The Impact of Institutional Arrangements on Inflation[1]

A Study of 18 OECD countries, 1959-1990

by

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Abstract
We investigate the influence of institutional arrangements on inflation in 18 OECD countries. The factors considered are, on the on hand institutional constraints on monetary policy such as the independence of the Central Bank and commitment to fixed exchange rates and on the other political factors such as ideological and re-election motives. We find that an independent Central Bank has a disinflationary effect, whereas fixed exchange rates have no influence. Above a threshold value, the independence of the Central Bank becomes effective. The ideological colour of the government is measured by a new proxy that is more precise than those used in related studies. The use of this proxy changes the results significantly.

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1 Introduction

Inflation has become a well-entrenched phenomenon in many countries. Somehow it seems that the general price level can only rise implying that there is an inflationary bias in society. Consensus has it that inflation is likely to impose considerable economic costs (Fischer and Modigliani (1978)). Types of costs are, for instance, menu costs, the decrease in real money balances and decreased efficiency of the price system [2]. There is, however, a lack of understanding of the process which systematically generates inflation (Davis (1991)).

It is generally thought that the inflationary bias in recent decades has primarily been caused by policy mismanagement (see e.g. Guitán (1992)). A number of diverse and competing theories has been put forward to explain why policy makers seem to be unable or unwilling to crush inflation. We can distinguish between theories emphasising mechanisms that create higher levels of inflation and theories focusing on mechanisms that create cyclical patterns in inflation. Theories of the first category stress the lack of the appropriate domestic or international institutional arrangements constraining inflationary forces in society (Rogoff (1985), Alogoskoufis (1992)). Some theories in the second category emphasise the vulnerability of decision makers to the inflationary impulses stemming from either opportunistic or partisan politics. This would result in fluctuations in rates of inflation around election dates.

Since both a high level of inflation and unexpected fluctuations in this rate are undesirable, it would be interesting to seek out those institutions that are able to negate the bias in society as well as politically induced cycles. If there are institutional arrangements that seem able to contain inflationary tendencies, reforms could be implemented to increase society's efficiency.

Because monetary policy is the most important policy variable determining inflation, effective institutional arrangements should constrain the discretionary use of this policy. Various proposals for limiting the discretion of monetary policy can be found in the literature (See for instance Barro and Gordon (1983a) and Rogoff (1985) condensed in Blanchard and Fisher (1989)).

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Two of these proposals are considered in this paper: an increase in the independence of the Central Bank and becoming a member of a fixed exchange rate arrangement. We assume that the independent central banker and the anchor country in the exchange rate arrangement both pursue a low rate of inflation. The independent central banker guarantees that political factors will not influence monetary policy. The exchange rate arrangement constrains the use of domestic policy, even though the Central Bank might not be independent. So, in some sense, the membership of a fixed exchange rate regime and the independent Central Bank are substitutes.

The aim of this paper is to investigate the influence of institutional arrangements on the rates of inflation in industrialised countries. We pay attention to political influences, in particular the effects of elections and partisan policies, and to effects of an independent Central Bank and the membership of a fixed-exchange rate mechanism. A novelty of this paper is that it considers political factors and institutions of monetary policy simultaneously. A second feature is the use of a more precise proxy for the colour of the government.

The set-up of this paper is as follows. Section 2 describes the inflationary impact of discretionary monetary policy and the way in which an independent central banker or membership of a fixed-exchange rate regime can contain inflationary tendencies. In section 3 we review the theories on the possible influences by political parties. Sections 4 and 5 are devoted to the empirical evidence and Section 6 contains the conclusions.

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[2] Surveys of the theoretical and empirical literature on the costs of inflation can be found in Driffill et al. (1990) and Dowd (1994).

2 Central Bank independence, exchange rate arrangements and monetary policy

Room for discretion in policy-making has an important aspect to it; time inconsistency. This means that if policy makers have an incentive to renege on an announced policy, the public will incorporate this possibility in their expectations, reducing the credibility and effectiveness of the policy in question. As a result, society is likely to have higher inflation without any gain in output.

In the spirit of the rational expectations-upheaval, time inconsistency was first highlighted by Kydland and Prescott (1977). Using a game-theoretic approach they evaluate on the one hand the costs of an anti-inflationary policy, in terms of production and unemployment, and on the other the design of monetary policy to minimise these costs. Incorporating the "Lucas-critique", they show that the ex-ante optimal policy can be sub-optimal ex-post. Rational agents will recognise ex-ante that policy makers will face the temptation to "cheat" ex-post, so that the announced policy loses credibility. Generally, this lack of credibility will result in an outcome inferior to a situation where policy-makers can commit themselves to maintaining the announced policy. The equilibrium rate of inflation will be higher without any reduction in unemployment. A "consistent"-policy is one that leads rational agents to believe that the policy maker has no incentive to "cheat" ex-post.

How can we negate the inflationary effects suggested by the various theories? The solutions generally suggested are either "internal" or "external". Both approaches aim at reducing the latitude for discretionary policy. Internally, discretion could be reduced by increasing the cost of reneging to the policy maker. The costs of reneging could be increased if policy makers consider reputational effects as is done by Barro and Gordon (1983a,1983b) in the context of a repeated game. In their model they assume that an upward deviation from announced policy leads economic agents to believe that this high-inflation policy will be continued for one more period, regardless of the announced policy. This leads policy-makers to abstain from cheating if the cost in terms of loss of established reputation is too high. The rate of time preference and the length of the punishment period influence

the final outcome. Therefore, society could achieve lower equilibrium rates of inflation if cheating were more costly.

Another internal method of reducing the inflationary bias consists of the appointment of an independent "conservative" central banker. By isolating the Central Bank from direct political pressure from each current government, three goals can be achieved. First, there might be a reduction of the inflation bias caused by time-inconsistency. Second, pre-electoral manipulation of monetary policy could be reduced. Finally, partisan variability in monetary policy, might be diminished. Rogoff (1985) has advocated the appointment of a "conservative" central banker. Policy would still be set in a discretionary fashion and hence "cheating" would still be possible [3]. However, a conservative central banker would be more concerned with reducing inflation than the rest of society. As a result, such a central banker would generate a lower equilibrium rate of inflation. Extending Rogoff's analysis to a heterogeneous society, Waller (1989,1992) notes that in the presence of partisan disagreement over monetary policy there could still be gains for society as a whole. However, there will be partisan disagreement over the appointment of the central banker [4].

An "external" reduction in latitude for discretionary policy could be found in "tying your hands" (Giavazzi and Pagano (1988)). Giavazzi and Pagano suggest that monetary discipline could be achieved by fixing the domestic currency to a "hard" currency (i.e. German Mark). Policy will be more credible because the government is entering an international agreement. Breaking this "contract" will result in great political costs. These costs will deter the government from reneging [5]. This will lend increased credibility to government policy.

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[3] It has been argued that society would want to be cheated. Central Bank secrecy would aid the effectuation of these "surprises" (Lewis (1991), cf. Cukierman and Meltzer (1986)).

[4] Especially in the U.S.A. the constitutionality (i.e. democratic content) of an independent (i.e. not elected) monetary policy-body is questioned (Akhtar and Howe (1991:352-367), Belden (1991)). More specifically, Federal Reserve behaviour would be aimed at institutional preservation and not at optimising society's welfare (Auerbach (1991)).

[5] This can also be considered a form of bonding. In this case, the government arrives at a consistent solution by posting a bond that penalizes it for not carrying out the first best outcome. See e.g. Blanchard and Fischer (1989:599-600)

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3   Political factors

3.1   Introduction

It has been argued that the preferences of political parties and their concern regarding re-election generate "political business cycles" (PBC's) in both output and inflation. The theories dealing with electoral influences on policy trace their origins in the writings of Kalecki and Schumpeter (Rogoff (1988):53).

Two main approaches have evolved in the more general field of polical economy. The first approach views political parties as being only office motivated, while the second group sees them as trying to implement some kind of ideologically motivated program [6]. Within these approaches a distinction is made between models assuming "naive voters" and "sophisticated voters" [7]. We will cover these approaches in turn. At this point we should make some qualifying remarks with regard to the analysis. The theories examined assume, explicitly or implicitly, a bipolar political spectrum. Thus the complications of coalitions are ignored. Regretfully, we will follow this limited analysis. Another remark is that the "naive voter" category assumes a permanently exploitable Phillips-curve trade-off. Although internally consistent, since agents are unsophisticated in both the political and the economic arena, this line of research has suffered from the demise of the stationarity of the Phillips-curve. Another important insight, not incorporated in these models, is that agents will have some form of rationality. Therefore, the emphasis will be on the more recent theories incorporating rational voter behaviour. We simplify with regard to the control over monetary policy and assume that the elected government is able to determine monetary policy. Naturally, this is the case if the elected government is the sole policy maker, but even if monetary policy is determined by another, independent institution, extensive influence is possible[8].

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[6]   Preferences of the (median) voter or the parties representing him are taken as a given. See Cohen (1988) for an exposition on shifting preferences (eg. increased conservatism in the last decade).

[7]   The two categories could also be termed backward- and forward-looking (Ellis and Thoma (1991)).

[8]   See Section 3 for the role of an independent central bank. See Havrilesky (1988) for executive and Grier (1991) for legislative influence on monetary policy.

3.2   Opportunistic politicians

3.2.1   Nordhaus' legacy

In his seminal article on PBC's, Nordhaus (1975) argues that politicians are mainly interested in re-election. In his model, votes for the incumbent party are related negatively to inflation and unemployment, and positively to growth. Thus the incumbent has an incentive to boost output before an election coupled with a corrective contraction after the elections. This process results in long-term cycles in both real variables (GNP-growth and employment) and monetary variables (inflation). Empirical evidence of the existence of electoral budget cycles seems rather thin[9]. For the United States only the Nixon administration seems to have succumbed to the temptation of a political monetary cycle.

3.2.2   The rational extension

The application of game theory to macroeconomics has led to a restatement of the PBC-approach propagated by Nordhaus (1975) in a rational expectations framework. This extension is formulated by, for instance, Cukierman and Meltzer (1986), Rogoff and Sibert (1988) and Rogoff (1990).

The models in these papers share two basic ingredients. Firstly, different governments are characterised by different degrees of competency. Secondly, due to informational asymmetry, the government is better informed than the voters about its own level of competence. The models share the property that the incumbent government has an incentive to "signal" its competence by engaging in pre-electoral manipulations of policy instruments.

We will discuss Rogoff and Sibert's (1988) model as an example of these asymmetric information models [10]. In this model, competent governments are able to produce more public goods for given fiscal revenues than incompetent ones. Voters prefer competent governments to

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[9]   Empirical evidence rejecting the PBC is found in Alesina (1988), Alesina and Roubini (1992), Allen and McCrickard (1991), Alt and Chrystal (1983), Beck (1982), Grier (1989), Havrilesky (1987), Hibbs (1977,1987) and Laney and Willett (1983). Evidence in favour of the PBC can be found in Frey and Schneider (1978) - who combine 'opportunistic' and 'partisan' effects - or Haynes and Stone (1989).

[10]   In Rogoff (1990) the same definition of competence is used while in Cukierman and Meltzer (1986), competency is referred to as the ability to forecast. In the former model information is conveyed

incompetent ones. Signalling would proceed along the following lines: incumbents would reduce

taxes and/or increase spending before elections, to appear competent. Pre-electoral deficits are

monetized, but the voters notice the effects of the monetization on inflation or on real wealth only

after the election. Although voters are rational and aware of the government's incentives, the lag in

observation creates the latitude for signalling, financed with a pre-electoral deficit.

Alesina, Cohen and Roubini (1992) draw two important conclusions from these models.

Firstly, because of the assumption of asymmetric information, opportunistic cycles can survive in

rational models. In contrast to the cycles in Nordhaus' earlier work, however, the observed cycles

would not occur in GDP or employment; rational agents cannot be fooled repeatedly in the long run.

Incumbents could, however, engage in short-run manipulation of policy instruments around elections.

Therefore cycles would be found in short-term instruments like money-growth and

transfers.Secondly, rational behaviour does not preclude backward-looking voting behaviour. If

competence can only be evaluated on the basis of some kind of "performance record", rational voting

will be based on achieved policy goals and thus will be backward-looking.

Empirical evidence on the manipulation of policy instruments is mixed. It is, however,

stronger than the evidence in favour of Nordhaus's hypothesis [11].

3.3   The partisan approach

3.3.1   Hibbs' groundwork

Hibbs (1977,1987) disagrees with the opportunistic-approach, where party policy converges to court

the median voter. In his view, parties are ideologically identifiable, for instance in "Left-wing" = L

and "Right-wing" = R. L-parties are relatively more concerned about unemployment than about

inflation, while R-parties have opposite priorities. Voters choose the parties that best represent their

objective economic interest and subjective preferences. Voting is based on past performance and thus

naive. The implication of backward-looking behaviour and differing party objectives is that economic

through inter-temporal substitution of government investment and consumption and in the latter
competency is signalled through monetary growth rates.

policy only changes when the party in power is replaced. Monetary policy will be tighter under inflation-averse R-parties. This would lead to lower rates of inflation under R-parties than under L-parties. Therefore, a change of government from an L-party to an R-party leads to a decrease in the rate of inflation. Another implication is that incumbent parties do not try to "buy" their re-election through manipulation of economic performance. Cycles would not be linked to elections.

3.3.2 Election uncertainty

The idea, put forward by Hibbs, that parties differ in their ideological platform is intuitively appealing. However, the assumption that voting is based on past performance is not. The dissatisfaction with simplistic backward-looking voting behaviour led to the development of partisan models with "sophisticated" voters. The most important model in this line of research is a model proposed by Alesina (1988) and Alesina and Sachs (1988), focusing on the uncertainty of electoral outcomes. Like Hibbs, they assume a left- and a right-wing party, with different objective functions. However, because voters are perfectly informed about the policy preferences of the two parties they can calculate the rate of monetary expansion chosen by each party, leading to perfect -and therefore correct- expectations in non-election periods. Since there is no surprise inflation, output will be at the level determined by the market. In election periods, however, there is uncertainty as to which party will be elected. Rational voters can calculate the expected rate of monetary expansion. They calculate this rate as a weighted average, using the respective election victory probabilities, of the discretionary rates chosen by each party in case of election. After an election it becomes clear which rate of monetary expansion will prevail but there will be surprise inflation or deflation because the actual rate of monetary growth will differ from the expected rate. This will lead to a recession in the first half of an R-administration because the actual rate of monetary expansion will fall short of the expected rate, while the reverse holds for an L-administration. The larger the difference in relative weights assigned by the parties to the two targets, the larger the upward or downward deviation from the output growth trend. Another implication of the uncertainty of the electoral outcome is that the

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[11]   Tentative support for fiscal transfers can be found in Alesina (1988) and Hibbs (1987). Evidence

more surprising the electoral result, the greater the difference between the expected and the actual money growth will be. This surprise inflation (deflation) leads to a bigger deviation of output growth from its trend.

3.4 Conclusion

What do the reviewed theories predict for the behaviour of output and inflation? table a presents a summary of the various theories.

Table A Models of electoral cycles

Party Motivation →	Opportunistic	Ideological/Partisan
Voter Behaviour ↓		
Naive	Nordhaus (1975,1989): All incumbents will stimulate prior to elections and shift focus back to price stability after elections. This will lead to consistent cycles in output and inflation, with output rising before and inflation rising after or just before elections.	Hibbs (1977, 1987): Liberal and conservative parties choose different output-inflation trade offs. Thus there will be significant differences in actual inflation levels between governments of a different "colour". No cyclical pattern around elections.
Sophisticated	Cukierman-Meltzer (1986) Rogoff-Sibert (1988) Rogoff (1990): Short-run manipulation of policy instruments. Informational asymmetry gives governments an incentive to "signal" their competence. No consistent cycles in output, but manipulation of policy-instruments around elections, and thus a rise in inflation after an election	Alesina (1989) Alesina-Sachs (1988) Havrilesky (1987): Voters understand ideological differences but due to electoral uncertainty different patterns of money-growth prevail. Decline in output and actual inflation if government changes from Left to Right, while the reverse holds for a switch from Right to Left.

Ex-ante, the model proposed by Nordhaus does not seem very convincing. It relies on predictable "surprise", which is a contradictio in terminis. It is therefore not surprising that it has not received very strong empirical support (see note 9). Hibbs' model predicts a lack of cycles around elections but different levels of inflation between governments of a different colour because of different objectives. Both these models rest on the assumption that agents are naive. The sophisti-

identifying a monetary cycle is presented in Grier (1989).

cated extensions, reviewed in Sections 3.2.2 and 3.3.2 try to incorporate rational agents in the

models. Their results are based on informational asymmetry or election uncertainty. The

opportunistic model predicts manipulation of policy instruments around election dates, which might

give rise to an increase in inflation after an election. The partisan model expects significant

differences in inflation between governments of a different "colour".

4 Empirical Evidence: specification and variables

We test the theories presented in the previous sections by means of the following relation for the rate of inflation.

$$\Delta P_{it} = \beta_{0it} + \beta_1 BANK_{it} + \beta_2 EXMECH_{it} + \beta_3 ELECT_{it} + \beta_4 COL_{it} + \beta_5 \Delta P_{t-1} + \beta_6 \Delta P_t^W + \beta_7 Oil_t + \varepsilon_{it}$$

In this model ε_{it} is an independently distributed disturbance term. A short description of the variables is given in table b while a more thorough description can be found in the following sections. The percentage change in world price index, ΔP_t^W and the dummy for the oil price shocks, Oil_t are included to control for exogenous factors. To take account of the persistence of inflation ΔP_{it} is added with a one period lag. table b presents the theoretical signs of the coefficients.

Table B The variables and their expected signs

Variable	Definition	Assumption Tested	Sign
BANK	Proxy for the relative degree of Central Bank independence based on legal texts.	An independent Central Banker is able and inclined to pursue less inflationary policies.	-
EXMECH	Proxy for the commitment to the exchange rate arrangement.	A fixed exchange-rate mechanism is associated with lower inflation.	+
ELECT	Dummy for elections.	Elections cause inflationary manipulation of policy.	+
COL	Proxy for the "colour" of the government.	Left-wing governments are inclined to choose higher rates of monetary growth.	+
OIL	Dummy for oil-shocks.	A rise in oil-prices has an inflationary effect.	+
ΔP_t	Percentage change in the Consumer Price Index [12].	---	---
ΔP_{t-1}	See P_t.	Rates of inflation show persistence.	+
ΔP^W	Percentage change in the world price index.	World inflation relates positively to domestic inflation.	+

The signs of the coefficients of variables representing institutional arrangements (BANK, EXMECH, ELECT and COL) follow from their construction. Before presenting the empirical results we turn to a discussion of the construction of these central variables.

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[12] Where the subscripts i and t denote that the particular occurrence concern the ith country at time t. The annual percentage rates were computed from indices given in various issues of the International Financial Statistics Yearbook, International Monetary Fund.

4.1 The independence of the Central Bank

A host of factors determines the degree of independence of the Central Bank. We can divide these factors into *formal* and *informal* influences.

Formal factors include, for instance, the sources of appointment of the governors of the bank or methods for reaching decisions [13]. Previous research has almost exclusively dealt with international comparisons of bank laws [14]. Most indices are constructed in a similar fashion. Bank laws are examined for a limited number of relatively precise legal characteristics such as control over policy or appointment of top-level officials. Except for Cukierman's index (Cukierman (1992)) the reviewed indices were computed for approximately the last decade only. It is surprising that there is disagreement even over such a short time-span and employing such clear data [15]. The disparities could be caused by either differing interpretations of the sometimes ambiguously stated bank laws or by dissimilarities in the construction of the various indices (Eijffinger and Schaling (1992)).

The degree of independence of the Central Bank is not solely based on its formal or legal status. *Informal factors* such as the personality of key figures involved, informal arrangements between the government and the monetary authority and cultural habits have a pronounced effect on actual independence [16]. However, these factors are less easily quantifiable. Even when the law is quite explicit, actual practice can deviate substantially because tradition has it that way [17].

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[13] Other important institutionalised factors are the statutory goals, the ownership-structure of the bank, formal liaisons or interchange of staff with the finance ministry and the reporting requirements or accountability to Parliament or Congress (Banaian, Laney and Willett (1983)).

[14] A short-list should certainly include the following: Banaian, Laney and Willett (1983), Parkin (1987), Alesina (1988), Masciandaro and Tabellini (1988), Grilli, Masciandaro and Tabellini (1991), Cukierman (1992), Eijffinger and Schaling (1992) and Eijffinger,van Roij and Schaling (1996).

[15] See Eijffinger and de Haan (1996) or Eijffinger and Schaling (1992) for a comparison.

[16] Havrilesky and others have shown that, for instance, not only the partisan affiliation but also the career and background characteristics of monetary policy makers in the U.S., including those who are not politically appointed, have significant effects on their monetary policy preferences. Havrilesky (1990), Havrilesky and Gildea (1992). Not so Belden (1991).

[17] The Dutch situation is a case-in-point. Formally, the minister of finance can issue directives to the Central Bank. However, this has never happened nor is it deemed likely to happen (See also Eijffinger and de Haan (1996). Cukierman (1992:386-391) proposes a questionnaire-method. Unfortunately this method has yet to produce a consistent index.

Rendering a balanced judgement on the "legal" indices necessitates detailed knowledge of the various bank laws. Since the evaluation of these indices is not our concern, we chose an index very simple criterion: the period covered. Since Cukierman (1992) is the only author who provides data for the whole post-war era we employ his weighted index of legal independence in the empirical test.

4.2 Exchange rate mechanisms

We constructed the variable EXMECH to capture commitment to fix the domestic exchange rate to an anchor currency. This variable means to capture two aspects of commitment; on the one hand the success in keeping the exchange rate stable and on the other the cost of stability in terms of reserves. Thus we define the variable as

$$EXMECH_{it} = \frac{\sum_{t=1}^{n} \frac{|E_{it} - E_{it-1}|}{E_{it-1}}}{\sum_{t=1}^{n} \frac{|R_{it} - R_{it-1}|}{R_{it-1}}}$$

where E_{it} is the exchange rate termed in local currency against the anchor currency, R_t the stock of reserves and n is set at 4 quarters [18]. The quarterly exchange rate, E_{it}, is taken from International Financial Statistics from the IMF. To determine the anchor country we consulted the IMF Annual Report on Exchange Arrangements and Exchange Restrictions [19]. We did not use the IMF classification because it may depend to a certain extent on wishful thinking [20]. If the exchange rate is relatively stable the EXMECH-variable will approach 0. A rise in EXMECH is tempered by the amount of reserves a country is willing to spend defending its currency. Higher values, truncated at the maximum of the rest of the sample, correspond with more unstable exchange rates. To capture the sluggishness of reputation building it is added with a one period lag.

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[18] Countries with floating currencies do not have an anchor currency. Therefore we calibrated their score at the maximum of the rest of the sample. Other specifications in the same vein were computed but did not give qualitatively different results

[19] The determination of anchor currencies follows directly from the IMF Annual Report but is available on request.

[20] See Honkapohja and Pikkarainen (1994: 52, note 9).

4.3   Political variables.

To consider electoral effects we include the dummy-variable $ELECT_{it}$. It equals 1 in a year in which an election is held in the first or second quarter. If an election is held in the latter half of the year, the following year is coded as 1. The slightly lagged definition of this variable captures the sluggishness of rates of inflation in response to any policy manipulation.

A number of problems are encountered in the definition of the "colour" of the government (COL-variable). The first problem is that a clear definition of Left/Liberal/Democratic or Right/Conservative/Republican cannot be given. This problem would become even more knotty, if the definition were to be valid across countries. So, even if a preference-function *could* be extracted from a political party's proclaimed goals, cross-country comparison would be difficult. Another problem is that preferences of political parties seem highly unstable. Changes in perceived popularity can have pronounced effects on politicians' stated policy goals [21].

Considering these difficulties, previous research has categorised governments into Left- and Right-wing categories. Alesina and Roubini (1992:685-687) give an easily accessible categorisation used by most authors in this line of research [22]. Governments are classified as either left- or right-wing. However, Woldendorp, Keman and Budge (1993) present a more precise categorisation. The ideological complexion of the government is ranked on a scale of 1 to 5. Strong Right-wing governments are assigned a value of 1 while higher values represent first weaker right-wing and then increasingly left-wing governments. The classification not only measures the colour but weighs it to reflect the degree to which a government can attain it's goals. We will employ this classification for the coding of the COL-variable in the test [23].

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[21]   "...it's a theory (Monetarism) I have never adhered to...", (M. Thatcher, BBC-interview, mid 1984) after it became clear that her Monetarist-policies were playing havoc with the British economy, causing high inflation and all time lows in popularity polls.

[22]   This categorisation is also presented in Alesina, Cohen and Roubini (1992). See Banks (1987) and Alt and Chrystal (1983) for an exposition on the matter of categorising parties.

[23]   In the classification of Woldendorp et al the United States are not included since the constitutional system is a presidential one. After conferring with professor Keman we allotted a 2.5 to a Republican President and 3.5 for a Democrat.

4.4 Concluding remarks

There are a number of difficulties that arise in this line of empirical research, in which institutions and policy makers' behaviour are modelled [24]. Some problems concern the exact definition of the variables. We already dealt with these difficulties in the previous sub-sections. Another problem is the low variance of these variables. Institutional changes or even changes of governments are relatively infrequent events. Thus, the researcher has few useful observations, even if he takes a relatively long sample-period. As a consequence there is a lack of degrees of freedom. A related problem is that some proxies are relatively static, leading to a singular matrix in regression analysis. For instance, the degree of independence of the Bundesbank as proxied by its legal independence has not changed since 1949 (Cukierman (1992)). To counter the problem caused by static Central Bank independence and to enlarge the number of degrees of freedom we employ pooled time-series and cross-national analyses. This alleviates the singular matrix difficulties caused by relatively static structural factors.

The sample period runs from 1959 to 1990 and we consider the following 18 countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States.

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[24] See Lombra and Kaufman (1992) for a more extensive exposition on this issue.

5   Empirical results

The results for the pooled time-series are shown in table c. An independent central bank and fixed

exchange rates appear to have had a disinflationary effect during the period 1959-1990 (table c,

column one). The full model explains approximately three-quarters of the variance, indicating a

reasonable fit. The covariance between the variables is within reasonable limits (See Appendix).

Table C Model results on pooled time-series (1959-1990)

Variable	1959-1990	1959-1972	1973-1990	Bank$_{low}$	Bank$_{high}$	Inflation$_{low}$	Inflation$_{high}$
BANK	-2.112	-.872	-3.062	4.630	-4.206	-1.718	-0.528
	(-3.659)	(-1.255)	(-3.609)	(2.259)	(-3.834)	(-3.155)	(-0.356)
EXMECH	.007	.006	-.012	-.008	.182	0.135	0.049
	(2.049)	(1.999)	(-.095)	(-.363)	(1.654)	(0.766)	(1.408)
ELECT	.310	.277	.269	.606	-.045	0.071	0.304
	(1.568)	(1.130)	(.942)	(1.957)	(-.195)	(0.306)	(1.035)
COL	.052	.051	.078	.043	.137	-0.003	0.097
	(0.913)	(.719)	(.969)	(.509)	(1.853)	(-0.034)	(1.213)
ΔP_{t-1}	.587	.349	.649	.525	.614	0.523	0.478
	(21.863)	(6.748)	(19.265)	(13.297)	(16.116)	(11.941)	(12.775)
ΔP^W	.454	.704	.466	.616	.333	0.359	0.750
	(11.675)	(8.110)	(9.292)	(10.173)	(7.013)	(7.510)	(11.857)
OIL	1.366	---	1.575	1.355	1.295	1.233	0.638
	(3.541)	---	(3.694)	(2.190)	(2.912)	(2.707)	(1.106)
Constant	.536	.401	.068	-1.279	1.959	0.930	-0.364
	(1.673)	(.893)	(.134)	(-1.447)	(3.348)	(2.526)	(-0.579)
R Square	.760	.438	.769	.756	.792	.711	.792
Adj. R Square	.757	.424	.764	.750	.787	.703	.787
Stand. Err.	2.074	1.670	2.256	2.291	1.722	1.704	2.181

The numbers not in parentheses denote the magnitude of the coefficients while the numbers in parentheses give the t-statistic.

In order to investigate the robustness of the result we have distinguished some sub-periods

and sub-groups of countries[25]. The sub-periods are the Bretton Woods period - a period characterised

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[25]   Another complication which we investigated, but for which we will not present the results here, is that
in our specification short- and long-run influences are thrown together. If we purge the equation of all
short-run influences (i.e. π=f(BANK,COL) and use 5 or 10 year averages the results do not differ

by a global fixed exchange rates system - and the post Bretton Woods period, characterised by flexible exchange rates between the most important currencies. The EXMECH variable has a significant inflation-reducing influence during the Bretton Woods period (table c, column two), whereas the Bank variable has this role during the post-Bretton Woods period (table c, column three)[26]. This suggests that the independence of the central bank has become more important and that there is a trade-off between the autonomy of the central bank and the exchange rate system (See below).

The countries were divided into two subgroups of equal size on the basis of the following criteria: One equal split was made between those countries that have an independent central bank versus countries with a relative dependent central bank. The other grouping was between countries with high versus those with low inflation rates. It appears that the BANK variable has the wrong sign in the group of countries with a dependent central bank. This variable is highly significant and correctly signed in the group of countries with an independent central bank (table c, columns four and five, respectively). These results suggests that there is a threshold level of independence above which the autonomy of the Central Bank becomes effective[27]. The results for the groups of high and low inflation rate countries (table c, columns six and seven) show that the independence of the central bank is only effective in countries with a low inflation rate. The other institutional variables do not have any significant influence in these two subgroups.

A conclusion from Section 2 was that rates of inflation would probably be lower under an unaccommodative fixed exchange-rate mechanism than under flexible rates. However the coefficients for the EXMECH variable have mixed signs. During the full period and the Bretton-Woods period the sign is correct and significant but the coefficient becomes insignificant in the second sub-period.

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significantly from those presented: BANK still has a significant negative influence on inflation and the coefficient of COL is insignificant.

[26] See also de Haan en Sturm (1992).
[27] We also tested for interaction between central bank independence and the exchange rate commitment by including an interaction term. This proved to be an unfruitful approach, probably due to the scaling of the two proxies. However rescaling still left the commitment variable insignificantly different from zero. Heylen and van Poeck (1996) stress the importance of interaction but estimate a 'blanket'

Maybe the fact that the exchange rate commitment does not reduce inflation in a significant way during every sub-period can be ascribed to the way the external commitment is measured. We therefore direct part of our future research to the measurement of external commitment.

Table 2 surmised the expected results yielded by the various theories concerning electoral influences reviewed in Section 3. Recapitulating and simplifying, the "opportunistic"-approach predicted significant effects around elections but no significant differences between parties[28]. There is a slight, positive effect in election years especially in countries with relatively dependent Central Banks (See the fourth column). Models of the "partisan"-approach predict significant differences in rates of inflation under left- and right-wing governments. In contrast with previous research, the variable capturing this effect, COL, does not support the theory[29]. Introducing a lag in the influence of the political color of the government does not change this. The variable does appear to be almost significant for the countries with a relatively independent Central Bank (column five). This suggests that in countries with a dependent Central Bank political influences are "channelled" through the Central Bank whereas in countries with an independent Central Bank this channel is cut off and therefore the political influences become a factor of their own [30]. This suggestion is supported by the increased covariance between the COL and the BANK variable: from 0.074 in the first sub-section to 0.245 in the second sub-section..

A conclusion from the results presented in table c is that there seems to be a trade off between the various institutional arrangements. In particular, the results of the Bretton Woods period versus the post Bretton Woods period suggest a trade-off between fixed exchange rates and the independence of the central bank, whereas the subdivision of high and low central bank independence

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interaction term; i.e. they assume that the interaction is equally strong for all included explanatory variables.

[28] As noted, the theories assume a bipolar system. To investigate if the neglect of the dynamics of coalitions is warranted we split the sample in countries with two-party versus a multi-party tableau; The results did not really differ between the groups.

[29] See for instance Alesina, Cohen and Roubini (1992). Employing their proxy for the 'colour' of the government in the model of the first column gives a coefficient value of 0.43 with a -significant- t-value of 2.26. This implies that a left-wing government might pursue more expansionary policies.

suggest a trade off between the independence of the central bank and the political variables. In order to have a direct test of these trade offs, two variables have been added to the list of explanatory variables, namely CROS 1 and CROS 2. These terms are constructed by dividing respectively COL and EXMECH by BANK. We expect the influence of CROS1 to be positive due to the following: the direct signs of COL and BANK are expected to be positive and negative, respectively. By construction the value of CROS 1 becomes smaller when BANK becomes larger, i.e. the central bank becomes more independent. Thus, if the sign of CROS 1 is positive a left wing government is more inflationary but will be curbed by the Central bank. We constructed CROS 2 to capture any interaction between the commitment to an exchange rate target and the independence of the central bank. An independent central bank could, for instance, very well be in favour of exchange rate commitments. Another possible interaction channel is that given a strong commitment to an exchange rate target the central bank is left with less leeway in monetary policy. It is therefore likely that the influence of central bank independence will be lower under relatively more fixed exchange rate arrangements.

The resulting relation has been estimated for all (sub)groups and (sub)periods mentioned in table c. For each regression the variable with the least significant coefficient has been deleted until all remaining coefficients are significant. The results are presented in table d.

[30]   Analogously to the interaction term between the exchange rate commitment and the central bank independence, we estimated a model with an interaction term between the colour of the government and the degree of central bank independence. Again this approach was unfruitful.

Table D Model results after stepwise deletion on pooled time-series (1959-1990)

Variable	1959-1990	1959-1972	1973-1990	Bank$_{low}$	Bank$_{high}$	Inflation$_{low}$	Inflation$_{high}$
BANK	-2.113	---	-3.080	4.774	---	-1.743	---
	(-3.662)		(-3.680)	(2.352)		(-3.235)	
EXMECH	.064	.056	---	---	.212	---	---
	(1.975)	(2.049)			(1.928)		
ELECT	---	---	---	.598	---	---	---
				(1.939)			
COL	---	---	---	---	-.741	---	---
					(-3.683)		
CROS 1	---	---	---	---	.396	---	---
					(4.082)		
ΔP_{t-1}	.586	.353	.653	.529	.609	.521	.472
	(21.870)	(6.995)	(19.956)	(14.043)	(16.037)	(11.972)	(13.509)
ΔP^W	.457	.704	.472	.613	.360	.351	.771
	(11.736)	(8.154)	(9.626)	(10.251)	(7.423)	(7.665)	(14.302)
OIL	1.382	---	1.550	1.327	1.209	1.244	---
	(3.578)		(3.673)	(2.160)	(2.725)	(2.744)	
Constant	.729	.231	.290	-1.426	-.120	1.049	-.183
	(2.454)	(.772)	(.613)	(-2.429)	(-.475)	(3.321)	(-.685)
R Square	.758	.430	.773	.755	.793	.710	.794
Adj. R Square	.756	.423	.770	.751	.789	.706	.792
Stand. Err.	2.076	1.672	2.246	2.285	1.715	1.697	2.177

The numbers not in parentheses denote the magnitude of the coefficients while the numbers in parentheses give the t-statistic.

For most (sub)groups and (sub)periods the results of the equations with the cross-terms (table d) reaffirm the conclusions derived from table c. The only cross term that appears to be significant is CROS 1 in the relation of countries with a highly independent central bank (table d, column five). In this relation the following institutional factors are significant: EXMECH, COL (wrongly signed), and CROS 1. The significance of the coefficient of CROS 1 suggests that there is a trade off between the colour of the government and the independence of the central bank. The direct effect of central bank independence becomes insignificant and that of the colour of the government becomes significant but wrongly signed. Hence, chances are that these results originate from the resulting multicollinearity between BANK, COL, and CROS 1. We, therefore, stick to the results of table c and conclude that in

the case of countries with an independent central bank, inflation is lower than with a dependent one

and that in these countries there is a tendency that left-wing governments increase inflation. No

plausible direct cross effect is significant and thus these results once again show robustness of the

estimations presented in table c [32].

Finally, we estimated the model for each country individually. These regressions confirm our

choice of pooled estimation. For most countries only world inflation and lagged inflation were

significant. The within-country variation of the other variables is not large enough to give a

meaningful estimate. However, for some countries some variables did remain significant. After

stepwise deletion of the least significant variables some institutional effects remain for two countries

(See table e).

Table E Institutional influences in individual countries (1959-1990)

Variable	Australia	Italy
EXMECH	---	.104
		(2.630)
ELECT	---	1.769
		(2.012)
COL	.451	---
	(2.662)	
ΔP_{t-1}	.454	.485
	(4.363)	(6.145)
ΔP^W	.611	1.198
	(4.614)	(7.594)
Constant	-.637	-2.627
	(-.947)	(-3.136)
R Square	.859	.912
Adj. R Square	.844	.899
Stand. Err.	1.638	2.030

The numbers not in parentheses denote the magnitude of the
coefficients while the numbers in parentheses give the t-statistic.

[32] The robustness is reaffirmed by estimates for the various sub-samples in Table 3 without the countries of the two major anchor currencies, the US Dollar and the German Mark. These regressions did not change the result drastically.

For Australia the variable COL remains significant (table e,column one). This is due to the terrible inflationary record of the Australian Labour Party. For Italy the variable EXMECH and ELECT are significant (table e, column two). The fact that ELECT remains significant whereas COL is insignificant seems plausible. After World War II Italy has seen many changes in governments and there were many elections. However, during our sample period all governments were dominated by the same parties. The significant influence of the exchange rate mechanism suggests that the Italian membership of fixed-exchange-rate- regimes - the Bretton Woods system, the Snake and European Exchange Rate Mechanism - has been instrumental for reducing inflation.

6 Conclusion

In this paper we have investigated the influence of institutional arrangements on inflation in 18 OECD countries during 1959-1990. The institutional factors considered are the degree of independence of the Central Bank, the membership of a fixed-exchange rate arrangement and political variables, such as elections and partisan policies. The regression appeared to explain about three-quarters of the variance of the rate of inflation. An independent Central Bank appears to significantly reduce the level of the rate of inflation. A more detailed analysis suggest that there is a threshold level of independence above which the independence of the Central Bank becomes effective. It was also suggested that in countries with a dependent Central Bank political influences are channelled through the bank while this channel is blocked in countries with a more independent Central Bank. In some cases we found an indication that the membership of a fixed exchange rate regime reduces inflation rates. In countries with a dependent central bank after election years political factors increase the rate of inflation. In this study a new proxy for measuring the ideological colour of the government is employed. This proxy is more precise then the proxy published in Alesina, Cohen and Roubini (1992) and used in most previous studies. It appears that ideological motives have no influence on inflation whereas there are effects in studies using the 'Alesina'-proxy.

For future research we suggest the development of a measure that represents the degree of commitment to a fixed exchange rate regime. Another direction that might be fruitful is to investigate whether there is a critical level at which Central Bank independence and/or the commitment to a fixed exchange rate mechanism becomes effective in reducing inflation. Finally, an interesting avenue, which has not been explored here or in any other literature, is in what way these theories would be applicable to non- or newly industrialising countries.

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Appendix

Table F Correlation of variables (1959-1990)

	ΔP_t	ΔP_{t-1}	ΔP^W	BANK	COL	ELECT	EXMECH	OIL
ΔP_t	1.000	.817	.717	-.229	.105	.015	-.046	.261
ΔP_{t-1}		1.000	.592	-.232	.093	-.093	-.078	.078
ΔP^W			1.000	-.024	.096	.005	-.130	.378
BANK				1.000	.029	-.011	-.074	-.011
COL					1.000	.012	-.048	.032
ELECT						1.000	-.026	.032
EXMECH							1.000	-.043
OIL								1.000