stabilization into a development with steady economic growth and increasing government approval by the electorate only happens after the government changes. Political instability is here the precondition for an economic take-off.

Figure 3a

Ex. shock at $T=1$;
 decrease of $POP(1) = -5$
 Change of government
 without change of consumption
 expectations

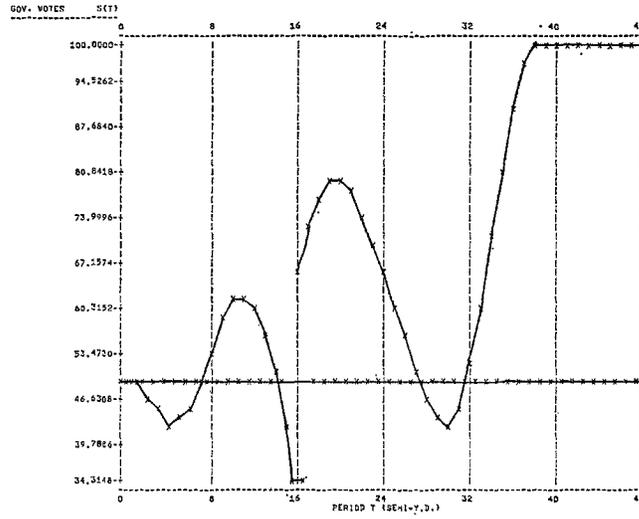


Figure 3b

Ex. shock at $T=1$;
 decrease of $POP(1) = -5$
 Change of government
 without change of consumption
 expectations

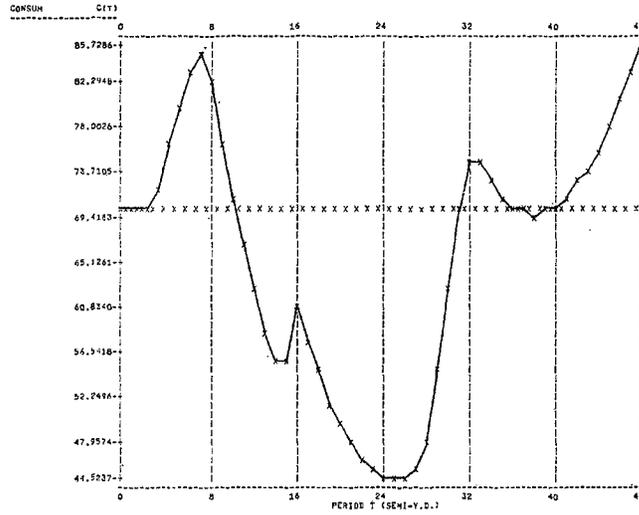
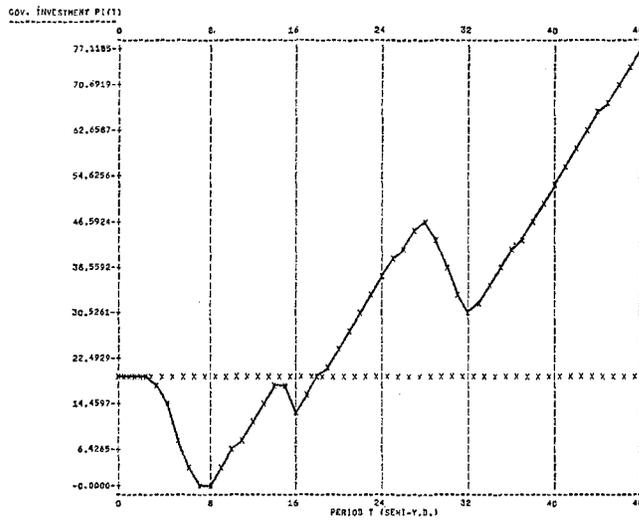


Figure 3c

Ex. shock at $T=1$;
 decrease of $POP(1) = -5$
 Change of government
 without change of consumption
 expectations



THE POLITICO-ECONOMIC SYSTEM

Run 4. A somewhat higher initial exogenous popularity decrease of 10 per cent leads to a quite different picture. The downward shock on popularity and election expectations cannot be counterbalanced by the government suffering this blow, despite the fact that everything possible is done: political investment is reduced to zero as quickly as possible thereby increasing consumption from 70 to 79. Popularity and the expected vote share rise albeit insufficiently and/or too slowly [$S(8) = 48\%$].

The new government comes in with a relatively small majority (52%) and—what is (as seen in *Run 3*) even more important—inherits an economy with low and declining real capital and income. The government is almost immediately forced to completely stop political investment in an attempt to boost popularity by increasing consumption. The leeway for action is, however, so small that consumption continues its decline. The election defeat is unavoidable and crushing [$S(16) = 14\%$]. The party which now takes over the government is able to stay in power over two legislative periods because of its overwhelming election victory and popularity ratings (74%). It tries to shift some of the re-election potential to the future by rapidly raising political investments from 0 to 28 (at $t = 26$). This decreases the margin of victory at the next elections ($t = 24$) to 61 per cent, and the re-election expectations thereafter even fall to less than 50 per cent. The government now quickly reverses its policy and pushes up consumption, but the still low real capital stock prohibits a success. The government loses the next elections with 34 per cent of the vote.

From now on, no party can stay in power longer than the minimum of one legislative period: the initial margin of victory is too small to survive on, and this means that no government can invest sufficient amounts to reverse the long run trend of worsening economic conditions with falling real capital stock.

The large popularity loss of 15 per cent from external sources leads to strong instability of the politico-economic system. The rapid changes of the party in government does not lead to a reversal of the trend of worsening economic conditions, but does, in this case, contribute toward it.

Figure 4a

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 without change of consumption
 expectations

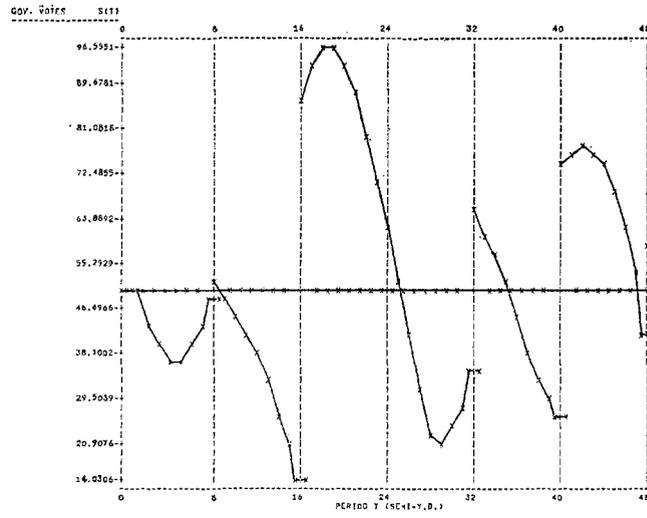


Figure 4b

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 without change of consumption
 expectations

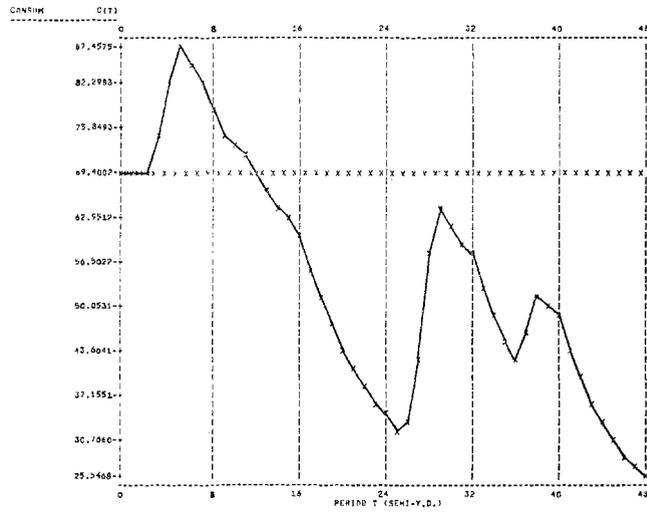
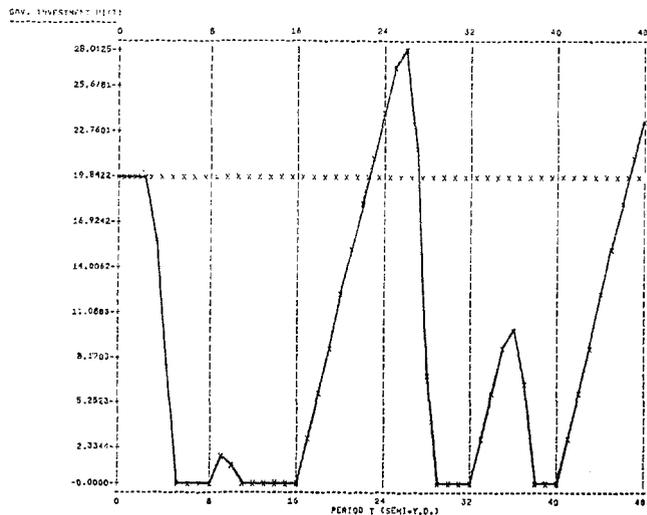


Figure 4c

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 without change of consumption
 expectations



b. Popularity Bonus for a Newly Elected Government

Casual observation and more formal empirical observation indicate that there may be a 'past-election honeymoon' (see *e.g.* GOODHART and BHANSALI, 1970, p. 58–9). The voters give the new government, who cannot reasonably be made responsible for the conditions of the *status quo*, a bonus or credit for some limited time (approximately one year). This may be accounted for by raising the government's popularity level by 10 per cent for two periods after assuming power.

Run 5. This run is up to the first election identical to *Run 4*. The party taking over after the government's defeat at the first elections is benefitted by the bonus, thus having a higher popularity with the voters. It undertakes political investments in order to guarantee re-election in future periods. This policy is, however, in this particular case, a failure as capacity limits in the production of investment goods prohibit reversing the falling trend of real capital stock and national income. Consumption drops so sharply that re-election is missed by a small margin [$S(16) = 49\%$].

The previous party now coming to power again is luckier: the increase of political investment it undertakes after its victory is sufficiently large to increase the real capital stock and income. Consumption is still falling, but expectations are also so low, that the high after-election 'honeymoon bonus' is only slowly reduced. The government wins the coming election handsomely [$S(24) = 93\%$]. The next election is won by a smaller margin [$S(32) = 83\%$], because the capacity effect makes itself felt only slowly. The virtuous circle then carries the government to further victories.

The post-election popularity bonus makes quite a difference in the adjustment of the politico-economic system to exogenous shocks. It gives the new government under adverse conditions the chance to pursue a longer run policy after having come to power. A bad economic situation may be overcome by the fact that the government can afford to undertake additional investment. This allows the first party, after once having been defeated, to thereafter stay in power. Here again, initial political instability in the sense of changes of parties in power leads to a take-off into self-sustained economic growth and increasing political stability.

Figure 5a

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)

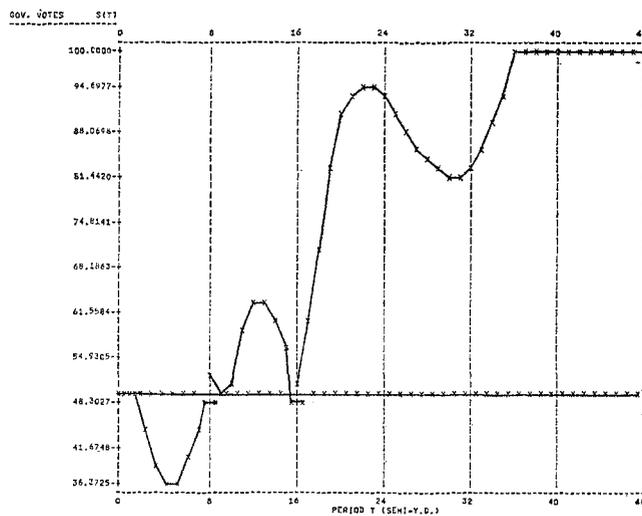


Figure 5b

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)

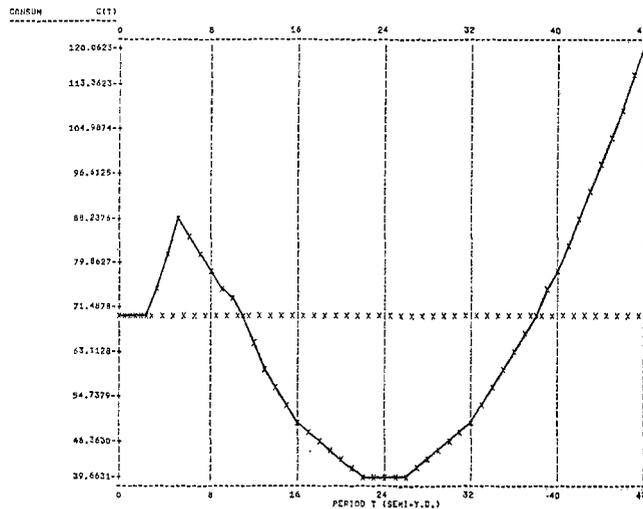
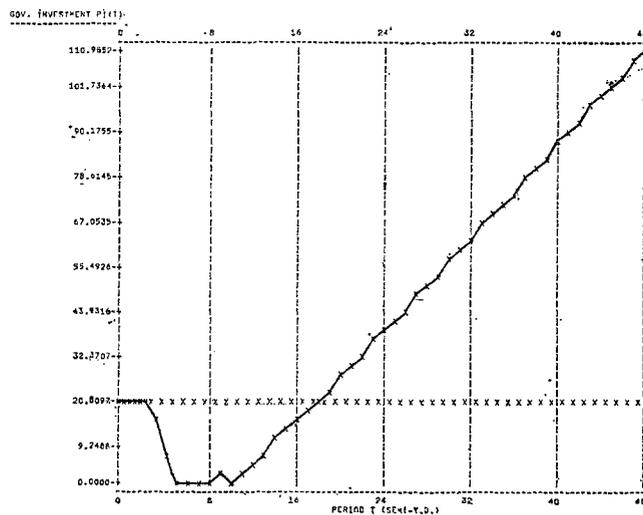


Figure 5c

Ex. shock at $T=1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)



THE POLITICO-ECONOMIC SYSTEM

Run 6. This run traces the development of the politico-economic system when the initial downward shock on government popularity is increased to –15 per cent compared to –10 per cent in the previous run. The government cannot counterbalance this large popularity shock even though it reduces political investments as quickly and as much as possible. As in *Run 4* with an exogenous popularity decrease of only –10 per cent the government already loses the first elections, reaching a vote share of only 38 per cent.

The new party coming into power inherits a low real capital stock and national income. Its attempt to guarantee re-election for a second term is successful, as the popularity bonus given by the electorate allows it to strongly increase political investment without immediately having to fear an election defeat. The first election at $t = 16$ is won with a 52 per cent share of the vote, but immediately after the re-election prospects look dark. At midterm the government can only expect a vote share of 24 per cent. There is some hope for the party in power to redress the picture by quickly lowering political investment. This allows the party to benefit from the consumption spurt caused by the displacement and capacity effect from the now somewhat higher real capital stock. However, the expected vote share cannot be sufficiently increased (political investments are already zero) and the government is defeated with a vote share of only 35 per cent.

The new government is confronted with almost the same situation as the one before: it manages to be re-elected for a second term, but then loses. The same applies to the victorious party coming in.

The politico-economic system is characterized by ‘instability’ of government and rapid increases and decreases of economic well-being (consumption), but only by a *slow* worsening of the economic situation. Political instability is thus accompanied by economic instability, but prohibits a more marked economic decline.

c. Exogenous Change in Consumption Expectations When a New Government Comes in

Instead of a popularity bonus for the newly elected government, one may also hypothesize that the electorate takes the government change as a sign indicating serious economic problems and is therefore ready

Figure 6a

Ex. shock at $T=1$;
 decrease of $POP(1) = -15$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)

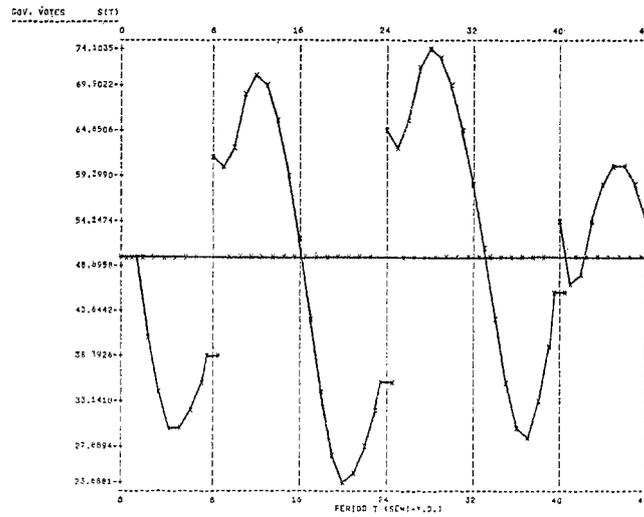


Figure 6b

Ex. shock at $T=1$;
 decrease of $POP(1) = -15$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)

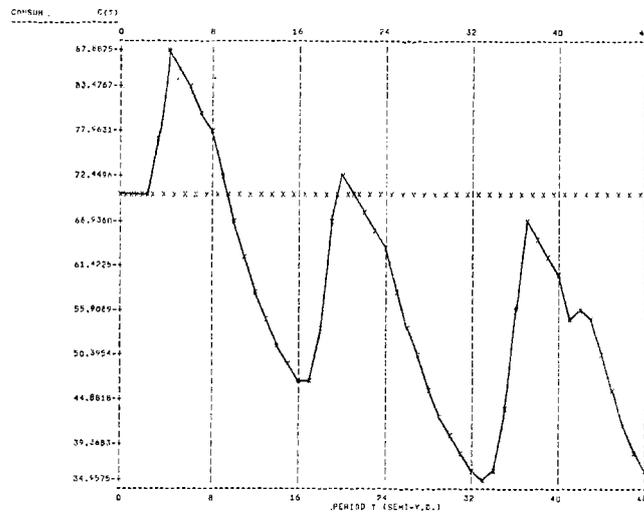
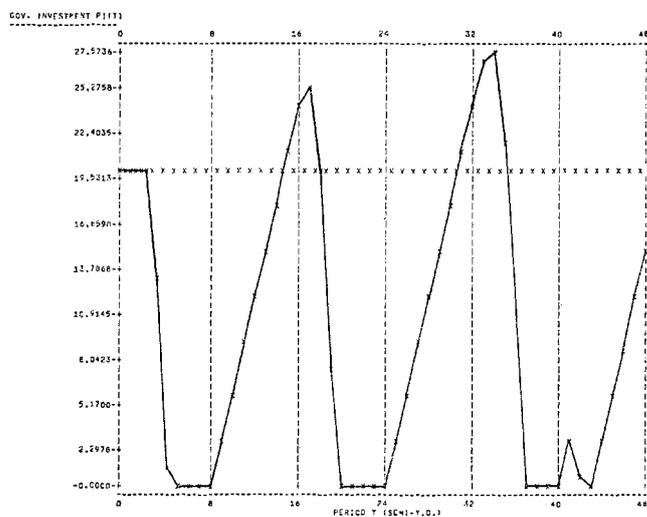


Figure 6c

Ex. shock at $T=1$;
 decrease of $POP(1) = -15$
 Change of government
 with (!) change of popularity
 (+10.0 for two periods)



THE POLITICO-ECONOMIC SYSTEM

to adjust its consumption expectations *downward*³. This is introduced into the model by (exogenously) lowering *EC* in the first period after a government change by -10 .

Run 7. There is no need to discuss each step of this development following an exogenous popularity drop of -10 per cent, as the intuitive working of the system should now be clear to the reader.

There is a sequence of two defeats, two victories, and again two defeats in the elections. A downward revision of consumption expectations of the size assumed is not sufficient to overcome the unstable political and economic development pictured in *Run 4*, which is affected by the same unfavourable initial popularity shock of -10 per cent.

III. SUMMARY

Table 2 gives a summary picture of the simulation runs discussed. The results show that no easy conclusions can be drawn regarding the relationship between economic and political stability. Sometimes, political *instability* contributes to economic *stability* (*Runs 2, 3*); sometimes it strongly accentuates economic *instability* (*Runs 4, 6*).

The studies of political-economic cycles mentioned in the beginning tend to argue *onesidedly* from economics to politics, or *vice versa*. This applies also to the empirical estimations of popularity functions cited, which take economic conditions as independent variables and take too little account of the interdependence between economic and political variables. This may result in biased estimates.

It should be noted that a specific definition of 'political stability' and 'political instability' is used here. One must be aware of the fact that 'political stability' used in this sense may be incompatible with the survival of *democratic institutions*, as these may require *some* changes of parties in power, and may be endangered by a party receiving a too high vote share over a too long period.

The runs as simulated in this paper do, of course, not happen in such pure form in reality. The parties are continually faced with exogenous shocks on their popularity functions. The imposition of a

3. The contrary may also be true. In this case the electorate judges the general economic situation to be sound and blames the old government for mismanagement. The advent of a new party governing then *raises* consumption expectations.

Figure 7a

Ex. shock at $T = 1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of the consump-
 tion expectations

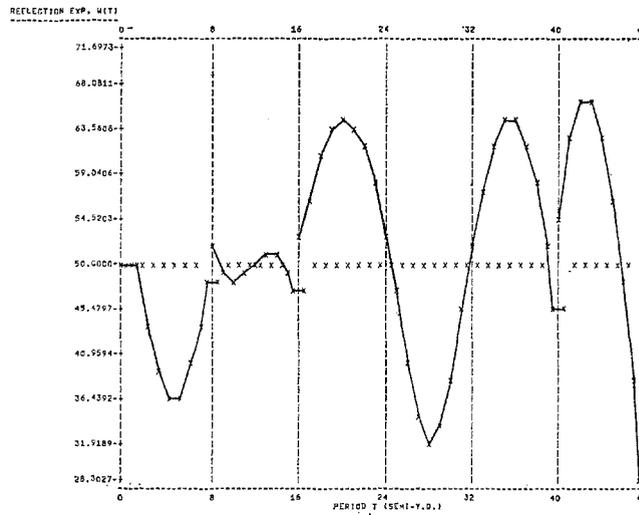


Figure 7b

Ex. shock at $T = 1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of the consump-
 tion expectations

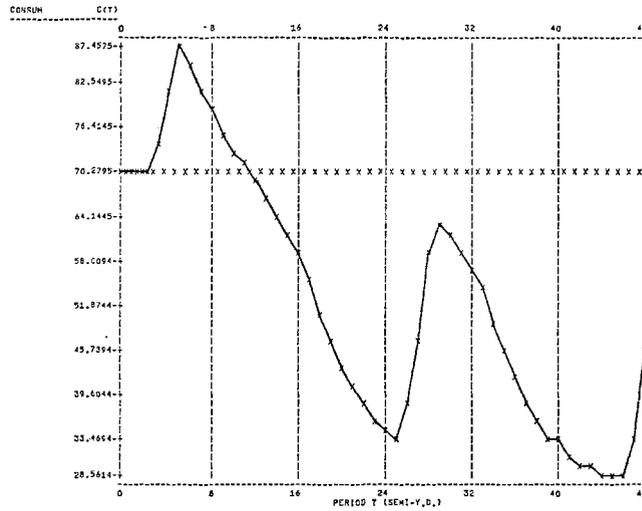
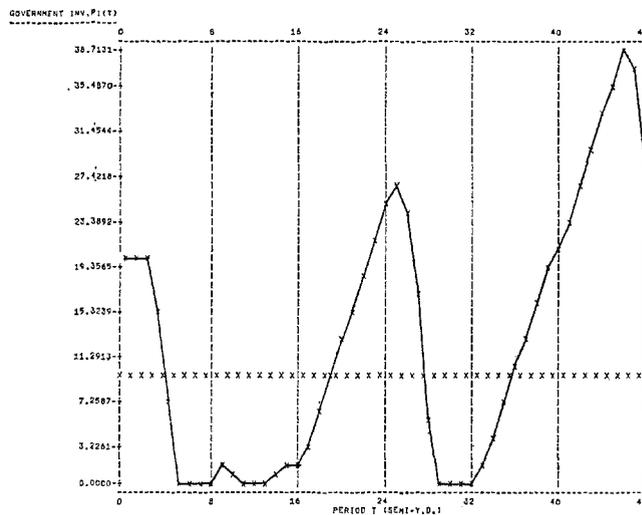


Figure 7c

Ex. shock at $T = 1$;
 decrease of $POP(1) = -10$
 Change of government
 with (!) change of the consump-
 tion expectations



THE POLITICO-ECONOMIC SYSTEM

Table 2
Characterization of the Simulation Runs

| Exogenous popularity shock | Election victory (V) or defeat (D) of reigning party | | | | | | Political conditions | Economic conditions |
|---|--|----|----|----|----|----|--|---|
| | Periods | | | | | | | |
| | 8 | 16 | 24 | 32 | 40 | 48 | | |
| +15% | V | V | V | V | V | V | High and increasing stability | Stable growth |
| +5% | V | V | V | V | V | V | Initially some instability, but no government change | Marked instability, then stable growth |
| -5% | V | D | V | V | V | V | Instability, then increasing stability | Marked instability, then stable growth |
| -10% | D | D | V | D | D | V | Strong instability | Instability and worsening economic well-being |
| -10% (with post-election bonus) | D | D | V | V | V | V | Instability, then increasing stability | Instability, then growth |
| -15% (with post-election bonus) | D | V | D | V | D | V | Strong instability | Strong instability and slow economic decline |
| -10% (with post-election expectation drop) | D | D | V | V | D | D | Strong instability | Instability and economic decline |

series of random shocks on popularity indeed generates time series of economic and political variables quite similar to those observed in reality⁴ (even outside possible reaction thresholds).

4. See SCHNEIDER (1974).

IV. EXTENSIONS AND OUTLOOK

The politico-economic model presented here may be extended in a great many directions:

- Different behavioural assumptions of the government and other politically relevant actors, such as the central bank and government bureaucracy, may be introduced;
- the *political sector* may be treated more fully, *e.g.* by considering the various steps going from the vote share, to the share of seats gained and finally to the probability of being part of government (for which a coalition theory is needed); the effect of political propaganda outlays on popularity may be included, *etc.*;
- the *economic sector* may be modelled more realistically by considering additional politically relevant variables (especially inflation and unemployment).

An extension of the simulation model should, however, not lose sight of the *purpose* of the approach. There is little use in tracing through some specific politico-economic development; it is well known that an appropriate choice of parameters together with sufficient computer-time allow to 'imitate' any desired time sequence.

In the present paper, much emphasis has therefore been put on the specification of the *theoretical structure* of politico-economic interdependence. All the equations are based on some theoretical idea derived from traditional economics or from the New Political Economy. The purpose is to gain insight into the interaction of the economic and the political sectors and to therewith serve as a basis for the next step to be undertaken.

This next step consists in deriving those *parameter constellations* corresponding to reality. Though this may be done by intuitively assigning values to the parameters, it is preferable to derive them by formal estimation techniques known from econometrics. The construction of politico-economic models allows to improve single-equation estimations currently undertaken especially for popularity functions. The goal thus is to construct and estimate complete models of the politico-economic system—which may be called politometrics.

THE POLITICO-ECONOMIC SYSTEM

From the point of view of economics, the endogenisation of government behaviour means a decisive improvement. Besides the aforementioned possibility of better forecasting with econometric models, worthwhile contributions may be made especially to business cycle theory and other macro-economic fields. On the normative level, government advising may be improved as it can be checked what actions the government may undertake without endangering its reelection. The almost complete neglect of this aspect has been criticised especially by Policy Science [see DROR (1971)].

From the point of view of political science such modeling may further the introduction of economic aspects into political science. This may be more easily possible with the help of simulation rather than with more abstract analytical models.

*Universities of Constance
and of Basle*

BRUNO S. FREY

REFERENCES

- ÅKERMAN, JOHAN: 'Political Economic Cycles', *Kyklos*, Vol. 1 (1947).
- CAMPBELL, A., CONVERSE, P.H., MILLER, W., and STOKES, D.: *The American Voter*, New York, Wiley, 1960.
- DROR, YEHEZKEL: *Design for Policy Sciences*, New York, American Elsevier, 1971.
- FREY, BRUNO S., and GARBERS, HERMANN: 'Der Einfluss wirtschaftlicher Variabler auf die Popularität der Regierung – eine empirische Analyse', *Jahrbücher für Nationalökonomie und Statistik*, Vol. 186 (1972).
- FREY, BRUNO S., and LAU, LAWRENCE J.: 'Towards a Mathematical Model of Government Behaviour', *Zeitschrift für Nationalökonomie*, Vol. 28 (1968).
- GOODHART, C.A.E., and BHANSALI, R.J.: 'Political Economy', *Political Studies*, Vol. 18 (1970).
- KALECKI, MICHAEL: 'Political Aspects of Full Employment', *Political Quarterly*, Vol. 14 (1943).
- KRAMER, GERALD M.: 'Short-run Fluctuations in U.S. Voting Behavior, 1896–1964', *American Political Science Review*, Vol. 65 (1971).
- LIEFMANN-KEIL, ELISABETH: 'Intertemporale Spillovereffekte und öffentlicher Haushalt', in HALLER *et al.* (Eds.), *Theorie und Politik des finanzpolitischen Interventionismus*, Tübingen, Mohr (Siebeck), 1970.
- LINDBECK, ASSAR: 'Fiscal Policy as a Tool of Economic Stabilization', *Kyklos*, Vol. 23 (1970).
- MILLER, W.L., and MACKIE, M.: 'The Electoral Cycle and the Asymmetry of Government and Opposition Popularity', *Political Studies*, Vol. 21 (1973).

BRUNO S. FREY

SUMMARY

The politico-economic model is composed of two blocks, the economy and the polity. Their interaction is described by a relationship transferring impulses from the economy to the polity ('popularity function') and a relationship showing the reaction of the government to the expected chance of being reelected ('reaction function'). It is assumed that the government's goal is to stay in power as long time as possible. The simulation runs trace the development for various positive and negative exogenous shocks upon the popularity function. The purpose is to gain additional knowledge about such systems in order to be able to endogenize government behaviour in economic and econometric models.

ZUSAMMENFASSUNG

Das politisch-ökonomische Modell besteht aus zwei Blöcken, dem wirtschaftlichen und dem politischen Bereich. Ihre Interaktion wird durch zwei Beziehungen beschrieben: Die eine überträgt Impulse von der Wirtschaft auf die Politik («Popularitätsfunktion»), die andere zeigt die Reaktion der Regierung auf die erwartete Wiederwahlchance («Reaktionsfunktion»). Es wird angenommen, dass die Regierung solange wie möglich an der Macht bleiben will. Die Simulationsläufe geben die Entwicklung für verschiedene positive und negative exogene Anstöße auf die Popularitätsfunktion wieder. Das Ziel besteht darin, durch zusätzliches Wissen über solche Systeme eine Endogenisierung des Regierungsverhaltens in ökonomischen und ökonometrischen Modellen zu ermöglichen.

RÉSUMÉ

Deux blocs composent le modèle politico-économique: l'économie et la politique. Leur interaction est décrite par deux relations: l'une transfère des impulsions de l'économie à la politique («fonction de popularité»), l'autre montre la réaction du gouvernement à la chance attendue d'une réélection («fonction de réaction»). On assume que le gouvernement voudrait rester au pouvoir aussi longtemps que possible. Des *simulations runs* tracent le développement de plusieurs chocs exogènes, positifs ou négatifs, sur la fonction de popularité. Le but en est d'élargir la connaissance de tels systèmes afin de rendre endogène le comportement du gouvernement dans des modèles économiques et économétriques.