

CENTRAL BANK LAWS AND MONETARY POLICY

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ABSTRACT

This paper investigates the cross-country relationship between monetary policies and the laws which establish and delimit the powers of central banks. The study is empirical and deals with the experience of twelve industrial countries (Australia, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States) during the floating exchange rate years 1972 to 1986.

Our main conclusions are: (i) there is evidence that central banks which are independent of central governments both in policy-making and in the appointment of directors deliver a lower rate of inflation than other central bank types; (ii) such central banks do not deliver lower variability of inflation; (iii) there do not appear to be any systematic differences in the macroeconomic variables that trigger policy reactions across different central bank types; and (iv) no policy differences appear to arise from the financial relationships between the central bank and government.

I. INTRODUCTION

This paper addresses a narrow and well-defined aspect of the broader question: Why do inflation rates vary across countries? Specifically, it investigates the cross-country relationship between monetary policies and the laws which establish and delimit the powers of central banks. The study is empirical and deals with the experience of twelve industrial countries (Australia, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States) during the floating exchange rate years 1972 to 1986.¹

In the next section (II), we describe the central bank statutes of the twelve countries, focusing on three areas: (i) The relationship between the central bank and government in the formulation of monetary policy; (ii) the procedures for appointing and removing central bank directors; and (iii) the financial and budgetary relations between the central bank and government. On the basis of this description, we classify the twelve central banks according to their degrees of policy independence and financial independence from government. In Section III we describe the monetary policies of the twelve countries, focusing on two features of policy: (i) The degree of inflation as measured by the rate of change of consumer prices and (ii) the variability of policy as measured by the dispersion of the inflation rate. In Section IV, we search for associations between central bank "types" and the characteristics of monetary policy established in Sections II and III.

Our main conclusions are as follows. First, there is evidence that central banks which are independent of central governments both in policy-making and in the appointment of directors deliver a lower rate of inflation than do other central bank types. They do not, however, deliver

¹An earlier but less satisfactory attempt at this task may be found in Michael Parkin and Robin Bade (1978).

lower variability of inflation. Second, no policy differences appear to arise from the financial relationships between the central bank and government.

How robust these conclusions will be to extending the number of countries studied, using alternative measures of the characteristics of monetary policy, or, more importantly, to systematically controlling the informal rules and procedures as well as the broader constitutional and intellectual environment in which monetary policy is made, only further work can reveal.

II. CENTRAL BANK LAWS

Central bank laws and related legislation differ in a large number of respects and a more detailed classification and analysis could be undertaken than that presented here. We focus on those limited aspects of central bank laws which existing economic analyses predict will have an influence on the degree of inflation and the variability of policy. The small but growing literature on the positive theory of monetary policy (see, e.g., Robert J. Gordon (1975), Finn E. Kydland and Edward C. Prescott (1977), Robert J. Barro (1983), Barro and David B. Gordon (1983a, 1983b), David Backus and John Driffill (1985), Alex Cukierman (1985) and Allan H. Meltzer and Cukierman (1986)) suggests that policies will differ depending on whether the policy-making agent is a discretionary democratically-elected relatively short-lived government or rule-governed, autonomous and relatively long-lived central bank for which reputation is an important consideration. The main features of potential importance, therefore, concern the relationship between the central bank and its major policy-making organs on the one hand and government on the other. There are three subsidiary matters which need to be examined: First, the relationship between the policy-making organs of the central bank and those of the government as regards the formation and execution of monetary policy; secondly, the role of government in the appointment

of members of the central banks' policy-making organs; and thirdly, the degree of financial control exercised by the government over the central bank. We examine each of these in turn beginning with the policy-making organs.

A. The Relationship Between the Central Bank and Government in the Making of Monetary Policy

The central banks of Australia, Belgium, France, Italy, the Netherlands, Sweden, and the United Kingdom are subservient to the central governments in those countries in the formulation and conduct of monetary policy; those of Germany, Japan, Switzerland and the United States have varying degrees of independence from central government; while that of Canada underwent a change in status in 1967 and, prior to that date, was largely independent of government but since then has had its legislated powers diminished. We examine first those banks which are subservient to their governments.

The final authority for the conduct of monetary policy in Australia is the Federal Treasurer. In order to minimize disagreements and the need for extremes of formalism in the relations between the Reserve Bank and the Federal Treasury, "The Governor and the Secretary to the Department of the Treasury shall establish a close liaison with each other and shall keep each other fully informed on all matters which jointly concern the Bank and the Department of the Treasury" (Reserve Bank Act, 1959-1973, 13, p. 284 and Aufricht, 1961, p. 56). Further, however, the Board of the Bank is required to inform the government of its monetary and banking policy and, in the event of a difference of opinion between the government and the Board, the Treasurer and the Board are charged with the "endeavour to reach agreement". Failing an agreement, the Bank Board must furnish the Treasurer with a statement in relation to the disputed matter. The Treasurer may

then submit a recommendation to the Governor-General (the head of state) who, acting with the advice of the Federal Executive Council, determines the policy to be adopted by the Bank. The Treasurer then has to inform the Bank of the policy so determined and that the government accepts responsibility for the policy. The Bank Board is then required to adopt the policy. Further, the Treasurer must lay before Parliament a copy of the relevant order determining policy and a statement by the government on the matter in respect of which the difference of opinion arose (Reserve Bank Act 1959-1973, 11(1) through 11(7), pp. 283-4 and Aufricht, 1961, pp. 55, 56). Thus the federal government is unambiguously in charge of monetary policy, but at the expense of having to take any dispute between the Bank Board and the government into the public arena. The Banking Act of 1959 (Section 50) strengthens the power of the Federal Treasurer even more by requiring the Reserve Bank to obtain approval of the Federal Treasurer prior to making regulations concerning the control of interest rates and discounts (Aufricht, 1961, p. 49).

The lack of authority of the National Bank of Belgium is clear from Article 29 of the Organic Law of the National Bank, 1939. That article states that "the Minister of Finance shall have the right to control all the Bank's operations. He may oppose the execution of any measure which would be contrary to the law, the By-laws or the interests of the State. This control shall be entrusted to a Government Commissioner." Article 30 goes on to define the position of the government commissioner, which is to "supervise all the Bank's operations, ... [to] suspend and report to the Minister of Finance any decisions that would be contrary to the law, the By-laws or the interests of the State" (Aufricht, 1967, p. 65).

The relationship between the Bank of France and the French government cannot be established by only examining the Codified Statutes of the bank, for monetary policy in France involves three agencies: The Bank of France, the National Credit Council, and the Banking Control

Commission. "Of this trio, the National Credit Council, set up in 1945, is the policy-making arm of authority" (Wilson, 1962, p. 34). The Law of December 2, 1945 (Article 13) states the composition and authority of the National Credit Council and its position vis-à-vis that of the Bank of France (Aufrecht, 1967, p. 205). The Bank's role is advisory and executive. It does not make monetary policy. The law of 1973 changed the details but not the substance of the Bank's powers. In the words of the 1973 Law "the Bank of France is entitled to give advice on all questions relating to the currency. The Bank contributes to and participates in the formation of monetary policy agreed by the Government and with the cooperation, within the framework of its competence, of the National Credit Council" (Loi de 3 Janvier, 1973, Article 4, p. 1 (our translation)).

The Statute of the Bank of Italy (1936) provides only an implicit statement of the relationship between the Bank and the government. The Board of Directors is charged with the general administration of the Bank (Article 20) but not with powers to make monetary policy. It may be inferred from Article 25, which sets out the powers of the Governor, that the Bank is largely subservient to the government. That article states that the Governor "shall make proposals to the Minister of the Treasury concerning changes in the discount rates and in the interest rate on advances" (Aufrecht, 1967, pp. 427, 429). The clear implication is that monetary policy is proposed by the Bank, approved (or otherwise) by the government through the Ministry of the Treasury and executed by the Bank.

The relationship between the Netherland's Bank and the government is set out in Article 26(1) of the Bank Act of 1948 which states that "our Minister may, after consultation with the Bank Council, give such directions to the Governing Board of the Bank as he thinks necessary for the Bank's policies" (Bank Act 1948, De Nederlandsche Bank N.V., p. 13 and, with a slightly different translation, Aufrecht, 1967, p. 471).

The relationship between the Central Bank of Sweden, the Riksbank, and the government are defined in the Sveriges Riksbank Act of 1934. Article 32 of that Act states that "the directors (of the Riksbank) may not receive instructions with regard to the administration of the Riksbank from anyone except the Riksdag or its Banking Committee. ...the directors are not obliged to account for their functions as Directors to except to the Riksdag or its Banking Committee and Auditors. ...The Riksdag decides on the granting of discharge to the Directors of the Riksbank" (Aufrecht, 1967, pp. 668-9). Further, Article 38 states that "such rules as are necessary for the administration of the Riksbank in addition to the present Act are laid down by the Riksdag in special regulations" (Aufrecht, 1967, p. 670). Many "special regulations" have in fact been "laid down" by the Riksdag. Examples are the Liquidity and Cash Ratio Act, 1962, the Investment Ratio Act, 1962, and the Interest Rate Control Act, 1962, all of which gave the Riksbank powers to implement credit control policies in various areas (Aufrecht, 1967, pp. 673, 677, and 680). However, these "special regulations" also make it clear that the Swedish government makes monetary policy decisions and brings in the appropriate legislation for their implementation by the Riksbank as required.

The relationship between the Bank of England the United Kingdom government is set out in Paragraph 4, Subparagraph 1, of the Bank of England Act of 1946 which reads, "The Treasury may from time to time give such directions to the Bank as, after consultation with the Governor of the Bank, they think necessary in the public interest" (Aufrecht, 1961, p. 186). It is this paragraph which enabled the Radcliffe Committee [Committee on the Working of the Monetary System (Report. Cmnd. 827, 1959)] to talk about "the authorities" as a single unified monetary authority meaning the Treasury and the Bank of England working in unison.

We now turn to those central banks which have some measure of independence from their

central governments. Article 6 of the Deutsche Bundesbank Law, 1957, states in Subsection 1 that "the Central Bank Council shall determine the monetary and credit policies of the Bank" (Aufrecht, 1967, p. 252, translated from Gesetz über die Deutsche Bundesbank, Article 6 (1)). The Bank's relationship to the federal government is explicitly stated in Article 12 as, "The Deutsche Bundesbank shall be obliged insofar as is consistent with its functions, to support the general economic policy of the Federal Government. In the exercise of powers conferred on it under this Law it shall not be subject to instructions from the Federal Government" (Aufrecht, 1967, p. 255, translated from Gesetz über die Deutsche Bundesbank). Article 13 requires the Bundesbank to "advise" the federal government on matters in the field of monetary policy and Subsection 2 of Article 13 permits "members of the Federal Government...to take part in the deliberations of the Central Bank Council. They shall have no vote, but may make motions. At their request the taking of a decision shall be deferred, but for not more than two weeks" (Aufrecht, 1967, pp. 255, 256, translated from Gesetz über die Deutsche Bundesbank). It seems clear from this that the Deutsche Bundesbank is an independent central bank.

Monetary policy in Japan is made by the Policy Board in the Bank of Japan (Article 13-2) which has wide powers in the areas of deciding basic policies for the operation of business of the bank, fixing and changing rates of discount, changing the qualifications of bills to be discounted, fixing, changing and abolishing maximum rates of interest, reserve ratios, and controls over loans, etc. (the Bank of Japan Law, By-laws and the Law concerning Reserve Deposit Requirement Systems, p. 3).

The relationship between the Swiss National Bank and the federal government is explicitly set out in Article 63 of the National Bank Law of 1953 [Aufrecht, 1967, p. 721, translated from Bundesgesetz über die Schweizerische Nationalbank (Vom 23, Dezember 1953), pp. 20-1)]. This

delimits the role of the Confederation to supervision of and approval of such matters as the size of the Bank's capital, the denominations of bank notes, and the share of profits between Cantons. Thus the Swiss National Bank appears to be genuinely independent of government in the conduct of its monetary policy.

In the Federal Reserve Act of 1913 and in the Banking Act of 1935 there is no provision for instructions to be issued to the Federal Reserve Board by the federal government of the United States. The Federal Reserve Reform Act, 1977, Section 202, provides for congressional review of the general policy of the Federal Reserve Board and for a dialogue between the Congress and the Board on monetary policy. It does not, however, reduce the authority of the Board in any way; nor does it permit any formal role for the executive branch of the U.S. government in the formation of monetary policy² (see *Federal Reserve Bulletin*, December 1977, p. 1076). The Board of Governors of the Federal Reserve System with their statutory Federal Open Market Committee and other agencies are the ultimate decision-makers concerning monetary policy. Thus the government has no control over the day-to-day policy matters of the Federal Reserve System.

Finally, we consider Canada, the only case in our sample of countries where a change in legislation affected the legislated independence of a central bank. Up to 1967, the Bank of Canada appears to have been an independent central bank in the sense that there was no provision for day-to-day government intervention and involvement in the formulation and execution of monetary policy. The Governor of the Bank and the Board (and the Governor having certain veto powers) were responsible for the conduct of monetary policy (Bank of Canada Act (18), Aufrecht, 1961, pp. 93-96). The Bank of Act of 1967 made a major change in the Canadian arrangements. Section

²We are grateful to Anna Schwartz for drawing our attention to this Amendment.

14 of the revised statute (Bank Act, 1967, *Revised Statutes of Canada*, 1970, Vol. 1) says that, "The Minister [i.e., Finance Minister] and the Governor shall consult regularly on monetary policy and on its relation to general economic policy (Paragraph 14(1))," and, in Paragraph 14(2), "If, notwithstanding the consultations provided for in Subsection (1) there should emerge a difference of opinion between the Minister and the Bank concerning the monetary policy to be followed, the Minister may, after consultation with the Governor in Council, give to the Governor a written direction concerning monetary policy, in specified terms, and the Bank shall comply with such directive." This major change in legislation clearly gives the government ultimate authority in monetary policy matters, but, only after pursuing prespecified procedures in the event of a dispute.

B. The Appointment of Central Bank Policy Boards

Even though we have established that four of our twelve central banks are independent of government in the formulation of their monetary policy, it is still possible that governments can exercise leverage via their control over the appointment and removal of members of the policy board. In general, central banks which have some provision for policy board members to be appointed independently of government and also where appointments enjoy a lengthy period of tenure there may be a reduction in the leverage which governments can exercise on central bank policy.

In all cases in which the government is responsible for the formulation of monetary policy (Australia, Belgium, Canada, France, Italy, the Netherlands, Sweden, the United Kingdom), the government also is fully in control of all appointments to the policy board. In the case of Australia, the Board of Governors of the Reserve Bank consists of the Governor and Deputy-Governor (both appointed for a term of no more than seven years, as determined by the Governor General), seven

other members (at least five of whom are not officers of the Bank or of the Public Service and who are appointed for five years, and the remainder holding office during the pleasure of the Governor General) and as an *ex officio* member, the Secretary of the Treasury. The Governor, Deputy-Governor and other seven members of the Board are appointed by the Governor General (i.e., the executive branch of the Australian Federal Government) (Reserve Bank Act 1959-1973, pp. 286-7).

In the case of Belgium, the Board of Directors of the Bank consists of the Governor, together with three to six others. All are appointed by the Crown (the executive branch of the government), the Governor for five years and the Directors for six years. In addition to the Board of Directors there is a Council of Regency (the principal policy-making body in the Bank of Belgium) which consists of the Board of Directors plus ten Regents elected by a general meeting of the shareholders for three years (Aufrecht, 1967, pp. 63-64). Although this may appear to give the Bank of Belgium some independence in the appointment of its principal policy-making body, it must be noted that the principal shareholder of the Bank of Belgium is the government (50 percent) and the remaining shares are held by various statutory authorities under the indirect control of the government. Hence, the appointments of Directors and Regents are effectively in the hands of the central government.

The Board of Directors of the Bank of Canada, which consists of the Governor, Deputy-Governor, twelve Directors and the Deputy Minister of Finance, constitutes the general management of the Bank. The Governor and Deputy-Governor are appointed by the Directors with the approval of the Governor in Council for seven years. The twelve Directors are appointed by the Minister of Finance with the approval of the Governor in Council for three years. The Deputy Minister of Finance is an *ex officio* member (*Revised Statutes of Canada*, Vol. 1, 1970).

The General Council of the Bank of France consists of the Governor, two Deputy-

Governors, and ten Councillors. The Governor and two Deputy-Governors are appointed by the Council of Ministers for unspecified terms. Of the ten Councillors, one is elected by secret ballot of the staff of the Bank of France and the other nine are appointed by the Council of Ministers on the proposal of the Minister of France. These Councillors have a six-year term (Article 14 of Loi du 3 Janvier, 1973, p. 3).

In the case of Italy, the Governor of the Bank of Italy alone appears to be responsible for the conduct of monetary policy (Article 25, Aufricht, 1967, p. 429). He is appointed by the Board of Directors, which are themselves appointed by the general meeting of shareholders (Aufricht, 1967, pp. 425-426). Thus it appears that the appointment of the Board of Directors of the Bank of Italy is independent of the central government. However, Article 19 requires that all "appointments and dismissals...be approved by decree of the President of the Republic on the proposal of the President of the Council of Ministers in agreement with the Minister of the Treasury, the Council of Ministers having been heard," (Aufricht, 1967, p. 427). It is this provision which leads us to classify Italy as having complete government domination of appointments.

The Governing Board of the Netherland's central bank consists of a President, Secretary, and three to five other Directors. These appointments are for seven years and are all made by the government (Bank Act 1948, De Nederlandsche Bank N.V., p. 12; Aufricht, 1967, p. 470).

The Bank of Sweden is managed by the Board of Directors consisting of seven Directors each appointed by the King in Council (i.e., the government) for three years (Aufricht, 1967, pp. 668, 670, 672).

The Governor, Deputy-Governor and sixteen Directors of the Bank of England are all appointed by the Crown; the Governor and Deputy-Governor each for five years and the Directors for four years (Aufricht, 1961, pp. 186, 189-190).

Although the Federal Reserve Board is not under the formal control of the United States government or Congress, all appointments to the seven-member Board are made by the President with the advice and consent of the Senate for terms of fourteen years. Any member serving a full term is ineligible for reappointment. Two of the members are designated by the President as Chairman and Vice-Chairman for a term of four years (Krooss and Samuelson, 1969, pp. 2913, 2914). Thus, although the Governors of the Federal Reserve System are political appointees, their appointments run for a period spanning the life of more than three political administrations and, therefore, the Board enjoys a greater measure of independence than do those whose appointments are more closely coterminous with those of governments/administrations.

The Policy Board of the Bank of Japan is also not under the formal control of the government. It consists of seven members--the Governor, appointed by the Cabinet for five years and renewable, two nonvoting members *ex officio* as representatives of the Ministry of Finance and of the Economic Planning Agency and four appointments each for four years appointed by the Cabinet with the consent of both Houses (The Bank of Japan Law, etc., pp. 4-5; Aufricht, 1961, pp. 428-429). Thus all the positions on the Policy Board of the Bank of Japan are direct government appointments.

It is clear then that in all the above cases, the government has full power in the matter of the appointment of the Governor and members of the policy board of the central bank. The only matter that provides cross-country variability is the length of the appointments which range from as little as three years (Canada, Italy, Sweden) to as long as fourteen years for ordinary policy board members (though not for Chairmen) in the case of the United States.

The cases of Germany and Switzerland are different from the above. The Central Bank Council of the Deutsche Bundesbank is composed of the members of the Directorate consists of the

President, Vice-President of the Deutsche Bundesbank and up to eight other members, all appointed by the President of the Federal Republic for eight years, on the proposal of the Federal Government after consultation with the Central Bank Council. The Presidents of the Land Central Banks are appointed by the President of the Federal Republic for eight years, on the proposal of the Bundesrat, the proposals being made on recommendation of the authority competent under Land legislation and after consulting with the Central Bank Council [Aufricht, 1967, pp. 252-254, translated from Gesetz über die Deutsche Bundesbank, Articles 6(2), 7(2), and 8(4)]. It is clear that to a large degree the Central Bank Council of the Deutsche Bundesbank is a self-perpetuating oligarchy. The Central Bank Council itself has an opportunity to comment on and offer advice on the appointment of all of its members. The Federal government has a direct input into the appointment of not more than ten members of that Council (a minority). Thus there is a degree of independence from the Federal government even in the appointment of the Central Bank Council. It is also noteworthy that the term of office of all members of the Central Bank Council is uncommonly long (eight years).

The policy board of the Swiss National Bank, known as the Bank Committee, is composed of the Chairman and Deputy Chairman of the Bank Council and eight others appointed for four years by the Bank Council. The latter consists of forty members selected for four years. The Chairman, Deputy Chairman and twenty-three others (of which no more than five are members of Federal Parliament) are appointed by the Federal Council (the executive branch of the Swiss Federal Government). The remaining fifteen are selected by the General Meeting of shareholders (Bundesgesetz über die Schweizerische Nationalbank, 1953, Articles 40, 41, 42, 46, and 48). Thus the appointment of the policy board of the Swiss National Bank is decentralized and diffused. Only the Chairman and Deputy Chairman of the Bank committee are appointed directly by the government. It is true that the Bank Council which appoints the policy board is itself elected by

a procedure which gives a five-eighth's weight to the general meeting of Bank shareholders. Thus this appointment process dilutes the power of the federal government and only a three-eighth's weight to the general meeting of Bank shareholders. Thus this appointment process dilutes the power of the federal government such that it controls only two of the ten appointments directly.

C. The Financial and Budgetary Relations Between Central Banks and Governments

The main reason for examining this dimension of central bank law is that *a priori* notion, suggested by the theory of bureaucracy, that the more closely the budget of an agency is monitored by the principal, the more closely the agency pursues the objectives of the principal and the less closely it is able to pursue its own objectives.

Eleven of the twelve central banks (the exception being Japan) have complete budgetary autonomy. In most cases (Australia, Belgium, Canada, Germany, Italy, the Netherlands, Sweden, Switzerland, and the United Kingdom) the central bank statutes are implicit rather than explicit in this matter. In the cases of France and the United States, there are explicit budgetary arrangements set out in the relevant statutes. In the French case, Loi du 3 Janvier 1973 Article 15 explicitly places responsibility for the budget with the General Council of the Bank. In the United States case, the Federal Reserve Act of 1913, Section 10 (Krooss and Samuelson, p. 2449) empowers the Board to "levy semiannually...an assessment sufficient to pay its estimated expenses...for the half year succeeding...together with any deficit carried forward...".

In contrast to the rest, the Bank of Japan must obtain prior approval from the government of its budgeted expenditures. The Bank of Japan Law 1942-1971, Article 13-3.8 seems to deny this, stating that "the Policy Board [of the Bank] shall be charged with...deciding on the estimate of expenditures...of the Bank of Japan." However, this is subject also to Article 37 which requires

that "the Bank of Japan shall, in accordance with prescriptions of the competent Minister, make an estimate of the expenditures of each business period, and submit the same to the competent Minister for his permission prior to the commencement of the business period" (The Bank of Japan Law, etc., p. 10, and Aufricht, 1961, p. 433). No other central bank has this degree of explicitly legislated budgetary control by government. Of course, all central banks must account, *ex post*, for the proper expenditure of funds.

All the central banks are required to pay their residual profits to their respective governments. In some cases (Belgium, Canada, Germany, Italy, the Netherlands, Switzerland and United States) the profits so paid are after meeting transfers to reserves and prior claims set out in the relevant statutes. In other cases, either the Bank (United Kingdom) or the government (Australia, France, Japan, Sweden) decides on the profit allocation between reserves and the amount paid to the government.

Board members' salaries are fixed either directly by the government (Australia, France, Japan, Sweden and United States) or by the bank subject to varying degrees of government approval (Belgium, Canada, Germany, Italy, the Netherlands, Switzerland and United Kingdom).

D. Central Bank Laws: Summary and Classification

The above discussion concerning authority for monetary policy-making, and role of government in the appointment of the policy board is brought together and summarized in Table 1. It is clear from this table that, even ignoring the finance aspects of the central banks discussed in Section C above, there are a large number of alternative combinations of the various attributes of central bank laws which we have singled out for consideration. There are two possibilities concerning authority for monetary policy-making--either the government or the bank; there are cases

where the government has representation on the policy board and those where it has no direct membership of the board; there are cases where the government is responsible for appointing all or most of the policy board, and those where it appoints some smaller fraction of it; finally, the terms of office of the policy board members and Governor or Chairman vary considerably. Ignoring the last matter, there are eight alternative combinations of the first three attributes or eight potential central bank types. Four of these types have no members; thus we have a fourfold "policy type" classification of central banks, indicated by the four groups in Table 1.

The classification of central bank types based on financial relations between bank and government ("financial types") is set out in Table 2. As the table indicates, there are four distinct financial types, the least independent having all financial matters under government control and the most independent having full financial autonomy.

Table 3 provides a summary of the cross relationships between policy types and financial types. There are four policy types and four financial types giving potentially sixteen separate Central Bank types. Of these sixteen possibilities only eight actually occur in our sample.

We now turn to an investigation of the relationship, if any, between these Central Bank types and the inflation performances that they deliver.

III. MONETARY POLICY

Just as we ruthlessly simplified the laws of central banks in order to focus on a limited number of aspects, so also in our analysis of monetary policy we abstract and simplify. Specifically, we focus on three features of monetary policy: First, its relative inflationary/deflationary stance; secondly, its variability; and, thirdly, the variables to which it reacts. We will deal with both cross-country and time-series data and examine how the inflationary

process differs across countries. We will also seek to establish whether any of the differences are significant and are associated with differences in Central Bank Laws.

A key feature of much of the postwar history of the twelve countries is that it was characterized by fixed exchange rates. Exchange rates were fixed from the beginning of the postwar era through to the early 1970s. Since 1972 exchange rates have been flexible. A commitment to a fixed exchange rate is a political commitment which effectively determines a country's inflation rate and which leaves monetary policy with the task of determining the balance of payments, or, equivalently, the stock of foreign exchange reserves. It would be pointless, therefore, to look for the effects of Central Bank Laws on inflation in a fixed exchange rate era. In the interests both of simplicity and to sharpen our focus on the issues of central concern, we examine only the flexible exchange rate period which began in 1972. However, in examining the monetary policy reactions, the availability of other appropriate studies restricts us to a less clear-cut body of data and forces us to look at policy reactions averaged across exchange rate regimes.

We rank the degree of inflation embodied in a country's monetary policy by the average rate of change of its consumer prices. This way of ranking the countries' average inflationary tendencies is not without problems, but it seems to be the cleanest available. Concerning policy variability, what is of interest of course is the variability of inflation, as well as output and employment. If, however, we were to measure variability of policy by examining *both* nominal *and* real variability, there would inevitably be conflicting rankings arising purely from cross-country differences in slopes of short-run output inflation trade-offs, a matter well outside the scope of this paper. We avoid this by examining only the variability of inflation.

It may be felt that we should measure policy variability by looking at variables under the direct influence of the central bank. Most central banks (see Hodgman, 1974) use interest rates as

their proximate instruments of policy, which would imply the use of interest rates in judging the stability of monetary policy, stable interest rates being identified with stable policy. In our view this way of identifying stable policy would be entirely inappropriate. Nominal interest rates ought to vary in order to reflect variations in the anticipated rate of inflation. Therefore any unwillingness of the central bank to allow interest rates to move in line with variations in the inflation rate would have to be interpreted as a source of variability rather than a source of constancy in policy. If that is the case perhaps we should look at real rates of interest and their variability. However, even this exercise would be of limited value since there are many factors which lead to variations in equilibrium real rates of interest of all which would have to be controlled for before one could use the observed variability of the real rate of interest as an indicator of the variability of monetary policy. Even though interest rates are the proximate instruments of monetary policy, they are typically (and in recent years, increasingly) manipulated with a view to achieving a particular behavior for the growth rate of various monetary aggregates, and these aggregates are further regarded as appropriate intermediate targets which help in achieving predictable and less variable inflation. Thus there is no inherent inconsistency in using the variability of inflation as the appropriate measure of the variability of policy.

The degree of inflation and its variability are summarized in Tables 4 and 5.

We now turn to an examination of the relationship between those policies and central bank types summarized in Section II.

IV. RELATIONSHIPS BETWEEN CENTRAL BANK LAWS AND MONETARY POLICIES

Our classification of central bank types has two dimensions, one concerning its degree of financial independence and the other concerning its degree of policy independence from government. First, examine the relationship between financial independence and the inflationary and policy variability record. Table 4 provides the relevant data. It is immediately clear by inspection of Table 4 that there is no association whatsoever between the financial independence of its central bank from government and these two aspects of monetary policy.

Next, consider Table 5 which permits a direct examination of the relationship between central bank policy independence and monetary policy. The first category (Australia) differs from the second (Belgium, Canada, France, Italy, the Netherlands, Sweden and the United Kingdom) only in that a government official sits on the Australian bank board. Both categories are fully subservient to government in all other policy and appointment matters. It is immediately apparent that there are no discernible differences in inflation rates as between these two groups. The third and fourth groups (Japan, United States, Germany and Switzerland) are the independent central banks with Germany and Switzerland having a greater degree of independence than Japan and the United States in the appointment of the bank policy boards. It is striking that the two most independent central banks, Germany and Switzerland, have delivered a lower inflation rate than the intermediate central banks of Japan and the United States. The mean inflation rate of the eight government dominated central banks is in excess of ten percent; thus, although the U.S. and Japanese inflation rates are well within two standard deviations of that mean, those of Switzerland and Germany are significantly below the mean. On the basis of these facts, we tentatively conclude that there is an association between the degree of central bank policy independence and the average

rate of inflation.

Next, consider the relationship between policy independence and the variability of policy. Table 5 again contains the relevant information for making this comparison. It appears that there is no association between any of the categories of central bank independence and the measure of variability of policy presented. Thus it appears that as far as achieving low variability of monetary policy is concerned, there is nothing to be achieved from the way in which central bank laws are written. This result is perhaps not surprising in view of the large potential for individual Governor/Director preferences and for personal strengths and weaknesses to influence policy in a genuinely independent central bank (see Friedman, 1962).

The informal discussion of the differences in average inflation and the variability of inflation across the different central bank financial and policy types may be given formal content in a variety of ways. That which seemed to us to be the most informative was to exploit the time-series and cross-section data available to us and also to exploit the well-known fact that economic time series are autocorrelated. Initially, we estimated an autoregressive process for inflation for each of the twelve countries. In view of the small sample available to us, we did not undertake an extensive diagnostic analysis to discover the "best" ARMA representation. Rather, we simply estimated first-order autoregressions for each country. These results are set out in Table 6. The details of these results are of some interest. The autoregression coefficient is significantly greater than zero (level) for most countries. The coefficient also typically estimates as something in the neighborhood of one-half. The standard error of the estimate is highly variable across countries, however, and so is the constant term.

Our central concern is not with the details of these results. Rather, it is to test hypotheses concerning differences among inflation processes across the twelve countries and also with

searching for relationships between central bank types and inflation.

In pursuit of this goal, we pooled the time series and cross section and estimated the following model:

$$WP_{it} = \alpha_0 + \sum_{i=1}^{12} \alpha_i WP_{it-1} + \sum_{i=1}^6 \beta_i D_{it} + u_{it}$$

$$E(u_{it}u_{it}) = L$$

where i indexes a country and t is time and where WP = inflation.

$D_1 = 1$ for $i =$ Australia and zero elsewhere

$D_2 = 1$ for $i =$ France and Sweden and zero elsewhere

$D_3 = 1$ for $i =$ U.K. and zero elsewhere

$D_4 = 1$ for $i =$ Japan and zero elsewhere

$D_5 = 1$ for $i =$ United States and zero elsewhere

$D_6 = 1$ for $i =$ Germany and Switzerland and zero elsewhere.

The covariance matrix L is treated as being diagonal but the elements of that covariance matrix are allowed to vary across the twelve countries. Thus the regression was estimated as a weighted regression where the weights for the standard errors of the inflation process in each individual country are as set out in Table 6. On the basis of estimating this equation we then performed a series of hypothesis tests. Specifically, we tested the hypothesis that the coefficients on lagged inflation were the same in each country. We were not able to reject that hypothesis. The computed F-statistic with 11 and 161 degrees of freedom was 0.686. We also tested the hypothesis that each of the central bank type dummy variables was zero. These results are set out in Table 7.

Evidently, the hypothesis that central bank type significantly affects the inflation rate is decisively rejected for cases 1 through 5. These are the central bank types of Australia, France and Sweden, the United Kingdom, Japan, and the United States. In the case of the sixth central bank type--Germany and Switzerland--although, in the context of the above very general regression model the evidence is not strong, there is some indication that that particular central bank category exerts a more decisive influence on the rate of inflation. There is, even within the framework of this unrestricted and general model of inflation, a 20 percent chance that the central bank type affects the inflation process.

Encouraged by this finding and by the fact that we could not reject the hypothesis of a common autoregressive coefficient for all countries, we proceeded to estimate a more restricted version of the above model. Specifically, we estimated a variant of the above model in which we forced all the coefficients on lagged inflation to be the same and also where we only included a dummy variable for the German and Swiss central bank type. The result of that estimation was:

$$WP_{it} = \frac{2.48}{(4.79)} + \frac{0.700}{(12.69)} WP_{it-1} - \frac{1.305}{(2.36)} D_7$$

The numbers in parentheses are t-statistics. The explanatory power of this pooled cross-section time-series equation is remarkably good (for an equation of that type). It explains more than 45 percent of the variance of inflation. The t-statistic on the dummy variable indicates that the contribution of the German-Swiss central bank type to explaining the overall time-series cross-section variability of inflation is highly significant. An F-test of the restriction that D_7 is zero provides $F(1,177) = 5.58$ which strongly rejects the null hypothesis.

The formal statistical analysis just reported seems to confirm the broad impressions created

by the less formal analysis summarized in Tables 4 and 5. It seems that central bank laws only influence inflation in the case of the extremely independent central bank type prevailing in Germany and Switzerland. The critical element that distinguishes that case from the others is that the central bank is independent in the double sense that its policy independence is explicitly provided for in the statute and also, the key distinguishing characteristic, that the appointments of board members in those two banks are not entirely controlled by the governments of those countries. We would tentatively conclude, therefore, that independence in this double sense provides a significantly lower average inflation performance. Indeed, the steady-state rate of inflation for Germany and Switzerland is of the order of one-half of that for the average of the other countries.

It may be objected that all we have uncovered is some historical accident and that there is something deeper in the political processes of Germany and Switzerland that result in this lower average inflation performance. We have thought hard and long about this possibility and tried to come up with variables that might represent such factors. The obvious variable that is often raised is that of the memory of hyperinflation. It seems to us that that explanation does not sit well with the facts. Switzerland never suffered from the types of hyperinflation that Germany (and some other countries) experienced. The monetary history of Germany and Switzerland is very different. Their political histories are also very different. The only thing that we can detect that they have in common is a similar central bank law.

V. CONCLUSION

We have presented a stylized and selective description of the characteristics of central bank laws for twelve countries and a two parameter description of monetary policy performance for those countries. Further we have searched for associations among central bank laws on the one hand and monetary policy performance on the other. The most important finding is that the average rate of inflation is significantly lower in countries that have highly independent central banks compared with those that do not. There appear to be no economically interesting relationships between inflation variability and central bank type.

Our work is by no means definitive. We have completely omitted any discussion of the effect of what might be called informal rules and arrangements which may in important ways modify the written law of the central bank and influence its *de facto* relationship with the government. Further, we have studied only a handful of countries over a very short period of time. Yet further we have developed no rigorous theoretical analysis of the effects of central bank law and the relationship between the central bank and government on the rate and variability of inflation. Finally, we have completely ignored the potential influence of intellectual ideas and strong and painful "collective" memories of such phenomena as mass unemployment or hyperinflation. These omissions constitute potentially important limitations of the results that have been discovered and reported here. They are also suggestive of important further contributions that might be made in this area. There is clearly a need to broaden the experience studied by bringing in a larger number of countries and a bigger amount of variability both in inflation experience and in central bank law. There is no doubt a need for highly detailed institutional studies that examine the relationship between the informal rules and procedures adopted in the relationships between central banks and governments and the laws which establish and delimit the powers of those banks.

Last and by no means least, indeed perhaps the most pressing, is the need for a carefully and rigorously developed theory of the determination of inflation as the outcome of the optimal choice of central banks or governments each acting in their own self-interest, but subject to constraints imposed on each by the other and on both by the behavior of private economic agents.

Thus the research agenda that remains is lengthy and when embarked on may well modify the results that we have found here. These results should be regarded as tentative though nevertheless interesting in that they do seem to confirm the perhaps only vaguely expressed idea that central banks are inherently more conservative and more disinflationary than the governments which establish them and which they serve.

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Table 1

Central Bank Laws: Policy Types

Country	Final Authority	Government Officials on Board	Proportion of Policy Board Appointed by Government	Number of Members	Term of Members	Term of Governor/Chairman
(See note below)	(a)	(b)	(c)		(d)	(e)
Australia	g	1	1	10	5	7
Belgium	g	0	1	14-17	6	5
Canada	b(1967-) g(1967+)	0	12/14	14	3	7
France	g	0	12/13	13	6	u
Italy	g	0	1	1	3	3
Netherlands	g	0	1	5-7	7	7
Sweden	g	0	1	7	3	3
United Kingdom	g	0	1	18	4	5
Japan	b	0	1	7	4	4
United States	b	0	1	7	14(N)	4
Germany	b	0	10/21	21	8	8
Switzerland	b	0	1/5	10	4	

- Notes: (a) b = bank; g = government
 (b) number of ministers (or their representatives) who sit on bank board
 (c) number represents proportion of members appointed directly or indirectly by the government
 (d) years (N = not eligible for re-election)
 (e) u = unlimited term

Table 2

Central Bank Laws: Financial Type

Country	Budgetary Independence	Board Members' Salaries Determined by	Profit Allocation Determined by
Japan	no	g	g
Australia	yes	g	g
France	yes	g	g
Sweden	yes	g	g
United States	yes	g	g
Belgium	yes	b	s
Canada	yes	b	s
Germany	yes	b	s
Italy	yes	b	s
Netherlands	yes	b	s
Switzerland	yes	b	s
United Kingdom	yes	b	b

Key: b = bank, g = government, s = statute

Table 3

Central Bank Types

Financial Type

Policy Type	1	2	3	4
1		Australia		
2		France Sweden	Belgium Canada Italy Netherlands	United Kingdom
3	Japan	United States		
4			Germany Switzerland	

Note: Financial Types:

- 1 Government approves budget, determines Board Members' salaries and profit allocation.
- 2 Bank determines budget allocation (and reports to government); government determines Board Members' salaries and profit allocation.
- 3 Bank determines budget and Board Members' salaries; profit allocation determined by statute.
- 4 Bank determines budget, Board Members' salaries and profit allocation.

Policy Types:

- 1 Government is final policy authority, has official on bank Board, and appoints all Board Members.
- 2 Like 1, but no government official on bank Board.
- 3 Bank is final policy authority but all Board appointments made by government.
- 4 Bank is final policy authority and some Board appointments made independently of government.

Table 4

Average Inflation and its Variability

Grouped According to Central Bank Financial Type:

Flexible Exchange Rate Period, 1972-1986

Country	Inflation Rate			Infation Variability	
	Type	Percent	Rank	Standard Deviation	Rank
Japan	1	6.6	(4)	6.1	(12)
Australia	2	9.9	(10)	3.2	(7)
France		9.5	(9)	3.2	(7)
Sweden		8.9	(8)	2.5	(2)
United States		6.9	(5)	3.5	(9)
Belgium	3	7.1	(6)	3.0	(5)
Canada		7.9	(7)	2.8	(3)
Germany		4.3	(1)	2.0	(1)
Italy		14.0	(12)	4.6	(10)
Netherlands		5.8	(3)	3.0	(5)
Switzerland		4.4	(2)	2.8	(3)
United Kingdom	4	11.2	(11)	6.0	(11)

Source: *International Financial Statistics*, Yearbook, 1984, p. 101, 1986, p. 111 and March 1987, p. 71.

Table 5

Average Inflation and its Variability

Grouped According to Central Bank Policy Type:

Flexible Exchange Rate Period 1972-1986

Country	Inflation Rate			Policy Variability	
	Type	Percent	Rank	Standard Deviation	Rank
Australia	1	9.9	(10)	3.2	(7)
Belgium	2	7.1	(6)	3.0	(5)
Canada		7.9	(7)	2.8	(3)
France		9.5	(9)	3.2	(7)
Italy		14.0	(12)	4.6	(10)
Netherlands		5.8	(3)	3.0	(5)
Sweden		8.9	(8)	2.5	(2)
United Kingdom		11.2	(11)	6.0	(11)
Japan	3	6.6	(4)	6.1	(12)
United States		6.9	(5)	3.5	(9)
Germany	4	4.3	(1)	2.0	(1)
Switzerland		4.4	(2)	2.8	(3)

Source: *International Financial Statistics*, Yearbook, 1984, p. 101, 1986, p. 111 and March, 1987, p. 71.

Table 6**First-Order Autoregressions of Inflation**

Country	Constant	AR Coefficient	Standard Error
Australia	5.12 (2.14)	0.508 (2.22)	2.71
Belgium	1.718 (0.82)	0.731 (2.78)	2.51
Canada	2.68 (1.39)	0.669 (2.99)	2.18
France	2.23 (0.80)	0.750 (2.79)	2.61
Germany	-0.364 (0.33)	0.991 (4.42)	1.33
Italy	7.11 (2.01)	0.516 (2.21)	3.60
Japan	2.70 (1.20)	0.581 (2.36)	5.39
Netherlands	-0.39 (0.32)	0.974 (5.45)	1.68
Sweden	5.54 (1.93)	0.389 (1.29)	2.37
Switzerland	0.94 (0.80)	0.707 (3.20)	2.18
United Kingdom	3.90 (1.25)	0.646 (2.69)	5.00
United States	2.31 (1.25)	0.669 (2.89)	2.76

t-statistics in parentheses

Table 7

Central Bank Type and Inflation

Hypothesis	F(1,161)	Significance Level
$D_1 = 0$	0.271	0.60
$D_2 = 0$	0.544	0.46
$D_4 = 0$	0.429	0.51
$D_5 = 0$	0.081	0.78
$D_6 = 0$	0.178	0.67
$D_7 = 0$	1.752	0.19