Is Japan Special? Monetary Linkages and Price Stability

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Empirical studies of central bank independence and inflation identify Japan as an outlier. By standard measures, the Bank of Japan is one of the least independent central banks in the world, and yet Japan enjoys some of the lowest inflation rates. This paper develops a model of monetary linkages with implications for the institutional commitment to price stability. The model explains why price stability in the "old" Japan—with its powerful bureaucracy and single-party rule—did not necessarily rely on monetary institutions. It predicts that the "new" Japan, in which power is shifting from the bureaucracy to elected politicians who compete with each other in the political marketplace, must make use of monetary institutions to achieve price stability.

Key words: Design of central banking institutions; Linkage politics; Japanese political economy

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I. Central Bank Independence and Inflation

Journalists and scholars have long classified the Japanese political economy as "special" (Prestowitz [1988]; Fallows [1989, 1994]; Vogel [1979]; Johnson [1982, 1987]; Abegglen [1984]; Aoki [1988]). For many years, the Japanese economy produced high rates of GDP growth coupled with low rates of inflation, as its exporting industry churned out competitive products sought after by consumers all over the world. U.S. business schools celebrated Japan's unique approach to business, built on the reputation and trust coming out of long-term relationships between producers and suppliers, employers and employees. Japanese managers were envied for their passive shareholders and their long-term attitude toward return on investment. Admirers of "Asian values" celebrated the political stability made possible by the dominance of Japan's "long-lived" elite bureaucracy, the one-party rule of the Liberal Democratic Party, and the complacency of Japanese voters and consumers.

In the early 1990s, the Japanese model began to crumble. The economy's rate of growth dropped sharply, home-loan companies crashed, and the stability of the Japanese financial system was threatened by bad debts. Japanese firms fired long-term suppliers and employees in unprecedented numbers. Increasingly, the bureaucracy lost its power to elected politicians competing in a "real" multi-party system. Shareholders, voters, and consumers began to assert their interests.

Accordingly, journalists and scholars are revising their view of Japan. Some move from one extreme view to another, replacing "Japan as Number One" (Vogel [1979]) with "Japan as—*Anything But*—Number One" (Woronoff [1991]). Others admit the possibility that there never was anything special about Japan, arguing that the Japanese political economy is subject to the same "laws" of economics and political science that have been successful in accounting for the behavior of producers, consumers, voters, interest groups, politicians, and bureaucrats in modern democracies (*The Economist* [1996]; Calder [1988]; Ramseyer and Rosenbluth [1993]; Cowhey [1993]; Cowhey and McCubbins [1995]; Cox, Rosenbluth, and Thies [1996]; Ramseyer [1996]; McCubbins and Thies [1997]).

This paper contributes to the emerging view of Japan as a "normal" country. It addresses the widespread view that Japan is an outlier with regard to its monetary institutions and inflation performance (Cargill [1995]; Cargill, Hutchison, and Ito [1995]).

Empirical studies of central bank independence and inflation have found that developed countries tend to have independent central banks and low inflation rates, while developing countries tend to have dependent central banks and high inflation rates (admitting substantial differences with each group and changes over time within some countries). For developed countries, measures of legal central bank independence have predictive power for inflation; for developing countries, the turnover rates of central bank governors are good predictors of inflation, while legal arrangements are more or less irrelevant (Cukierman [1992]; see also Maxfield [1997]).

Against this background, the data suggest that there is indeed something remarkable about Japan (Table 1). Japan enjoys some of the lowest inflation rates in the world. At the same time, the Bank of Japan is ranked as one of the least independent

central banks among developed countries; even when Japan is compared to a group of developing countries, the legal independence of its central bank ranks low, and the turnover rate of its central bank governors compares to the turnover rates observed in many developing countries.

Table 1 The Bank of Japan in International Comparison[1]

I. Ranking of Central Banks by Inflation, 1980s[2]
Japan ranks . . . . . . 1st (tied with Switzerland, Germany, Malta, the Netherlands, Panama, and Singapore) out of 68 developed and developing countries . . . 1st (tied with Switzerland, Germany, and the Netherlands) out of 21 developed countries . . . 1st (tied with Malta, Panama, and Singapore) out of 47 developing countries and Japan
II. Ranking of Central Banks by Legal Independence, 1980s[3]
Japan ranks . . . . . . 63rd (tied with Morocco and Panama) out of 68 developed and developing countries . . . 20th out of 21 developed countries . . . 43rd (tied with Morocco and Panama) out of 47 developing countries and Japan
III. Ranking of Central Banks by Governors' Turnover Rate, 1950–89[4]
Japan ranks . . . . . . 33rd (tied with Spain, Romania, Colombia, and Thailand) out of 58 developed and developing countries . . . 18th (tied with Spain) out of 19 developed countries . . . 16th (tied with Romania, Colombia, and Thailand) out of 39 developing countries and Japan

Notes: 1. Rankings are calculated from tables 19.3, 19.4, and 19.5 in Cukierman (1992).
2. High rank corresponds to low inflation, low rank to high inflation.
3. High rank corresponds to high degree of independence, low rank to low degree of independence.
4. High rank corresponds to low turnover rate, low rank to high turnover rate.

Japan's outlier status raises questions about the validity of the causal inferences drawn from the empirical correlation between various measures of central bank independence and inflation. Indeed, the Japanese example is occasionally cited in support of the view that central bank independence is epiphenomenal—that price stability is guaranteed not by institutions but by powerful political interests that stand to gain from low inflation (Posen [1993]; see also Henning [1994] and Maxfield [1997]). The empirical record is also consistent with the opposite view that "institutions matter"—but what matters is the way the central banking institution is embedded in a larger political system, not whether it is independent on paper (Lohmann [1995, 1998]). Thus, even if the Bank of Japan is formally subordinate to the Ministry of Finance, monetary policy will be insulated from the pressures of electoral and partisan politics to the extent that the Ministry of Finance is independent.

This paper develops a model of monetary linkages, with the goal of providing a unified account of cross-country differences and intra-country changes over time in the institutional commitment to price stability. The model sheds light on the relationship between monetary institutions and price stability in the old Japan and generates predictions about the prospects for price stability in the new Japan.

The structure of the paper is as follows. Chapter II. presents the time-consistency problem in monetary policy and the "reputational solution" to this

problem.[1] Chapter III. discusses the conditions under which the commitment to price stability takes on institutionalized form. Chapter IV. develops a model of monetary linkages, in which the credibility of the government's commitment to price stability depends on its performance on other dimensions of public policy. Chapter V. argues that monetary institutions serve to establish and maintain linkages across dimensions of public policy. Chapter VI. applies the model to developed and developing countries, including the old and new Japan.

II. Reputation and the Time-Consistency Problem in Monetary Policy

This chapter develops a simple model of the time-consistency problem that results in a counterproductive inflation bias to discretionary monetary policy (Kydland and Prescott [1977]; Barro and Gordon [1983]). There are two "unitary actor" players: the private sector, which forms inflation expectations p^e, and the government, which sets inflation p. This sequence of events is repeated in each period over an infinite horizon.

The political party controlling the government has two economic goals, output stimulation and inflation stabilization. When in power, its one-period utility function is given by

$$U = p - p^e - \frac{p^2}{2}. \tag{1}$$

The government party has an infinite time horizon with discount factor $\Delta \in [0, 1]$. In each period, it is elected with probability Π and becomes the opposition party with probability $(1 - \Pi)$, $\Pi \in [0, 1]$.[2] The party does not care about economic welfare when it is out of power; its utility in periods of opposition is normalized to zero.[3]

The first term in the government party's utility function, $p - p^e$, reflects its desire to stimulate output growth, which is driven by unanticipated inflation (Fischer, 1977). The wage setters in the private sector target the natural rate of output growth (normalized to zero) in their nominal wage contracts. They negotiate nominal wage growth p^e before the government sets the inflation rate p. If the actual inflation rate exceeds its expected value, real wage growth decreases, with positive output effects. Correspondingly, an inflation rate that lies below its expected value lowers output growth. The second term in the government party's utility function, $-p^2/2$, reflects its desire to stabilize inflation (the inflation "bliss point" is normalized to zero).

Once the private sector's inflation expectations are locked in, the optimal value for inflation is given by

$$p_D = 1 \tag{2}$$

1. My terminology is consistent with that of the political economy literature, which speaks of reputational solutions in complete information settings (see, for example, Persson and Tabellini [1990]). Standard game theory has reputational effects arising in the presence of incomplete information (see, for example, Fudenberg and Tirole [1992]).
2. This probability Π is exogenously fixed. In a more elaborate model, it could depend on the government's economic performance.
3. This assumption is made for simplicity. As a practical matter, it is plausible that a political party cares less strongly about economic welfare when it is out of power.

where the subscript D stands for discretion. Since there is no uncertainty, the private sector's rational inflation expectations are equal to the actual inflation rate:

$$p^e_D = 1. \tag{3}$$

The government's utility under the discretionary regime is equal to

$$U(p_D, p^e_D) = -\frac{1}{2}. \tag{4}$$

If the government can credibly commit itself to an inflation rate before nominal wage growth is locked in, it sets

$$p_C = 0 \tag{5}$$

where the subscript C stands for commitment. The private sector rationally anticipates the inflation rate under this regime:

$$p^e_C = 0. \tag{6}$$

With credible commitment, the government's utility is equal to

$$U(p_C, p^e_C) = 0. \tag{7}$$

If the government promises to set zero inflation and the private sector writes zero inflation expectations into its nominal wage contracts, then the government can achieve a one-period gain by reneging on its promise—with "surprise" inflation it can stimulate the economy:

$$U(p_D, p^e_C) = \frac{1}{2}. \tag{8}$$

If the government keeps its promise, it achieves the utility given in equation (7). Hence, the government's temptation to renege is equal to

$$U(p_D, p^e_C) - U(p_C, p^e_C) = \frac{1}{2}. \tag{9}$$

The private sector employs a "grim" trigger-strategy punishment: if the government defects, the private sector loses faith in the government's commitment to price stability and expects the government to inflate forever after (see equations [2] and [3]).[4] The government's punishment is then equal to the discounted value of the

4. Alternatively, we could assume that a defection triggers a breakdown of the zero inflation regime for a finite number of periods, after which price stability resumes. The comparative statistics with respect to the length of the punishment period correspond to those for the discount factor. That is, an increase in the length of the punishment period has the same effect as an increase in the discount factor.

difference between the utility achieved under price stability (see equation [7]) and the discretionary regime (see equation [4]):

$$(\Delta\Pi + \Delta^2\Pi^2 + \Delta^3\Pi^3 + \ldots)\,[U(p_C, p^e_C) - U(p_D, p^e_D)] = \frac{\Delta\Pi}{1-\Delta\Pi}\frac{1}{2}. \tag{10}$$

Price stability is sustainable as an equilibrium outcome if the punishment is greater than the temptation, that is, if

$$U(p_D, p^e_C) - U(p_C, p^e_C) \leq (\Delta\Pi + \Delta^2\Pi^2 + \Delta^3\Pi^3 + \ldots)\,[U(p_C, p^e_C) - U(p_D, p^e_D)] \tag{11}$$
$$\Leftrightarrow \quad \frac{1}{2} \leq \frac{\Delta\Pi}{1-\Delta\Pi}\frac{1}{2} \quad \Leftrightarrow \quad \Delta\Pi \geq \frac{1}{2}.$$

The commitment to zero inflation is credible if the government's time discount factor is sufficiently high and the reelection prospects of the party controlling the government are sufficiently favorable. Defining the political discount factor $\delta \equiv \Delta\Pi$ as a composite of the "true" time discount factor Δ and the government party's election probability Π, equation (11) implies that price stability is sustainable as an equilibrium outcome for the set of political discount factors $\delta \in [0.5, 1]$.

III. Institutional Solutions to the Time-Consistency Problem

Well-designed monetary institutions may alleviate the time-consistency problem in monetary policy. For the purposes of this paper, an institution is defined as an arrangement that constrains the conduct of monetary policy.[5] Examples are monetary targeting procedures, especially *x*-percent monetary growth rules (Friedman [1968]; Canzoneri [1985]); delegation to a conservative central banker (Rogoff [1985]; Lohmann [1992]); constitutionally guaranteed central bank independence (Neumann [1991]); fixed exchange rate regimes (Giavazzi and Pagano [1988]; Mélitz [1988]; Cukierman [1992]); the gold standard (Bordo and Kydland [1993]); and incentive contracts for central bankers (Walsh [1995]).

It is often argued that monetary institutions "create" credible commitment (Lohmann [1995]). However, even though institutions may further the prospects for price stability, they are not generally necessary or sufficient for credible commitment. The integrity of an institution must be protected by reputational means. Suppose a government commits itself to respect the constraints on monetary policy that are implied by a monetary institution. In any one period, the government is tempted to

5. Consistent with this definition, a central bank that makes purely "technocratic" decisions about monetary policy would not be classified as a monetary institution.

defect and ignore these constraints. The "audience" of its commitment—wage setters, financial markets, voters, and the like—might punish such an institutional defection by disbelieving the government's institutional promises in the future. That is, the government loses the future benefits that come with the institutionalized commitment to price stability. The credibility of the government's commitment is then a function of its political discount factor, which determines the relative importance of the one-shot temptation to defect and the discounted future punishment.

If monetary institutions cannot create credible commitment in the absence of reputational enforcement, they may nonetheless strengthen the commitment to price stability. First, institutions may coordinate people's beliefs about trigger-strategy punishments, thereby selecting a Pareto-preferred equilibrium out of a multiplicity of possible equilibria. Second, in the presence of imperfect or incomplete information, institutions may improve the monitoring ability of the audience whose equilibrium prescription it is to punish defections (Lohmann [1995]).

Clearly, a government that cares little about the future cannot achieve price stability, whether by reputational or institutional means. However, a government whose political discount factor is sufficiently high has a choice. To achieve price stability, it can live with the non-institutionalized reputational mechanisms (if any) that wage setters, financial markets, or voters happen to coordinate on, or it can commit itself to a monetary institution. A well-designed institution that enjoys credibility because it is backed up by reputational trigger-strategy punishments may improve upon the economic outcomes obtained under non-institutionalized reputational mechanisms.

For example, in the absence of institutional constraints, suppose that the government loses popularity among voters, with negative consequences for its reelection prospects, if it inflates. This mechanism makes inflation politically costly and thus has the potential to reduce inflation. It also has a downside. The voters' trigger-strategy punishments are "too crude": legitimate inflationary responses are not excused, perhaps because the voters lack information about when inflation is legitimate. (Inflation may further economic welfare when extreme real shocks or unforeseen contingencies are realized.) Moreover, inflationary surges can be caused by factors the government does not control, such as extreme money demand shocks. To avoid triggering the voters' wrath, the government has incentives to respond "too conservatively" to real shocks and unforeseen contingencies.

For an example of a monetary institution that is backed up by reputational trigger-strategy punishments, consider the European Monetary System (EMS). A stylized view of the EMS interprets the deutsche mark as the anchor currency of the system. Other member states of the EMS are in effect committed to set their inflation rate equal to the German inflation rate. Just as a country can join the EMS by political fiat, it can "defect" on its institutional commitment by devaluing its currency or exiting from the EMS. Such a defection is punished by a loss in popularity: because devaluations and exits are front-page news, voters can monitor their governments' commitment to the EMS at low cost.

However, even though voters follow the simple strategy of punishing their governments for breaking the EMS commitment, monetary policy may nonetheless respond

flexibly as circumstances demand. Suppose, for the sake of argument, the Deutsche Bundesbank is the perfect central banker—following a course of price stability while responding optimally to a variety of real shocks and unforeseen contingencies, which are common to the member states of the EMS. In this case, the EMS is the ideal solution to the time-consistency problem in monetary policy: by linking the value of its currency to the deutsche mark, a country gains price stability without sacrificing flexibility. Moreover, since the EMS (in this idealized description) is the perfect monetary institution, the need to defect never arises, and the voters never execute their trigger-strategy punishments.

In practice, of course, the EMS comes at a price. German monetary policy is responsive to a variety of domestic concerns. To the extent that German shocks are not perfectly correlated with the shocks impinging on the economies of other EMS member states, those countries not only forgo the benefits arising from the stabilization role of monetary policy, but they also "import" monetary variability generated by the Bundesbank's domestic responsiveness. In the early 1990s, for example, the non-German EMS states suffered recessionary consequences when German monetary policy was geared toward dealing with the potentially inflationary consequences of German unification. Because the Bundesbank is not a perfect central banker, the non-German members of the EMS occasionally find it worthwhile to devalue their currency *vis-à-vis* the deutsche mark or to exit the EMS, in which case they incur the reputational cost triggered by such an "institutional defection."

For another example of an institutionalized commitment to price stability, consider the monetary targets publicly announced by the Bundesbank since 1974. The Bundesbank initially committed itself to point targets for the monetary growth rate; starting in the late 1970s, it switched to 2 and 3 percent ranges. Either way, the Bundesbank's targets have been very simple. Prohibitive transaction costs and limited foresight arguably prevent the Bundesbank from announcing monetary targets that are conditional on a variety of shocks and unforeseen contingencies. The Bundesbank's announcement is directed at trade union and employer peak organizations and financial markets; its audience consists of Bundesbank watchers whose inflation expectations shape a large number of nominal prices. The German public is not part of this audience: the huge majority of German people do not know the pre-announced value of the monetary target, and even if they did, they would face a prohibitive cost of monitoring whether the Bundesbank was fulfilling its target. Indeed, most Germans are blissfully unaware of the fact that the Bundesbank is committed to following a monetary target at all. It follows that the cost of an unexcused defection from the target consists primarily of the increase in future inflation expectations formed by Bundesbank watchers.

Interestingly, the Bundesbank has failed to fulfill its monetary targets about half the time, but in each case it has "explained" the reasons for its lack of success in great detail to the elite community that monitors its performance. This audience is capable of assessing whether the Bundesbank's excuses are acceptable, thereby allowing for "excused defection." According to this interpretation, the Bundesbank's monetary targeting regime *de facto* implements a monetary growth rule that is contingent on shocks and unforeseen circumstances. This theory is consistent with the observation

that the Bundesbank's inflation-fighting reputation has not suffered as a consequence of the apparently dismal performance of its monetary targeting regime. On the contrary, if anything, its reputation has become stronger in the last two decades.

At first blush, non-institutionalized reputational mechanisms and institutional mechanisms that are backed up by reputational trigger-strategy punishments look very similar: either the government is punished for inflating or it is punished for failing to respect the constraints implied by a disinflationary monetary institution. However, different reputational and institutional solutions address different audiences and invoke different beliefs about trigger-strategy punishments. As a result, reputational and institutions solutions differ with regard to the average rate of inflation, the degree to which monetary policy responds flexibly to shocks and unforeseen contingencies, and the probability that defections occur in equilibrium and trigger the punishment (price stability breaks down, the government suffers a loss in popularity, and the like).

IV. Monetary Linkages

So far we have analyzed the case of two "unitary actors," the private sector and the government, playing a monetary policy game. In this chapter, we first consider the possibility that these two players interact with each other on more than one dimension of public policy. Specifically, we assume that they play two games, a monetary policy game and a regulatory policy game. Both games are subject to a time-consistency problem: in the monetary policy game, the commitment to price stability is at stake, in the regulatory policy game, the commitment to stable regulatory standards. In this setting, *issue linkage* allows for the linkage of trigger-strategy punishments across dimensions of public policy (Lohmann [1997]; see also Bernheim and Whinston [1986]; McGinnis [1986]; and Lohmann [1993]). A defection in the monetary policy game *or* the regulatory policy game leads to an erosion of private-sector trust in *both* price stability and regulatory stability. Because the punishment looms larger under issue linkage, commitment obtains for a larger range of discount factors.

We then consider the possibility that the private sector and the government are not unitary actors but consist of multiple actors. Specifically, we assume that the private sector is composed of two actors: the wage setters, who interact with the government over monetary policy, and a firm that is subject to government regulation. (We also consider the possibility that the government consists of multiple actors.) In this setting, *player linkage* allows for the linkage of trigger-strategy punishments across games played by different players (Lohmann [1997]; see also Bendor and Mookherjee [1990]; Milgrom, North, and Weingast [1990]; Kandori [1992]; and Lohmann [1993]). If the government defects *vis-à-vis* the wage setters in the monetary policy game *or vis-à-vis* the firm in the regulatory policy game, then the commitment to *both* price stability and regulatory stability breaks down. The players who, in the aggregate, form the private sector punish the government for defecting in any game independently of whether they themselves are active participants in the

game in question. Once again, the punishment looms larger under player linkage, and commitment obtains for a larger range of discount factors.

We now turn to the description of the time-consistency problem in regulatory policy (Baron [1988, 1993]). Anticipating that the government will impose stringent regulatory standards in the future, the firm expects the resulting compliance costs to decrease its profits. As a result, the firm invests less, with negative consequences for employment and output. In this setting, the commitment to stable regulatory standards has value because it shapes the firm's expectations about future regulatory policy and thus affects its investment decision.

The government's one-period utility function over regulatory policy is given by

$$V = r - r^e - \frac{r^2}{2} \tag{12}$$

where r is the stringency of the regulatory standard and r^e the expected stringency of the standard. The first term, r, stands for the benefits of regulation. For example, the regulatory standard might affect the health and safety of the firm's workers. The second term, $-r^e$, stands for the loss in employment and output that obtains when the firm invests less anticipating future regulation; and the third term, $-r^2/2$, stands for the compliance costs of regulation. In each period, the firm forms rational expectations about the regulatory standard, r^e, and the government sets the regulatory standard, r. This sequence of events is repeated indefinitely. The time-consistency problems in regulatory policy and monetary policy thus have the same formal structure (compare equations [1] and [12]).

If the government sets regulatory policy at its discretion, we obtain

$$r_D = r^e{}_D = 1, \tag{13}$$

$$V(r_D, r^e{}_D) = -\frac{1}{2}. \tag{14}$$

If the government can credibly commit itself to a regulatory standard before the firm forms its expectations and locks in its investment, we obtain

$$r_C = r^e{}_C = 0, \tag{15}$$

$$V(r_C, r^e{}_C) = 0. \tag{16}$$

The utility level achieved by reneging on the commitment to stable regulatory standards is equal to

$$V(r_D, r^e{}_C) = \frac{1}{2}. \tag{17}$$

Thus, the temptation to defect is given by

$$V(r_D, r^e_C) - V(r_C, r^e_C) = \frac{1}{2}. \tag{18}$$

The punishment is the discounted value of the difference between the utility achieved under the regime of credible commitment (see equation [16]) and the discretionary regime (see equation [14]):

$$(\delta + \delta^2 + \delta^3 + \ldots)[V(r_C, r^e_C) - V(r_D, r^e_D)] = \frac{\delta}{1-\delta}\frac{1}{2}. \tag{19}$$

Credible commitment is feasible if the punishment dominates the temptation to defect:

$$\begin{aligned} &V(r_D, r^e_C) - V(r_C, r^e_C) \le \frac{\delta}{1-\delta}[V(r_C, r^e_C) - V(r_D, r^e_D)] \\ &\Leftrightarrow \quad \frac{1}{2} \le \frac{\delta}{1-\delta}\frac{1}{2} \quad \Leftrightarrow \quad \delta \ge \frac{1}{2} \end{aligned} \tag{20}$$

that is, for the set of political discount factors $\delta \in [0.5, 1]$.

So far, we have analyzed the situation in which the regulatory policy game is delinked from the monetary policy game. That is, if the government defects in one game, the credibility of its commitment in the other game remains unaffected.

Now we examine the implications of issue linkage. Without loss of generality, let us assume that in each period the government sets monetary policy first, regulatory policy second. If the government defects in one game, its credibility breaks down in both games.

The one-period gains from defection are the same as before. However, the punishment is higher under issue linkage. If the government defects in the monetary policy game, it loses the benefits of commitment in the regulatory policy game that is played concurrently as well as the benefits of commitment in the monetary policy games and regulatory policy games played in all future periods. The incentive constraint defining the feasibility of credible commitment in monetary policy is given by

$$\begin{aligned} &U(p_D, p^e_C) - U(p_C, p^e_C) \le V(r_C, r^e_C) - V(r_D, r^e_D) + \\ &\quad \delta[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta[V(r_C, r^e_C) - V(r_D, r^e_D)] + \\ &\quad \delta^2[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta^2[V(r_C, r^e_C) - V(r_D, r^e_D)] + \ldots \\ &\quad \Leftrightarrow \quad \frac{1}{2} \le \frac{1}{2} + \frac{\delta}{1-\delta}\left(\frac{1}{2} + \frac{1}{2}\right) \quad \Leftrightarrow \quad \delta \ge 0. \end{aligned} \tag{21}$$

If the government defects in the regulatory policy game, it loses the benefits of commitment in the monetary policy games and regulatory policy games played in all

future periods. The incentive constraint defining the feasibility of credible commitment in regulatory policy is given by

$$
\begin{aligned}
&V(r_D, r^e_C) - V(r_C, r^e_C) \leq \\
&\qquad \delta[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta[V(r_C, r^e_C) - V(r_D, r^e_D)] + \\
&\qquad \delta^2[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta^2[V(r_C, r^e_C) - V(r_D, r^e_D)] + \ldots \\
&\qquad \Leftrightarrow \quad \frac{1}{2} \leq \frac{\delta}{1-\delta}\left(\frac{1}{2} + \frac{1}{2}\right) \quad \Leftrightarrow \quad \delta \geq \frac{1}{3}.
\end{aligned}
\tag{22}
$$

When the trigger-strategy punishments in the two games are linked, price stability and regulatory stability are feasible only if the incentive constraints for both games are met. The game with the stronger incentives to defect dominates; that is, equation (22) defines the feasibility of credible commitment under issue linkage. Thus, the range of political discount factors for which the government can lock in the commitment to price stability and regulatory stability is given by $\delta \in [0.33, 1]$. Issue linkage enlarges the set of discount factors for which price stability and regulatory stability are sustainable as an equilibrium outcome, from $\delta \in [0.5, 1]$ to $\delta \in [0.33, 1]$.

As we add more issue dimensions, credible commitment is feasible for an increasingly large set of political discount factors. Suppose that in addition to monetary policy there are $k - 1$ regulatory issues that are decided sequentially and repeatedly: in each period, monetary policy is set first, followed by regulatory issue number 1, regulatory issue number 2, and so on, until regulatory issue number $k - 1$ is decided last; this sequence of events is repeated indefinitely. The government's utility function on each regulatory issue takes the form of equation (12).

The government has the strongest incentives to defect on issue $k - 1$, since this issue is decided last in a given period. The incentive constraint for this issue determines the feasibility of a credible commitment in monetary policy and all $k - 1$ dimensions of regulatory policy:

$$
\begin{aligned}
&V(r_D, r^e_C) - V(r_C, r^e_C) \leq \\
&\qquad \delta[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta(k-1)\,[V(r_C, r^e_C) - V(r_D, r^e_D)] + \\
&\qquad \delta^2[U(p_C, p^e_C) - U(p_D, p^e_D)] + \delta^2(k-1)\,[V(r_C, r^e_C) - V(r_D, r^e_D)] + \ldots \\
&\qquad \Leftrightarrow \quad \frac{1}{2} \leq \frac{\delta}{1-\delta}\, k\frac{1}{2} \quad \Leftrightarrow \quad \delta \geq \frac{1}{k+1}.
\end{aligned}
\tag{23}
$$

As the number of issues, k, increases, price stability and regulatory stability are feasible for an increasingly large set of political discount factors, $\delta \in [1/(k+1), 1]$.

Next, we consider the implications of player linkage. In this setting, the players' trigger-strategy punishments are linked across games even though each player is an active participant only in a subset of games. Suppose the private sector consists of wage setters, who interact with the government over monetary policy, and a firm,

which plays the regulatory policy game. If the government defects in the monetary policy game or the regulatory policy game, then the wage setters lose faith in price stability and the regulated firm loses faith in regulatory stability. The incentive constraint for the feasibility of credibility commitment in equation (22) applies here: under player linkage, credible commitment is feasible for the set of political discount factors $\delta \in [0.33, 1]$.

Alternatively, the private sector might consist of wage setters and $k - 1$ firms subject to different kinds of regulation. Here, the unitary actor government interacts with k players in k separate games. The incentive constraint in equation (23) applies: under player linkage, price stability and regulatory stability are feasible for the set of political discount factors $\delta \in [1/(k + 1), 1]$.

In a more complex game, multiple government actors play games on multiple issues with multiple private-sector actors and with each other. For example, the central bank, which sets inflation, plays the monetary policy game with the wage setters, and a regulatory agency, which has authority to set all kinds of regulatory standards, plays multiple regulatory policy games with private firms, among them private banks. The two government actors each face a time-consistency *vis-à-vis* a subset of the private sector, but they must also find a way to cooperate with each other over (for example) banking regulations that may have monetary policy consequences. Under issue and player linkage, if the central bank defects in the monetary policy game or fails to cooperate with the regulatory agency, it loses credibility both with wage setters and the regulatory agency; correspondingly, if the regulatory agency defects in the regulatory policy game or fails to cooperate with the central bank, it loses credibility both with regulated firms and the central bank. Clearly, as the number of issues and players increases, credible commitment is feasible for an increasingly large set of political discount factors.

Democratically elected politicians have short time-horizons because they fear losing power to the opposition. For this reason, they have a problem with credible commitment. However, modern democracies are complex societies dealing with a large number of issues: monetary policy, regulatory policy, trade policy, agricultural policy, environmental policy, and the like. Large numbers of players interact with each other: producers, consumers, interest groups, voters, political parties, legislators, courts, different levels of government, agencies, commissions, and so on. In such societies, complex issue and player linkages pave the way for credible commitment.

V. Institutional Webs

Linkage may further cooperation by establishing or maintaining beliefs that defections in one game will trigger a breakdown of cooperation in other games. So far, this idea has been developed in a setting with "reputational" play that did not assign an explicit role to institutions. This chapter argues that "institutional webs" (Portnoy [1995]; see also Lohmann [1995, 1997]; Bendor and Mookherjee [1987]) are the vehicle by which linkages are established and maintained.

Earlier we noted that one function of institutions is to coordinate the players' beliefs on a Pareto-preferred equilibrium. This function of institutions is all the more important because linkage is a fragile thing—it comes about only because of the players' beliefs that cooperative behavior in one setting influences the prospects for cooperation in other, possibly functionally unrelated, settings.

To illustrate the role of institutions in linking trigger-strategy punishments across games, consider a government seeking to achieve price stability by granting independence to its central bank. It can do so in one of three ways: the government can publicly announce that it will not meddle with the central bank in the future; it can pass a simple law declaring the central bank legally independent; or it can pass a constitutional amendment protecting the independence of the central bank.

A public announcement, which can be revoked by political fiat, is less credible than a simple law, which implies some degree of legal commitment; and a simple law is less credible than a constitutional amendment because the former can be revoked with a simple majority in parliament, whereas the latter requires a super-majority.

The credibility of a legal commitment to central bank independence does not rely on legal sanctions. It is unheard of for elected politicians to go to prison for dismissing their central bank governors or for pressuring the central bank by other means. Instead, legal commitments are credible because of issue and player linkages. If a government passes a law and then breaks the law or revokes it for opportunistic reasons, it pays a price: there is an erosion of trust in the credibility of legal commitments of similar standing. The commitment implied by a constitutional amendment is greater than the commitment implied by a simple law because the political cost of defying a constitutional amendment is greater than the political cost of defying a simple law: these two forms of legal commitment are supported by different linkages or, equivalently, they invoke different trigger-strategy punishments.

Earlier, we noted a second function of institutions. In games involving third-party enforcement, it obviously makes a difference whether the third party can observe, or is informed about, defections. When defections are partially or fully hidden from the relevant audience, institutions that provide information about defections affect the play of the game and its payoffs. As the issue and player linkages in a society become increasingly complex, informational problems are compounded: it becomes increasingly difficult for players who are not active participants in a game to observe a defection or to evaluate whether a defection occurred. This is where institutions come in.

International Monetary Fund (IMF) conditionality is an example of a monetary institution that furthers credible commitment by providing information enabling players to punish defectors. The IMF provides technical and financial assistance to developing countries conditional on agreement by recipient countries to follow through with inflation stabilization programs. IMF evaluations are a critical element in a country's debt restructuring and refinancing efforts. The country accepts the conditions imposed by the IMF because they serve as a "seal of approval" assuring private banks in foreign countries that the country in question is an acceptable credit risk (Edwards [1989]).

VI. Monetary Institutions and Price Stability in Japan

The theory developed here yields the following implications. Whether a country achieves price stability depends on the political discount factor δ. For very low δ, the government cannot credibly commit itself to price stability, nor can it credibly commit itself to respect the constraints imposed by a disinflationary institution. Neither reputational nor institutional solutions to the time-consistency problem work. The country suffers under inflation, and institutions "do not matter." Politically unstable developing countries might be classified in this way (low Π).[6]

If the political discount factor δ is very high, the government can commit itself to price stability directly or indirectly—by non-institutionalized reputational means or by setting up a monetary institution. Here, price stability is feasible, but once again institutions are irrelevant. The old Japan, with its powerful bureaucracy and single-party rule, might be classified in this way (high Π).

Most democracies lie between these two extremes: they are politically stable by some measures (a low incidence of riots and military coups) and unstable by other measures (high government turnover rates). For these countries, promises of price stability are not credible if such promises are made in isolation from other dimensions of public policy. But with issue and player linkages, credible commitment is feasible. Such linkages are established and maintained by monetary institutions. The institutional means by which price stability can be achieved differ across countries; examples given earlier included the Bundesbank's monetary targeting regimes, the EMS, legal central bank independence, and IMF conditionality. Different institutional choices reflect different trade-offs between price stability and other goals of monetary policy, as well as country-specific constraints. As a result, the degree to which price stability is achieved differs across countries. We would expect inflation to vary at low levels as a function of institutions. The new Japan, in which elected politicians are competing with each other in the political marketplace and asserting their dominance *vis-à-vis* the bureaucracy, might be classified in this way (intermediate Π).

In summary, this paper predicts that the new Japan will continue on its path of price stability—but it also suggests that price stability must be achieved by institutional means. For this reason, the ongoing efforts to "regularize" Japanese monetary institutions and bring them in line with the institutions of other highly developed, politically mature democracies are promising indeed.

6. On the relationship between seigniorage and political instability, see Cukierman, Edwards, and Tabellini (1992) and Cukierman (1992).

References

Aoki, Masahiko, *Information, Incentives, and Bargaining in the Japanese Economy*, New York: Cambridge University Press, 1988.

Abegglen, James C., *The Strategy of Japanese Business*, Cambridge: Ballinger, 1984.

Baron, David, "Regulatory Incentive Mechanisms, Commitment, and Political Action," *Graduate School of Business Research Paper*, No. 1028, Stanford University, 1988.

———, "The Economics and Politics of Regulation: Perspectives, Agenda, and Approaches," *Graduate School of Business Research Paper*, No. 1247, Stanford University, 1993.

Barro, Robert J., and David B. Gordon, "Rules, Discretion and Reputation in a Model of Monetary Policy," *Journal of Monetary Economics*, 12, 1983, pp. 101–121.

Bendor, Jonathan, and Dilip Mookherjee, "Institutional Structure and the Logic of Ongoing Collective Action," *American Political Science Review*, 81, 1987, pp. 129–154.

———, and ———, "Norms, Third-Party Sanctions, and Cooperation," *Journal of Law, Economics, and Organization*, 6, 1990, pp. 33–63.

Bernheim, B. Douglas, and Michael D. Whinston, "Multi-Market Contact and Collusive Behavior," working paper, Department of Economics, Harvard University, 1986.

Bordo, Michael D., and Finn E. Kydland, "The Gold Standard as a Commitment Mechanism," working paper, Rutgers University and Carnegie-Mellon University, 1993.

Calder, Kent E., *Crisis and Compensation: Public Policy and Political Stability in Japan, 1949–1986*, Princeton: Princeton University Press, 1988.

Canzoneri, Matthew B., "Monetary Policy Games and the Role of Private Information," *American Economic Review*, 75, 1985, pp. 1056–1070.

Cargill, Thomas, "The Bank of Japan and the Federal Reserve: An Essay on Central Bank Independence," in Kevin Hoover and Steven Sheffrin, eds. *Monetarism and the Methodology of Economics*, Aldershot, England: Edward Elgar Publishing, 1995.

———, Michael Hutchison, and Takatoshi Ito, "Solving Inflation Bias without Central Bank Independence: The Bank of Japan," working paper, University of Nevada, Reno, University of California, Santa Cruz, and Hitotsubashi University, 1995.

Cowhey, Peter F., "Domestic Institutions and the Credibility of International Commitments: Japan and the United States," *International Organization*, 47, 1993, pp. 299–326.

———, and Matthew D. McCubbins, eds. *Structure and Policy in Japan and the United States*, New York: Cambridge University Press, 1995.

Cox, Gary W., Frances M. Rosenbluth, and Michael F. Thies, "Mobilization, Social Networks, and Turnout: Evidence from Japan," working paper, University of California, San Diego, Yale University, and University of California, Los Angeles, 1996.

Cukierman, Alex, *Central Bank Strategy, Credibility, and Independence*, Cambridge: MIT Press, 1992.

———, Sebastian Edwards, and Guido Tabellini, "Seigniorage and Political Instability," *American Economic Review*, 82, 1992, pp. 537–556.

Economist, The, "A Survey of Tomorrow's Japan," July 13, 1996.

Edwards, Sebastian, "The International Monetary Fund and Developing Countries: A Critical Evaluation," working paper, University of California, Los Angeles, 1989.

Fallows, James, *More Like Us: Putting America's Native Strengths and Traditional Values to Work to Overcome the Asian Challenge*, Boston: Houghton Mifflin, 1989.

———, "What Is an Economy for?" *The Atlantic Monthly*, 273 (1), 1994, pp. 76–89.

Fischer, Stanley, "Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule," *Journal of Political Economy*, 85, 1977, pp. 191–206.

Friedman, Milton, "The Role of Monetary Policy," *American Economic Review*, 58, 1968, pp. 1–17.

Fudenberg, Drew, and Jean Tirole, *Game Theory*, Cambridge: MIT Press, 1991.

Giavazzi, Francesco, and Marco Pagano, "The Advantage of Tying One's Hands: EMS Discipline and Central Bank Credibility," *European Economic Review*, 32, 1988, pp. 1055–1082.

Henning, C. Randall, *Currencies and Politics in the United States, Germany, and Japan*, Washington, D.C.: Institute for International Economics, 1994.

Johnson, Chalmers, *MITI and the Japanese Miracle: The Growth of Industrial Policy*, 1925–1975, Stanford: Stanford University Press, 1982.

———, "Political Institutions and Economic Performance: The Government-Business Relationship in Japan, South Korea, and Taiwan," in Frederic C. Deyo, ed. *The Political Economy of the New Asian Industrialism*, Ithaca: Cornell University Press, 1987, pp. 136–164.

Kandori, Michihiro, "Social Norms and Community Enforcement," *Review of Economic Studies*, 59, 1992, pp. 63-81.

Kydland, Finn E., and Edward C. Prescott, "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*, 85, 1977, pp. 473–491.

Lohmann, Susanne, "Optimal Commitment in Monetary Policy: Credibility versus Flexibility," *American Economic Review*, 82, 1992, pp. 273–286.

———, "Electoral Cycles and International Policy Cooperation," *European Economic Review*, 37, 1993, pp. 1373–1391.

———, "Why Do Central Banking Institutions Matter?" working paper, University of California, Los Angeles, 1995.

———, "Linkage Politics," *Journal of Conflict Resolution*, 41, 1997, pp. 38–67.

———, "Federalism and Central Bank Independence: The Politics of German Monetary Policy, 1957–1992," *World Politics*, 51, 1998.

Maxfield, Sylvia, *Gatekeepers of Growth: The International Political Economy of Central Banking in Developing Countries*, Princeton: Princeton University Press, 1997.

McCubbins, Matthew D., and Michael F. Thies, "As a Matter of Factions: The Budgetary Implications of Shifting Factional Control in Japan's LDP," *Legislative Studies Quarterly*, 22 (3), 1997, pp. 293–328.

McGinnis, Michael D., "Issue Linkage and the Evolution of International Cooperation," *Journal of Conflict Resolution*, 30, 1986, pp. 141–170.

Mélitz, Jacques, "Monetary Discipline, Germany, and the European Monetary System: A Synthesis," in Francesco Giavazzi et al., eds. *The European Monetary System*, New York: Cambridge University Press, 1988, pp. 51–79.

Milgrom, Paul, Douglass North, and Barry Weingast, "The Role of Institutions in the Revival of Trade: The Medieval Law Merchant," *Economics and Politics*, 2, 1990, pp. 1–23.

Neumann, Manfred J. M., "Precommitment by Central Bank Independence," *Open Economies Review*, 2, 1991, pp. 95–112.

Persson, Torsten, and Guido Tabellini, *Macroeconomic Policy, Credibility and Politics*, Chur: Harwood, 1990.

Portnoy, Brian, "Credibility, Institutions, and Exchange Rate Commitments in Developing Countries," working paper, Department of Political Science, University of Chicago, 1995.

Posen, Adam, "Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix for Politics," in Richard O'Brien, ed. *Finance and the International Economy*, New York: Oxford University Press, 1993, pp. 40–65.

Prestowitz, Clyde V., *Trading Places: How We Allowed Japan to Take the Lead*, New York: Basic Books, 1988.

Ramseyer, J. Mark, *Odd Markets in Japanese History: Law and Economic Growth*, New York: Cambridge University Press, 1996.

———, and Frances M. Rosenbluth, *Japan's Political Marketplace*, Cambridge: Harvard University Press, 1993.

Rogoff, Kenneth, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics*, 100, 1985, pp. 1169–1189.

Vogel, Ezra F., *Japan as Number One: Lessons for America*, Cambridge: Harvard University Press, 1979.

Walsh, Carl E., "Optimal Contracts for Central Bankers," *American Economic Review*, 85, 1995, pp. 150–168.

Woronoff, Jon, *Japan as*—Anything But—*Number One*, Armonk, New York: M. E. Sharpe, 1991.