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Political Contagion in Currency Crises

Allan Drazen

2.1 Introduction

The possibility of contagion in currency crises across countries is highly topical, to say the least. Though the phenomenon is widely discussed and is supported by solid empirical evidence,[1] construction of convincing theoretical models of contagion is still in its infancy. Moreover, in existing models of contagion, political aspects of the decision whether to defend a currency against attack, central to the "new generation" crisis models, do not play an important role. This paper argues that political factors of two sorts may be key to understanding some examples of apparent contagion, most importantly the European Monetary System (EMS) crisis of 1992–93. First, the political nature of the decision to devalue, combined with incomplete information about government objectives in making this decision, is often crucial to the appearance of speculative pressures. Second, when one of a country's principal objectives in maintaining a fixed exchange rate is (explicit or implicit) political integration with its "neighbors," a devaluation by one of those neighbors will increase speculative pressures on the country. This argument is especially relevant to the EMS but is not limited to it.

In section 2.2 models of speculative attack are summarized to make

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1. See, e.g., Eichengreen and Wyplosz (1993), Gerlach and Smets (1995), and, esp., Eichengreen, Rose, and Wyplosz (1996).

clear the political nature of the devaluation decision. In section 2.3 existing models of contagion are summarized, as is the concept of *political contagion* introduced in this paper. In section 2.4 a very simple model is presented, along with a discussion of how it may be easily extended to a multiperiod framework. Section 2.5 suggests why, on the basis of varied types of evidence, political contagion may have been important in the 1992–93 EMS crisis. Section 2.6 concludes.

2.2 Models of Speculative Attack

In Krugman's seminal 1979 paper on exchange rate collapse, an inconsistency in fundamentals induces a steady loss in reserves, ending in an abandonment of fixed rates. For example, the government is running a deficit and is financing it by printing money. The rate of monetary expansion is inconsistent with the fixed exchange rate in the long run; in the short run, individuals do not want to hold the higher level of domestic currency and exchange it for foreign-currency-denominated assets. The peg rate must be abandoned when reserves hit a minimum level, which is common knowledge to all market participants. However, the peg collapses not at the date implied by simply extrapolating the steady decline of reserves but in a speculative attack at some earlier date, namely, the first date at which optimal investor behavior implies such an attack will succeed.

Krugman's model of the inevitable abandonment of an unsustainable peg was a major step in understanding how currencies collapse, and it has been extended in a number of directions. It has been criticized, however, because its description of the decision to abandon a fixed exchange rate is clearly unrealistic in some cases. In the Krugman model policymakers are passive, sticking with current mutually inconsistent policies and abandoning the fixed rate reflexively when the critical minimum level of reserves is reached. They neither take an aggressive role in defending the current exchange rate policy, nor do they adjust their commonly known policy objectives in light of external economic and political developments.

Though it may be accurate in some instances to argue that a devaluation reflects the technical infeasibility of continuing current policy, a more accurate characterization of the behavior of policymakers in many cases is that the decision about whether to devalue reflects the balancing of conflicting objectives. Deteriorating fundamentals are an important part of the story, but the decision to devalue is taken not because it is literally unavoidable but because of the importance of other objectives given external developments. Hence, devaluation is a *political* decision in that maintaining the peg is technically feasible (especially when a central bank can borrow reserves) but is seen by the government as no longer optimal in light of the costs of doing so and the importance of other objectives.

Krugman (1996) and others have applied the term "new crisis model" to models of currency crises that give a central role to government optimi-

zation and that characterize the devaluation decision in terms of a choice between conflicting objectives. As Krugman puts it in characterizing the new crisis model, "A government—no longer a simple mechanism like that in the classical model, but rather an agent trying to minimize a loss function—must decide whether or not to defend an exogenously specified exchange rate parity" (1996, 350). To the extent that weighing conflicting objectives is key to deciding how to respond to speculative pressures, political considerations are central to the new crisis model. Examples of this approach include Obstfeld (1994), Drazen and Masson (1994), Masson (1995), Ozkan and Sutherland (1995), Obstfeld (1996), and Bensaid and Jeanne (1997).[2]

In these models, however, the treatment of speculators is far less meticulous than the treatment of policymakers: the latter are modeled as solving an explicit, well-formulated optimization problem; the former act optimally, but the optimization problem is generally either left implicit or is quite simplified. The problem of formulating devaluation expectations is stressed, but the information structure under which this takes place is quite simple. In Obstfeld (1994, 1996), for example, speculator behavior is summarized by their expectations of a devaluation, rationally conditioned on the government's optimal response to a single underlying shock and on the common-knowledge distribution of that shock. Drazen and Masson (1994) and Masson (1995) add uncertainty about the policymaker's objectives (the policymaker's "type") and consider how it will interact with uncertainty about fundamentals.

A more realistic model of optimal speculator behavior should have them solving a more complicated, dynamic signal extraction problem in which there are several types of shocks. Bensaid and Jeanne (1997) is more satisfactory in this respect, with the probability of devaluation being derived via Bayesian updating of the policymaker's type. Drazen (1999) considers a dynamic model that allows for several types of shocks, where the rational expectations of devaluation are formed by Bayesian updating based on the history of policies and the current shock. In that model what is crucial in forming expectations of devaluation is not simply what policies were previously observed but also the circumstances in which they were observed. Not surprisingly, the information-based model of contagion presented here will be based on that model, though in a simplified form.

2.3 Contagious Currency Crises

"Contagion" appears to be the latest buzzword in foreign currency markets and in asset markets more generally. However, carefully reasoned

2. A model based on an optimizing government is *not* identical to one with multiple equilibria and the resultant possibility of self-fulfilling crises. A new crisis model can have a unique equilibrium, as in Drazen and Masson (1994), whereas a nonoptimizing model can have multiple equilibria, as discussed by Krugman (1996).

explanations of the causes of contagion, or even of what constitutes contagion, are as rare as discussions of the phenomenon are common.[3] I will apply the term to currency crises to refer to the phenomenon whereby a currency crisis *itself* in one country makes a currency crisis (or currency weakness) in another country more likely. The emphasis is meant to differentiate true contagion from a common shock (*other* than a currency crisis) that affects countries differentially because of their differential susceptibility to infection. When differential vulnerability to an unobserved common shock reflects unobserved characteristics, we may get what looks like true contagion because a crisis in one country will be followed by a crisis in another, with no apparent explanation other than the original crisis itself. This is an identification problem well known in epidemiology. Following the very clear discussion in Masson (1998), we call these "monsoonal effects."[4]

Masson makes a further distinction, arguing that contagion should be applied only to the case "where a crisis in one country may conceivably trigger a crisis elsewhere for reasons *unexplained* by macroeconomic fundamentals" (1998, 2; emphasis added). When a crisis in one country affects the fundamentals in another country (e.g., because a devaluation reduces the competitiveness of other countries and thus makes them more likely to devalue), he uses the term "spillover." I will use the term "contagion" more generally.

2.3.1 Three General Models of Contagion

A well-developed general model of contagion is that of information "cascades," in which asymmetrically informed investors acquire information sequentially by observing the actions of others who precede them. (See, e.g., Bikhchandani, Hirshleifer, and Welch 1992.) Agent 2 on the basis of his own information may prefer action A to action B, but he observes agent 1 choosing B. He thus infers that agent 1 has information favoring B, and this may push agent 2 to choose B as well. Agent 3, observing two previous choices of B, may also conclude that B is optimal, although his private information alone would imply choosing A. And so on. The general information cascade model may be more relevant for differentially informed investors in a given market than for contagion across foreign exchange markets. Two basic assumptions for an information cascade would not appear to be satisfied in foreign exchange markets: the cascade model relies on significant differences in private information across agents, but it is far from clear that there are such informational

3. E.g., the most common reason by far that market traders gave for devaluation contagion within the EMS in the Eichengreen and Wyplosz survey was that "markets 'tasted blood' (realized that there were profits to be made)" (1993, 98).

4. Masson focuses on shocks from industrial countries affecting Asian emerging markets, hence the terminology. We will use the term a bit more generally.

differences across large investors for major currencies; and the cascade model relies on significant transactions costs in order to generate sequential behavior, but foreign exchange markets are not characterized by such high transactions costs. Moreover, in discussions of the applicability of cascades to contagious currency crises, it is not clear what is the relevant information transferred *across* currency markets.

Less formally, the idea of informational externalities has been applied to foreign exchange markets as follows. It is argued that with uncertainty about policymakers' commitments to defending fixed exchange rates, the collapse of the exchange rate in one country may provide information that another country in similar macroeconomic circumstances is more likely to abandon its fixed parity. Though the argument is often heard, the logic is often incomplete. One could justify it in terms of a common unobserved shock that affects countries differentially due to different macroeconomic circumstances, but this is a monsoonal effect, rather than true contagion. As a contagion story, one must make clear what *new* information that is *relevant* to the second currency is being provided by the collapse of the first currency. Since devaluation in the first country provides no new information either about macroeconomic conditions per se (but see the arguments about spillovers below) or about the policy-making process in the second country (but see the discussion of political contagion in subsection 2.3.2 below) a less direct mechanism of contagion may be present.

More specifically, the argument that the collapse of the exchange rate in one country implies that another country in similar macroeconomic circumstances is more likely to abandon its fixed parity may be *probabilistic* or statistical. Market participants envision a collapse scenario that could occur under certain circumstances but assign it a low probability until it actually occurs in such circumstances. They then raise the probability of its occurring in similar circumstances elsewhere, perhaps increasing their speculation against those other countries. Hence, a crisis in one country, previously assigned low probability, may raise the probability of devaluation elsewhere. This is not herding to a currently faddish theory of contagion (a phenomenon that may itself be present), but statistical updating on the basis of drawing another observation favorable to a theory.

Another type of contagion model is a "spillover" model (to use Masson's terminology), focusing on trade linkages. This has been modeled formally by Gerlach and Smets (1995) and Eichengreen et al. (1996). An attack-induced devaluation in one country enhances its competitiveness, leading to trade deficits and declining reserves for its trading partners, making their currencies more vulnerable.[5] If one looks simply at bilateral trade linkages, the idea may be relevant for some cases (as in the effect of

5. An alternative argument is that changes in the price levels of trading partners reduce demand for money, leading to a depletion of reserves.

the floating of the Finnish markka on 8 September 1992 on speculation against the Swedish krona, as discussed by Gerlach and Smets), but it does not appear to be a general explanation. The magnitudes seem wrong because "contagious" attacks hit currencies where the bilateral trade volumes just are not large enough. However, this bilateral view is probably too limited, for we should consider multilateral linkages, whereby two countries compete against one another in the same third-country market. Theoretically, this appears relevant for Asian countries with significant exports to Japan or the United States. However, the trade magnitudes are probably still too small to explain contagion beginning in Thailand, even when both bilateral trade and third-market trade are included.

An analogous argument is that spillovers occur via financial markets, as third-country investors liquidate their positions in one country to cover crisis-induced losses in another. It is far harder to assess empirically how important this was in the recent Asian crisis. In any case, this vehicle for contagion seems of little relevance for the Exchange Rate Mechanism (ERM) crisis of 1992–93.

A third line of argument is that contagion is linked to the possibility of multiple equilibria and self-fulfilling speculative attacks. Masson (1998), in fact, argues that only models of this sort are capable of producing true contagion, reflecting his view (see above) that contagion, by definition, refers to the simultaneous occurrence of currency crises not linked to macroeconomic fundamentals. In his model, a crisis is the result of a deterioration of the current account, reflecting in turn extremely high debt service. Interest rates include a devaluation premium, so that the expectation of a devaluation can be self-fulfilling. Masson's argument concentrates on the simultaneity of a number of such episodes, rather than a causal link between them. Similarly, Eichengreen and Wyplosz (1993) suggest that high unemployment leads market participants to anticipate a future loosening of monetary policy, inducing speculation against the currency. The costs of defending the currency rise, due in part to the induced upward pressure on interest rates, so that a country may in fact devalue where it would not have in the absence of speculative pressure. Hence, the expectation of monetary loosening becomes self-fulfilling. This argument, as will be discussed in section 2.5 below, is close to but not identical to the one presented here.

2.3.2 Political Contagion

In the previous subsection, we summarized three general models of contagious currency crises. Each type of model is structured along the lines of the second-generation models of crisis, which stress the balancing of conflicting objectives in the devaluation decision, leading us to characterize these models as "political." The objectives themselves, however, are basically economic, and the nature of the contagion is thus economic as

well. In this paper, I want to introduce a fourth type of contagion that is inherently political, in that the objectives that give rise to contagion are primarily political. Contagion will be intrinsically political, for in the absence of the political objective, devaluation in one country would not affect speculative pressure on another country's currency.

First, what does one mean by "primarily political" objectives in economic policy? Economic decisions are often made on the basis of largely political goals. Income distribution programs are a good case in point: transfers are made with the aim of maximizing votes for the incumbent party. The objective of a decision is clearly primarily political when it supports a political objective that is in conflict with economic objectives. Hence, holding the exchange rate fixed for the purpose of enhanced political integration at significant economic cost is a primarily political decision. As many have argued, this characterization describes the impetus toward fixed exchange rates in the move toward European Economic and Monetary Union (EMU). (Feldstein 1997 argues quite strongly on the primarily political nature of decisions surrounding EMU.)

More generally, the point that the decision to keep a fixed parity may be primarily political can be put as follows. One component of increased political-economic integration with other countries is often the maintenance of a fixed exchange rate with respect to their currencies. This may reflect the desire to form some sort of explicit currency area or trading bloc, as, for example, in the case of the EMU. Or it may be less explicit, in the sense that "cooperative behavior" means refraining from competitive devaluations. Hence, one may think of membership in a "club,"[6] whether explicit or implicit, where the benefits of membership are heavily political and the condition for membership is the maintenance of a fixed exchange rate. (We consider in section 2.5 the specific institutional details that describe the EMU as such a club.)

The concept of political contagion in speculative attacks follows as an implication of the desire for political integration where maintenance of a fixed exchange rate is a membership condition on each potential member of the integrated unit. One must make one further assumption, namely, that the value of membership in the arrangement depends positively on who else is or may be a member. Hence, if a country learns that other potential members of the arrangement place less weight on meeting the conditions required to join and, hence, are less likely to participate, it will find less advantage in joining as well. It will therefore assign a lower value to maintaining a fixed exchange rate, especially when doing so requires sacrificing domestic goals.

6. I use the term "club" for lack of another term that is concise rather than cumbersome. One should note, however, that the role of clubs in providing public goods is not central to the argument here.

To complete the argument, suppose that speculators are uncertain about a country's commitment to a fixed rate because they are uncertain of the weight the country's policymakers put on conflicting objectives. Speculators know, however, that the desire for integration subject to the no-devaluation membership condition is an important objective. Rational behavior on their part will then imply that a successful attack on one currency (or perhaps even speculative pressure on the currency), revealing a weaker commitment than previously believed, creates an externality in the form of a lower commitment of all other potential members. These countries will therefore be more vulnerable to attack.[7] We term this contagious effect *membership contagion.*

2.4 A Model of Membership Contagion

In this section we present a simple model of membership contagion and discuss the underlying concept in greater detail in subsection 2.4.3. The possibility of a contagious currency crisis depends on incomplete information about government intentions, allowing revelation of information about the intentions of other countries to affect the probability of a devaluation. This probability is derived under rational expectations, where it is shown how this probability depends on history, on the country's current circumstances, and on the actions of other countries.

To make things as simple as possible, we consider a single-period model, based on the more general multiperiod model presented in Drazen (1999). The more general model allows an explicit discussion of how rational devaluation probabilities evolve over time as a function of a country's current circumstances and the history of policy—specifically, how information from the history of policy and the circumstances in which those policy decisions were made affects the current information set. Here this updating of the past will be implicit, but it will be clear how the model is easily extended to a dynamic framework.

The sequence of events in the model is as follows. A country that has maintained a fixed exchange rate experiences a stochastic shock η, which is observed by both the government and speculators. Speculators then choose a level of speculation against the currency, given η and the probability they assign to a devaluation (of known size) at the end of the period. Specifically, speculators borrow domestic currency to be repaid at the end of the period and use it to buy foreign currency reserves. Since main-

7. This contagion argument should be distinguished from the earlier argument about the spillover of competitive pressures via real exchange rate effects in implicit trading arrangements. The previous argument concerned the trade effect of a lower real exchange rate following a nominal devaluation, which induces a trading competitor to devalue. Here the argument focuses on the contagious nature of "breaking the rules," *independent* of any effects on the real exchange rate.

taining the fixed parity requires that reserves remain above some critical level, speculative demand for reserves determines a minimum interest rate i that must be maintained if the government is to defend the fixed parity. On the basis of η and i, the government then decides whether to defend the fixed exchange rate (denoted by choice of policy F) by holding the interest rate at i or to abandon the parity and devalue (policy D) consistent with a lower interest rate. At the end of the period speculators sell their reserves back to the government and pay off their borrowing. Though speculators use a range of information in deciding whether to attack a currency, we consider basically three types of shocks here: a country-specific factor that is unobservable to speculators (the country's unobservable "type"), a country-specific shock that is observable to both the government and speculators, and, to model contagion, a cross-country observable shock.[8] New information relevant to speculators will generally fall into one of these categories.

2.4.1 Speculator Behavior

As already indicated, key to speculator behavior is their borrowing of domestic currency in order to buy foreign currency reserves. Speculators are assumed to be atomistic, but the total cost of borrowing is assumed to be an increasing, convex function of the quantity borrowed.[9] This assumption allows us to maintain the simplicity of working with a parametric interest rate, rather than an interest rate schedule, but at the same time to prevent speculators from taking infinite speculative positions. Under these assumptions, one can easily show that total demand for reserves by profit-maximizing speculators is increasing in the probability p that speculators assign to a devaluation and decreasing in the cost of borrowing funds (see Drazen 1999). For simplicity, we make the further reasonable assumption that the cost of borrowing funds is such that demand for borrowing goes to zero as i approaches infinity and goes to zero as p goes to zero.

Suppose that maintaining the fixed exchange rate requires foreign currency reserves to be above some minimum level. For given devaluation expectations, defending the fixed rate then requires keeping the interest rate high enough that total demand for reserves is no greater than this minimum level. (Speculators' beliefs about the probability of a devaluation are fully summarized by p, where we discuss below how rational beliefs are formed, conditional on available information.) This determines

8. In a multiperiod version of the model, the country-specific unobservable "type" would be time invariant, while the observable country-specific shock would be time varying.

9. In a multiperiod model, assuming that speculators can adjust their positions period by period allows us to retain the feature that in deriving their optimal position, risk-neutral speculators would need only to consider the probability of devaluation in the current period and would not need to form expectations of the probability of devaluation in future periods. See Drazen (1999).

the lowest interest rate consistent with maintaining the fixed parity (the "minimum required interest rate"), which given our assumptions is an increasing, continuous function of p, namely, $i(p)$.

2.4.2 The Government's Choice Problem

We now turn to the decision problem of a social-welfare-maximizing government that has an announced commitment to a fixed exchange rate. If the government is to maintain the fixed parity (policy F), it must raise the interest rate to the level $i(p)$ consistent with maintaining sufficient foreign currency reserves, with the associated welfare loss due to the detrimental effect of high interest rates on the domestic economy. Four areas of negative impact are generally mentioned: negative impact on economic activity, especially when the economy is seen as depressed; negative impact on mortgage interest rates, especially when these rates are directly indexed to money market rates and defense of the exchange rate requires holding market rates high for significant periods (as in the case of the United Kingdom); impact of interest rates on increasing the budget deficit; and possible destabilization of the banking system. We represent these losses by a function $H(i,\eta)$, where H is increasing and concave in both the domestic interest rate i and the shock η and $H(\cdot) = 0$ if the government chooses to devalue rather than defend the fixed parity. The shock η is observed by both the government and speculators. It is meant to represent any currently observed factor known to affect the value the government may assign to maintaining a fixed exchange rate, such as changes in the level of foreign currency reserves or changes in domestic unemployment rates.

Not defending the fixed parity and devaluing has both benefits and costs. Since our interest is in the latter, we assume the benefits are subsumed in the function H. Whereas the benefits of devaluation are generally purely economic, the cost of not defending a fixed exchange rate are more political in nature in that they are costs associated with reneging on a commitment. In a multiperiod model loss of reputation would be foremost among these. Membership effects, as discussed in subsection 2.3.2, present another example of this sort of cost when devaluing creates a bar to participation in a cooperative arrangement. Two aspects of this cost are important for our modeling of contagion: first, that the cost the government assigns to devaluing is asymmetric information, known to the government but not fully known to speculators, and, second, that this cost depends, among other things, on (at least partially) known information about the commitment of other countries to the cooperative arrangement, or club, of the sort discussed in subsection 2.3.2 above.[10] We consider them in turn, both in some detail.

10. There is no contradiction between saying that the country's commitment to the fixed rate is not *fully* known and the commitment of other countries to a cooperative arrangement, which may itself depend on their maintaining fixed rates, is at least *partially* known. If this point is not clear here, it will be below.

The first aspect, asymmetric information about a government's intentions, is modeled as an element x which affects the loss from a devaluation, where x is known with certainty only to the policymaker himself (his "type"). Speculators, on the other hand, know only the distribution of possible types as summarized by a distribution $G(x)$ defined over $[\underline{x},\bar{x}]$. The information summarized by the distribution and its supports could reflect learning about the government on the basis of past observation of its policies and of the circumstances in which these policies were undertaken, as will be discussed below.

The second aspect is summarized by a parameter Z, an index of the value to the country of being in the club. Z could be simply the number of other countries that satisfy the membership criteria, or it could be a weighted sum, with weights depending on the importance for the home country of a given country's participation. More generally, Z could encompass the probability of the club arrangement coming into being, as a function of the behavior of other countries. We present a fuller discussion of the determinants of Z in the next subsection. The loss ζ from a devaluation will equal xZ if the policymaker devalues and will equal zero otherwise.

The trade-off that a social-welfare-maximizing policymaker faces if the currency is attacked—maintaining the fixed exchange rate against maintaining low interest rates—may then be represented by the loss function

$$L = H(i,\eta) + \zeta(xZ), \tag{1}$$

where the second term is zero if the government defends the fixed exchange rate, while the first term is zero if it does not.[11]

The government's policy choice, given the realization η and the interest rate $i(p)$ required to maintain the fixed exchange rate consistent with speculators' beliefs, as summarized by p, will be summarized by a cutoff type $\hat{x}$ of policymaker who is just indifferent between devaluing and not devaluing. All types with $x < \hat{x}$ will devalue; all types with $x \geq \hat{x}$ will maintain the fixed parity. To see why, first derive the cutoff $\hat{x}$ by equating the value of L in equation (1) under policy F (so that $L = H$) and policy D (so that $L = \zeta$), so that

$$\hat{x} = \frac{H(i[p],\eta)}{Z} = \hat{x}(p,\eta,Z). \tag{2}$$

The cutoff $\hat{x} = \hat{x}(p,\eta,Z)$ is continuous and increasing in p and η and continuous and decreasing in Z. For a type with $x \geq \hat{x}$, $xZ \geq H$, so that

11. In a multiperiod framework the government would minimize a discounted loss function in which each term would take the form of eq. (1), where the cost $\zeta(xZ)$ would be interpreted as a one-time cost. Optimization would be forward looking, in that the implications of policy F or D in any period for future trade-offs would be considered. See Drazen (1999).

it will be optimal to defend the fixed parity rather than devalue; for a type with $x < \hat{x}$, $xZ < H$, so that it will be optimal to devalue. Hence, the cutoff rule fully characterizes a governments optimal behavior, and the probability of a devaluation depends on $\hat{x}(p,\eta,Z)$, given $\underline{x}$ and $G(x)$. For future use it is useful to denote by $\underline{\eta}$ the value of η such that $\hat{x} = \underline{x}$, for given p and Z. That is, $\underline{\eta}$ is the value of η such that even the government type with the lowest cost of devaluation finds it optimal to maintain a fixed exchange rate, so that the probability of a devaluation is zero.

The nature of the optimal policy should be intuitive. Other things equal, the higher is speculation against the currency (summarized by p), the more likely a government is to find it optimal to devalue, rather than keep interest rates high. (I.e., an increase in $\hat{x}$ means that the probability that x lies below $\hat{x}$ increases.) The realization of an exogenous shock η will affect the government's incentive to devalue and, as we shall see, the equilibrium level of speculation itself. Finally, the fewer countries that are potential members of the association (or the less important are the other qualifying countries, or the less likely for the association to come into being), the lower is Z and the higher is $\hat{x}$, so the higher is the probability of a devaluation.

The determination of $\hat{x}$, and its implications for possible policy choices, also indicates how updating would take place in a multiperiod model. Suppose $\hat{x}$ is above $\underline{x}$ in period $t - 1$, as it will be for sufficiently high η, and the government chooses to defend the currency. This policy choice implies that the government's x is above $\hat{x}$, so that the lower support of the distribution at the beginning of t will be $\hat{x} > \underline{x}$, the lower support in $t - 1$. This is simply Bayesian updating, with the implied updating of the distribution of $G(x)$. If the realization of the current shock η was sufficiently low that $\hat{x} \leq \underline{x}$, all possible types would defend the fixed rate and the observation of policy F would provide no information, so the lower support of the distribution at the beginning of $t + 1$ would remain $\underline{x}$. Hence, the current lower support $\underline{x}$ and the associated distribution $G(x)$ summarizes what has been learned about the government's type prior to the current period on the basis of past observation of its policies and of the circumstances in which these policies were undertaken. The dynamics of speculative attacks based on such learning is the main focus of Drazen (1999), and this inference problem is one of the two key features distinguishing the multiperiod model presented in that paper from the single-period example presented here. (The other is the government's intertemporal optimization problem when it knows speculators are solving such an inference problem.)[12] Although we solve only a static problem, this discussion, combined with the discussion of the government's multiperiod objective in footnote 11, indicates how the model can be easily made dynamic.

12. A very similar multiperiod inference problem, as applied to the information conveyed by a policy of capital account liberalization, is presented in Bartolini and Drazen (1997).

2.4.3 Determinants of the Value of Membership

The heart of the model of membership contagion is the parameter Z, indicating the value of membership in a club, which depends on who else is, or is not, in the club. The extent of membership contagion will then depend on the specification of the club for which no-devaluation is the key membership criterion. As already indicated, this club may be a formal arrangement, such as an explicit common currency area or a trading bloc, or a far less explicit arrangement. To the extent that governments see such clubs as important, the political nature of the decision about whether to devalue may be seen in part as the decision about which club to join, the club of devaluers or the club of nondevaluers. Furthermore, if one views such clubs broadly, the club may be defined by politicians at the time devaluation decisions are being debated, rather than simply being preexisting or previously agreed upon arrangements. Hence, the concept of membership effects, and the possibility of contagion that arises from it, should be seen as including, but more broad than, simply explicit currency or trading arrangements.

The easiest case is that of explicitly defined clubs with no-devaluation as an explicit membership criterion, as is the case of the EMU as discussed in section 2.5. The link, however, from the no-devaluation membership criterion to contagion may be simple and direct, or it may be more subtle. The simplest link is where a devaluation disqualifies one country from joining the club for at least some period of time, and where the value to other potential members depends positively on that country's being a member. A less direct link is one in which devaluation by one country does not literally disqualify it over the relevant time horizon but makes its participation, or perhaps the existence of the arrangement itself, discretely less likely, thus lowering the value of membership to other potential members, making them more likely to devalue. This may be a more accurate description of the possible causal link from eventual membership in the EMU and the contagious currency crises in the EMS in 1992–93. An unanticipated devaluation by one potential member will reveal lower commitment to fixed exchange rates than previously believed, not only to speculators, but also to other potential members. This raises the probability they assign to that country's devaluing in the future and thus lowers the probability they assign to its meeting the membership criterion when it becomes effective.

In the context of an explicit currency union such as the EMU with a specific membership criterion of no-devaluation over a given horizon, there may be an even more subtle form of membership contagion. A devaluation by a country that other potential members view as important may lead to a weakening of the membership rules themselves. Suppose there is a desire to maximize the likelihood that the EMU will come into being

with, say, Italy as a member. Italian abandonment of the fixed parity in a way that might disqualify it because of failure to meet the membership criterion may lead to the no-devaluation rule being weakened, though not scrapped entirely. The weaker criterion would make other countries more likely to devalue, as this would no longer disqualify them, as previously. If several countries cannot "clear the bar," one might expect the bar to be lowered, so that others that could have will put less effort into maintaining fixed rates. One should be careful, however, in distinguishing between the argument that contagion may result from a devaluation-induced weakening of a no-devaluation criterion and the far stronger argument that a country that devalued believed ex ante this would have no membership consequences. There is no real evidence that ERM countries that abandoned their fixed parities in 1992–93 did so with the anticipation that the criteria would be changed in such a way that this would have no political costs, nor that a devaluation by a potential EMU member left the probability of EMU unchanged.

A related, though less formal, argument is that once a major player devalues and deviates from a previously solid arrangement, other players suddenly realize, "It can be done!" This is a variant of the argument in subsection 2.3.1 whereby contagion across countries in similar macroeconomic circumstances may reflect a probabilistic calculation, whereby seeing the phenomenon once significantly raises the probability that market participants assign to its occurring elsewhere. Replacing "probability" by "possibility" and replacing "market participant" by "government" shows how the analogy can be made. It has been argued that Britain's leaving the gold standard in 1931 may have had contagious effects on other countries for this reason (see, e.g., Eichengreen and Jeanne, chap. 1 in this volume).

What about less explicit clubs? More specifically, what sort of less explicit clubs might generate membership effects? And how might membership be defined? On a regional basis, politicians may attach weight to being "lumped together" in the eyes of international investors with neighbors whose economic performance is especially good, while differentiating themselves from countries in the same region whose performance is seen as poor. To the extent that there is a correlation between perceived performance and exchange rate regime, more specifically, fixed exchange rates, one obtains no-devaluation clubs. Such a club effect may be relevant for Asia or Latin America.[13] One possibility for membership contagion then

13. It seems quite relevant for France as well in the early part of the EMS period. In contrast to the strongly expansionary policies that the socialist government followed after coming to power in May 1981, there was an important change in behavior in June 1982, reinforced in March 1983, when France shifted to far tighter fiscal and monetary policies, the *politique de rigueur.* The purpose of this change in policy, which had a serious cost in terms of significantly higher unemployment, was to convince investors of a change in under-

comes from the argument in the previous two paragraphs, by which a devaluation by one club member weakens the membership criterion and makes other members more likely to devalue. That is, if one "success story" that previously maintained fixed rates suddenly devalues under specific circumstances, governments may perceive that avoiding devaluations under all circumstances is no longer a criterion in the eyes of investors to be part of the favored group. Of course, when devaluation itself is seen as revealing weakness, "reverse contagion" may result. If devaluations by its neighbors are seen as revealing economic problems that may have a regional component, a country's commitment to fixed exchange rates may be strengthened because it wants to make clear that it still belongs the no-devaluation club. The strength with which China and Hong Kong defended their exchange rates in the recent Asian turmoil would appear to reflect reverse membership contagion.

2.4.4 Speculator Inference and Rational Devaluation Beliefs

In subsection 2.4.2 we derived the optimal behavior of speculators on the basis of their beliefs about the probability of a devaluation p. On the basis of speculator behavior, we derived optimal behavior of the government in deciding whether to defend the fixed exchange rate. To close the model, we must ensure that the beliefs of speculators are consistent with government optimal behavior, that is, that they are rational. Hence, we must calculate the true probability of devaluation based on the beliefs p and equate them.

Given the cutoff nature of the government's optimal decision problem, the probability of a devaluation should reflect beliefs over government types. These beliefs are fully summarized by the set $[\underline{x},\bar{x}]$ and the conditional cumulative distribution associated with this set, $G(x)$. The actual probability of a devaluation, call it π, can then be calculated using $G(x)$ and the cutoff type $\hat{x}$, namely, as $G(\hat{x})$ for states where $\hat{x} > \underline{x}$ (i.e., for $\eta > \underline{\eta}$, as defined above) and zero otherwise. With the actual probability of devaluation π so defined, we may relate it to the perceived probability p using the definition of $\hat{x} = \hat{x}(p,\eta,Z)$ in equation (2). Since our focus is not on the role of history as summarized by $\underline{x}$, we will suppress the dependence of π on $\underline{x}$ and concentrate on the roles of η and Z. The rational equilibrium devaluation probability, for given values of η and Z, is then

$$\begin{aligned} (3) \qquad \pi &= G(\hat{x}(\pi,\eta,Z)) \quad \text{for } \eta > \underline{\eta}(Z), \\ &= 0 \qquad\qquad\qquad\quad \text{for } \eta \leq \underline{\eta}(Z), \end{aligned}$$

lying government objectives. France made this change credible by accepting high unemployment without devaluing. There were no realignments for a three-year period, despite unemployment rising above 10 percent. For a fuller discussion, see Drazen and Masson (1994).

where $\eta(Z)$ is defined by equation (2) for $\hat{x}(0,\eta,Z) = \underline{x}$. Equation (3) will always be satisfied for $\pi = 0$, as $\hat{x}(0,\eta,Z) < \underline{x}$. There will be at least one interior solution for sufficiently high η, given Z (i.e., $\eta > \eta(Z)$), or for sufficiently low Z, given η. Given the characteristics of $\hat{x}(\bar{p},\eta,Z)$ from equation (2) and the definition of $\pi(\eta,Z)$ in equation (3), it is clear that the equilibrium level of speculation π is increasing in η and decreasing in Z. The solution $\pi(\eta,Z)$ is central to our analysis of the dynamics of contagious speculative attacks.

The model admits the various types of contagion discussed above. An *information cascade* depends on what information is being transmitted; membership contagion discussed below will provide an example. Contagion via *spillover of fundamentals* can be represented by a change in fundamentals in another country inducing an increase in η, and hence in π. Contagion arising from *multiple equilibria* follows from the possibility of multiple solutions to equation (3). There will always be a solution $\pi = 0$, namely, where speculators believe there is no probability of a devaluation and do not speculate against the currency (due to the interest cost of borrowing), so that the government finds it costless to defend the currency. There may also be multiple interior solutions. (In this case, we take the highest value of π that satisfies the first part of eq. [3] as the interior solution for the discussion of other types of contagion, so that eq. [3] will have one positive and one zero solution.)

Our focus is on *political contagion* in speculative attacks, more specifically, the possibility of *membership contagion,* as discussed subsection 2.4.3. This would be characterized by the positive dependence of π on Z, the (possibly weighted) index of other potential members of the club. (A crucial assumption is that Z is known to both speculators and the government, as is the fact that $\zeta(xZ)$ is increasing in Z.) Hence, as long as *no*-devaluation is a membership criterion and a devaluation provides new information about Z, one obtains true contagion: a successful speculative attack on one potential member country will increase the probability of attack on other potential members.

2.5 Membership Contagion in the 1992–93 EMS Crisis

We now ask whether there is any evidence relating speculative attacks in the 1992–93 EMS crisis to membership contagion. (As argued above, the concept is also applicable to the desire for membership in less formal cooperative arrangements, but we focus here on the EMS.) We present not formal econometric tests but evidence more in the nature of "case studies," culled from other sources, suggesting that the concept may in fact be relevant. This will concern the answers to two questions: First, is there evidence that a devaluation in one country affected the probability of a de-

valuation in other countries? Second, if the answer to the first question is positive, is there evidence that this contagion may reflect membership effects?

On the first question, there seems to be general agreement that Britain's abandonment of its defense of the pound sterling in September 1992 did put pressure on some other European currencies. One can see this using the Eichengreen-Rose-Wyplosz index of crisis. More simply, looking at forward rates (measured as deutsche marks per unit of domestic currency), one can see a sharp fall in the rates for the Italian lira, the Spanish peseta, and the Irish punt, and a less sharp fall for the Danish krona and the French franc on 14 September 1992.[14] The Swedish abandonment of its defense of the krona in November appears to have had similar contagious implications.

The far harder question is whether membership effects were involved. This may be itself divided into two questions. First, as far as immediate causation, does a devaluation by one potential member lower the perceived probability of EMU? Second, does a lower probability of EMU actually taking place lower the political resolve of potential members to defend their fixed parity?

The first question is largely one of institutional detail, though not entirely, as the discussion in subsection 2.4.3 should make clear. As is well known, one of the convergence criteria required to qualify for EMU is that a country maintain exchange rate stability: it must keep its currency within the EMS fluctuation bands "without severe tensions" for at least two years before joining the monetary union. A devaluation, even one time, outside the EMS bands may thus prevent a country from joining the EMU. This formal membership criterion could then lower the perceived probability of EMU either directly, if the devaluation occurred within two years of when the criterion would be relevant, or indirectly, whereby a devaluation at some point lowers the perceived probability of a wide EMU coming into being in the more distant future. This second linkage, more relevant when discussing the connection between the EMS crisis of 1992–93 and later implementation of EMU, is discussed in subsection 2.4.3. Given the uncertainty about whether some countries would be able to meet the no-devaluation-for-two-years criterion when it becomes binding, a current devaluation would lower the perceived probability of EMU coming into effect.

14. The model would predict that not all currencies would be equally affected by contagion. For strong currencies with $\pi = 0$ originally, the increase in Z would still leave $\hat{x} < \underline{x}$, so that equilibrium $\pi(\eta,Z)$ will still equal zero and no change in speculative pressures will be observed. For other currencies, however, a successful speculative attack elsewhere will increase already present speculative pressures or will introduce them if absent (i.e., where the increase in Z pushes $\hat{x}$ above $\underline{x}$, so that π rises from zero to $G(\hat{x}(\pi,\eta,Z)) > 0$).

One caveat concerns the previously discussed possibility that the failure of a large country to meet the convergence criteria might create the expectation that the criteria themselves would be changed so much that the devaluation has no effect on perceptions about the likelihood of EMU. As discussed above, there appears to be no evidence for this extreme view. When Italy or the United Kingdom withdrew in September 1992, the perception was quite the opposite; namely, raising serious questions about the future of EMU. Hence, in terms of the model, the EMU convergence criteria imply that a devaluation by one potential EMU country will lower Z for all other potential EMU members.[15]

Will the reduced possibility of EMU lower the "political resolve" of countries that have maintained the fixed parity and make them more likely to devalue? There is much to suggest that this may be the case. First, there seems no doubt that the desire to play a role, preferably an important one in the EMU, was a factor in decisions not to devalue. For example, in his discussion of monetary policy in the EMS during this period, Mélitz (1995) asks why many countries (especially France) followed Germany's lead in adopting tight monetary policy though they were going through recessions. Given France's lower inflation than Germany's and its high unemployment, there is no reason a devaluation would have led markets to question France's monetary discipline. To explain the policy choice, Mélitz argues that "the French official behavior can best be explained on the basis of long-run political goals. By maintaining the policy of the *franc fort,* the French authorities wished to promote the aim of monetary union and, in addition, assure themselves an important place, along Germany's side, in future European monetary control" (1995, 26).

An even stronger statement of how new information about the political "will" in one country affects currency values in other countries can be found in Eichengreen and Wyplosz (1993). Speaking about the relation between speculative pressures and the prospects for EMU, they write: "Until the summer of 1992, anticipations of a smooth transition to monetary union had stabilized expectations and hence the operation of the EMS. At that point, the protracted process of negotiation and ratification allowed doubts to surface about whether the treaty would ever come into effect. This altered the costs and benefits of the policies of austerity required of countries seeking to qualify for European monetary union, leading the markets to anticipate that those policies would ultimately be abandoned" (1993, 52). They go on to argue that this may have played a role in the fall 1992 crisis. They suggest, as I have, that in making policy decisions, these governments traded off the costs of high unemployment against the benefits associated with qualifying for monetary union. Were

15. Moreover, as discussed in subsection 2.4.3, the perception that membership criteria would be significantly changed could lead to membership contagion via a different linkage.

the benefits of the latter reduced, the government's calculations would be affected. They write:

> An implication of this trade-off is that the stability of exchange rates should be correlated with the prospects for European monetary union. This was clearly the case in 1992. The weakness of the lira dated from the day the negative outcome of the Danish referendum was known. The lira, the British pound, the Danish krone, and the French franc all fell on June 3, the first day after the referendum. The Danish *nej* was a surprise; it had not been forecast by the opinion polls. Initially, reports stated that legal experts saw no way the Maastricht treaty, or even parts of it, could be approved and enacted by only eleven EC members. Doubts were compounded by press reports that confusion about the treaty's viability would stoke German concerns about the wisdom of pressing ahead with European monetary union. Italian businessmen voiced fears that Danish rejection would undermine Italy's resolve to comply with the convergence criteria laid down at Maastricht.[16]

The Eichengreen-Wyplosz argument is clearly close to the argument about membership contagion presented here, though it is not a contagion story per se, whereby weakness in *one* currency weakens *another* via the political decision-making mechanism. It is more accurately characterized as a nondevaluation, common shock—the negative outcome of the Danish referendum and, more generally, of the process of protracted negotiations mentioned in the first quote—hitting *all* currencies before any one of them is attacked. But the arguments are similar, each stressing how what are termed here membership effects can weaken the currencies of potential members in a club. The argument in this paper takes the Eichengreen-Wyplosz argument one step further, showing how membership effects can induce contagion in currency crises.

2.6 Conclusions

The argument here was not meant to suggest that membership contagion explains the EMS crisis of 1992–93 to the exclusion of other factors. German monetary policy had "monsoonal" effects, and spillovers of competitiveness clearly played a role in some of the EMS devaluations, as they have in other contagious currency crises. The purpose of the paper was to highlight a political mechanism for contagion that may have played a role in recent currency crises but has received no careful discussion in the literature. The discussion in section 2.5 should make clear the importance of external political events for currency crises in general and the possibility

16. Eichengreen and Wyplosz (1993, 85–86). For references on these, especially quotes in the *Financial Times,* 4 June 1992, 23 June 1992, on Italy, see n. 43 of Eichengreen and Wyplosz (1993).

of contagious membership effects in particular. Moreover, such effects need not be limited to explicit monetary unions. The next step is to find stronger evidence of such membership effects, in both explicit and implicit cooperative arrangements. It will not be easy, but it may be quite worthwhile.

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Comment

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Drazen's paper represents a first effort to formalize the role of political considerations in the process of how currency crises are transmitted across international borders. The theoretical literature on "contagion" is scarce, and the empirical literature equally so. Yet the EMS currency crises of 1992–93, the aftermath of the Mexican peso crisis of late 1994, and the meltdown of several Asian currencies in 1997 all have a flavor of "contagious currency crises." Thus gaining a better understanding of the channels for contagion is a fruitful and timely line of inquiry.

The concept of *political contagion* stressed in the paper has been largely ignored in the literature, if not in the statements of those individuals ultimately responsible for monetary and exchange rate policy decisions, as we are reminded in this paper. Political contagion revolves around the policy trade-off between the political losses incurred if policymakers decide to devalue and the economic gains achieved by doing so. The political losses arise primarily because policymakers wish to belong to a "club" that requires them to maintain the exchange rate peg as the fee for membership. The benefits from staying in the club are largely political and may accrue over the medium to long term. Contagion, in this context, arises if an "important" member of the club devalues, thereby reducing the resolve of other club members to maintain the peg. This is referred to as "true" contagion and distinguished from "monsoonal effects," which arise from economic transmission mechanisms. Importantly in this model, it is assumed that it is policymakers who decide which of the other club members influence their decision to devalue. Furthermore, devaluation is a political decision, not the inevitable outcome of the depletion of central bank reserves following bouts of speculative attacks.

The trade-off between the economic gains of abandoning the peg and the credibility losses incurred in this model is common to "second generation" models of currency crises. For instance, the cost of maintaining the peg is rising unemployment or prohibitive debt-servicing costs (see Obstfeld 1996). In any case, the policymakers' decision to devalue improves the economic situation even if it ruins their credibility.

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