WORKING PAPER 39

Democracy and Markets: The Case of Exchange Rates

John R. Freeman, Jude C. Hays and Helmut Stix

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Imprint: Responsibility according to Austrian media law: Wolfdietrich Grau, Secretariat of the Board of Executive Directors, Oesterreichische Nationalbank
Published and printed by Oesterreichische Nationalbank, Wien.
The Working Papers are also available on our website:
http://www.oenb.co.at/workpaper/pubwork.htm

Editorial

In this Working Paper, John Freeman, Jude Hays -- both from the University of Minnesota -- and Helmut Stix, an economist in the Economic Studies Division of the Oesterreichische Nationalbank study the impact of political information on exchange rates. In this interdisciplinary approach the authors combine theoretical results from the field of political science with those of economics to develop stylized facts about the impact of democratic institutions on economic equilibration. The authors develop several competing propositions about how political equilibration affects currency markets. Then these propositions are tested by means of a Markov switching model with time-varying transition probabilities which are governed by political information. The political variables used are government approval, the probability of government dissolution, the probability of government reelection and a measure of electoral uncertainty based on the concept of entropy. In general, the results show that information about electoral outcomes and opinion polls about chief executive performance do affect exchange rates. Also, there is some evidence that political effects are weaker in countries with proportional representation electoral systems than in countries with majority-plurality systems.

This working paper is forthcoming in the American Journal of Political Science.

December, 1999

DEMOCRACY AND MARKETS: THE CASE OF EXCHANGE RATES*

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forthcoming

The American Journal of Political Science

Abtract

The relationships between the workings of democratic institutions and currency markets are studied. Several competing propositions about how political (re)equilibration affects currency markets are derived and tested. The results support the view that democratic politics affects currency markets. Expectations and uncertainty about electoral outcomes and government survival affect the probability of switching between currency market equilibria. Additionally, opinion polls about chief executive performance have a direct effect on the probabilities of switches between currency regimes suggesting that these polls cause currency traders to revise their expectations about the stability of governments and (or) the contents of public policies. Electoral institutions mitigate the impact of politics on currency market equilibria. Political effects are weaker in countries with proportional representation electoral systems than in countries with majority-plurality systems. There is less evidence that central bank independence, consensual-corporatist systems, or "political coherency" reduces the effect of politics on currency markets.

*An earlier version of this paper was presented at the conference "Economic Internationalization and Democracy," University of Vienna, December 14-15, 1997 and at the Summer Meeting of the Political Methodology Society, San Diego, July 23-26, 1998. The authors gratefully acknowledge the financial support of the Austrian Ministry of Science and Transportation and the research assistance of Thomas Rudolph. For comments and advice we thank anonymous referees, Suzanne deBoef, J. Lawrence Broz, Helmut Elsinger, Jeffrey Frieden, A.C. Harvey, Melvin Hinich, Bernhard Kittel, Simon Jackman, Layna Mosley, Dennis Quinn, Duane Swank, Franz Traxler, and Georg Winckler. The authors are solely responsible for the paper's contents.

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Introduction

The study of democracy and markets is at the heart of political economy. Understanding how political equilibration and economic equilibration are related is one of the main challenges facing this field. The size and nature of currency markets make them especially important cases. Substantively, with globalization, currency markets have become important constraints on elected governments, reducing their "room to maneuver." Analytically, in comparison to most goods markets, currency markets are informationally efficient asset markets with distinctive equilibria: today's exchange rate is determined by currency traders' fully informed expectations about tomorrow's exchange rate. The sensitivity of these markets to the arrival of new information therefore makes them particularly well suited for studying the effects of political news and uncertainty on economic equilibration.[1]

This paper demonstrates there are "informationally relevant" political factors insofar as exchange rate determination is concerned, factors that directly affect the transition probabilities between currency market equilibria. Moreover, these factors vary in important ways across democracies. Some electoral institutions lessen the effects of politics on currency markets. Political effects are weaker in countries with proportional representation electoral systems than in countries with majority-plurality systems. There is less evidence that central bank independence, consensual-corporatist systems, or "political coherency" reduces the effect of politics on currency markets.

The discussion is divided into four parts. In part one the economic literature on exchange rate determination is briefly reviewed. Regime switching models are identified as some of the most useful with which to analyze the politics of exchange rate determination.

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[1] Currency markets are efficient in the sense that exchange rates "fully reflect" all the available information (Fama 1970). For a discussion of the differences between equilibration in asset markets and goods markets see Hallwood and MacDonald (1994, 156-157).

Next, the political science literature is discussed, including research on elections and comparative democracy. Out of this discussion emerge several competing propositions about how political (re)equilibration affects currency markets, more specifically, about the impacts of opinion polls and political uncertainty on the transition probabilities in Markov switching models for some or all democracies. In part three, a design for testing these propositions is laid out and implemented. We conclude by discussing possible extensions of our research and its implications for the study of financially open democracies.

1. Democracy and Currency Markets

While there has been some study of the politics of exchange rates in recent years, the causal connections between the workings of political institutions and currency markets are not well understood. With a few notable exceptions, economists have tended to ignore this subject, focusing instead on monetary and market related determinants of exchange rates. Political scientists have charted the constellations of interest groups that lobby for strong and weak currencies historically and contemporaneously (Frieden 1991). And they have speculated that the process whereby governments form and dissolve is reflected in the behavior of currency markets (Laver and Shepsle 1996, 2, 4-5, 144, fn. 13; see also Bernhard and Leblang 1998). But the exact nature of these relationships is unclear. For example, we do not know whether currency traders are able to gather and process <u>political</u> <u>information</u>—for instance, information about the prospects for government dismissal or dissolution—as efficiently as <u>economic</u> <u>information</u>. The character of political-economic equilibrium in currency markets is yet to be determined. Advances of this kind are essential, however, if we are to understand the future of democracy in a world of global finance.

There is a substantial amount of economic research on exchange rates. Many economists theorize that economic fundamentals such as the money supply move prices in currency markets. Unfortunately, empirical work has produced limited support for models

based on economic fundamentals. There is some evidence that economic fundamentals have an impact on long-run exchange rates. But the respective models have great difficulty explaining short-run movements. This is especially true in studies of the period roughly following 1978 (MacDonald and Taylor 1992, 9ff). For the years following 1978, the forecasting performance of fundamental models is generally inferior to simple random walk models of the logarithm of exchange rates.

Experimental research in economics has generated a number of important results. For instance, exchange rate series are nonstationary (contain unit roots); they display periods of turbulence and quiescence that cluster together; and they exhibit extreme values more often than one would expect if the series were normally distributed (fat tail property). Rational expectations theory is used to account for many of the experimental findings. For instance, a version of the efficient market hypothesis is used to explain why exchange rates follow random walks. If all the information in currency markets at time t-1 is incorporated in prices at time t, then all changes in exchange rates are unanticipated. Economic fundamentals can influence exchange rates but only as long as they themselves are martingale difference sequences.[2]

Among the most fruitful efforts to reconcile theoretical and experimental research on exchange rates is the so-called segmented trends or Markov regime switching model. This model exploits clustering or nonlinearities in exchange rates.[3] It holds that currency markets are governed by a two state, first-order Markov switching process. Each state corresponds to a separate market equilibrium or "regime," a separate random walk model. The exchange rate series we observe then is a mixture of these regimes, the relative proportions of which are determined by probabilistic transitions between states. With a first-order Markov

switching process, the probability that the exchange rate is in either regime at time t is a function of the regime it was in at time t-1. However, the switching between regimes need not follow a Markov process. With a simple switching process, the probability that the exchange rate is in either regime at time t is independent of the regime it was in at time t-1. One body of research argues that changes in fundamentals like monetary policy render the transition probabilities between two efficient market regimes (random walks) time varying. Shifts in fundamentals are "informationally relevant" insofar as they produce changes in the probabilities of shifts from one random walk regime to another (Weinbach 1993, Diebold et al. 1994, see also Filardo 1993).

Figure 1 is a schematic of the Markov regime switching model of exchange rates. A more detailed explanation of the model is provided in the Supplement to this paper. A politically relevant, substantive interpretation is given below.[4,5]

Critique. With a few exceptions, the economic research is devoid of political analysis and hence unable to answer our question about political and currency market equilibration. Markov switching models make no provision for the possibility that regime change is a consequence of political factors, for instance, the outcome of electoral and legislative processes. Advocates of the model do not recognize that the effects of changes in fundamentals on transition probabilities might be mediated by, if not the result of, electoral and (or) legislative politics. For example, consider Weinbach's (1993) argument that the transition probabilities in her Markov switching set-up are functions of deviations from

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[2] DeVries (1992) lists sixteen key experimental facts about exchange rate series, the three most important being the unit root, fat tail, and clustering properties.

[3] The Markov switching model's ability to account for both the observed nonstationarity in linear time series models and the fat-tailed distributions of currency returns is one of its major strengths (Meese, 1990: 129-130).

[4] Virtually all Markov switching models in the exchange rate literature are the two-state type.

[5] For an introduction to the Markov switching model and its application to economics and finance, see Kim and Nelson (1999); see also Ang and Bekaert (1998). For a sophisticated attempt to rationalize the Markov switching model showing that the shifts in regime are, in fact, anticipated in forecasted future exchange rates, see Evans and Lewis (1995). The Supplement is available at The Political Methodology Paper Archive (http://wizard.ucr.edu/polmeth/polmeth.html). It can also be obtained from the authors.

monetary fundamentals. The literature on monetary policy and elections suggests that the deviations are correlated with changes in the partisan identity of governments (Alesina, 1988, for instance). In fact, Engel and Hamilton's (1990) results for dollar-mark, dollar-franc, and dollar-pound exchange rates show shifts in currency regimes near or at the quarter in which elections occurred in the United States. The correspondence in the dollar-pound case is particularly striking (Figure 2). Neither Weinbach (1993) nor Engel and Hamilton (1990) consider this political explanation for their regime switches.

In general, the economics literature suffers from two problems. The first is an inconsistent treatment of economic and political information. Many economic variables are treated as random walks suggesting that currency traders process economic information efficiently. In contrast, when they do appear in models, political variables are represented as dummies or level variables (Blomberg and Hess 1997, Bachman 1992, Christodoulakis and Kalyvitis 1997). The implication is that political information is not anticipated and (or) political information is processed much more slowly or inefficiently than economic information. The rationale for distinguishing political information in this way is not well developed in the respective works. In the case of the Markov switching model a source of unanticipated information is posited. But, as explained below, the link between this source and politics is not explored.

Second, economists study a large number of bilateral exchange rates without making any provisions for potentially important differences in the impact of political institutions across democracies. They do not entertain, let alone analyze, the possibility that some kinds of political effects are less prevalent in certain countries due to the nature of their respective political institutions, e.g., the more consensual-corporatist nature of some democracies with their proportional representation systems lessens the effects of elections and other political events on exchange rates in comparison to pluralist polities with first-past-the-post electoral

systems. Any impacts of political factors on the time varying transition probabilities in the Markov switching process might be mediated by political institutions; different institutions may intensify or lessen the impacts of public opinion changes and electoral uncertainty on the probabilities of switches between currency regimes.

For our purposes then the Markov switching framework is potentially very useful. But to answer our question about political and currency market equilibration, we need to perform a deeper and more systematic analysis of the politics of exchange rate determination. In the process, we need to generate theoretically informed "political facts" about exchange rate determination akin to the facts that econometricians have produced (DeVries 1992).

2. The Politics of Exchange Rate Determination

The key to establishing a link between currency market and political equilibria lies in understanding the nature and source of the switches between currency regimes. The log difference of the spot exchange rate follows a random walk because currency traders have rational expectations about government policies and policy consequences. In this sense, the parameters—the means and variances—of the random walk reflect the equilibrium optimal decision rules of traders. But traders also are surprised by some events; they sometimes receive unanticipated information that causes them to revise their optimal decision rules. And this, in turn, leads to switches in the parameters of the random walks, switches in the currency market equilibria. In effect then, traders are able to gather and efficiently process some but not all information. They are unaware of or incapable of comprehending fully some social processes, namely, those that are responsible for changes in the probabilities of switches between exchange rate regimes. The questions are (1), is democratic politics responsible, in some part, for these switches? Is it because traders cannot gather and efficiently process some <u>political</u> <u>information</u> that we observe changes in the probabilities of switches between currency market equilibria? And (2), do all democracies produce these

changes to the same degree? Or are some democracies more unpredictable for traders than other democracies?

Political theory essentially gives two competing answers to the first set of questions. One line of argument is that democratic politics is well conditioned and predictable; political equilibration is not a source of economic disequilibration. Democracy consistently produces structurally and (or) knowledge-induced (ranges of) policy equilibria (Shepsle 1979, Shepsle and Weingast 1984, Hinich and Munger 1994, Richards, McKay and Richards 1998, 1999, Richards 1999). The outcomes and policy consequences of elections, government dissolution and formation, and legislative decision-making can be anticipated and hedged. For example, plurality electoral systems consistently produce the preferred policies of the median voters. And proportional representation (PR) systems regularly produce the preferred policies of (associated with) minimum-winning coalitions, “strong parties,” or “convergent [political] equilibria.” Traders know this; they understand how these policy equilibria translate into inflation and other macroeconomic outcomes that affect the exchange rate. Moreover, traders fully anticipate and adjust for changes in the probabilities of the election of inflation averse (acceptant) parties in the former system or of the dissolution (formation) of government coalitions composed of such parties in the latter system.[6]

Seen in this light there is no reason to believe that the switches in exchange rate regimes are caused by the workings of democratic institutions. Rather, to the extent to which they affect the economy, political events already are incorporated in each market equilibrium, that is, the equilibrium optimal decision rules manifest in the parameters of the random walk

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[6] For example, Laver and Shepsle (1996) conceive of coalition government in terms of equilibrium cabinets. The stability of these cabinets depends on such factors as the cabinets being composed of "very strong parties," there being a small number of parties, a small number of issue dimensions, and a decisive decision structure. When the equilibrium cabinet is a dimension-by-dimension median with an empty winset it is resistant to many different kinds of shocks. Lin, Donrussen and Enelow (1999) build on the work on probabilistic voting in two candidate elections (Hinich 1977, Enelow and Hinich 1989), work that shows equilibria are less rare than under deterministic voting. Lin, Donrussen and Enelow identify the existence of convergent equilibria at issue positions where the total distance from all voters’ ideal points is minimized.

fully anticipate and adjust for all current and future political events. Switches between currency market equilibria may occur. But these switches are outgrowths of traders' adjustments for economic surprises such as technology shocks, not for democratic politics.[7]

A competing line of argument holds that politics in general and democracy in particular are inherently ill-conditioned and, by implication, that political disequilibration is a source of switches in currency market equilibria. In general, there are no stable, predictable political equilibria (McKelvey 1976, Schofield 1993, Richards 1994). Elections, government dissolution and formation, legislative decision-making, and other facets of democratic politics produce policies that are unpredictable, if not chaotic. As regards electoral systems, the policy preferences of median voters cannot be easily discerned and (or) these preferences do not prevail in plurality systems. The likelihood of government dissolution and the outcome of formation attempts in PR systems cannot be predicted. Nor can the resulting policies that emerge from such events. Changes in the probability of the election of inflation averse (acceptant) parties in plurality systems or of the dissolution of governments composed of such parties in PR systems often comes as a surprise to traders (Bachman 1992, Christodoulakis and Kalyvitis 1997). These events represent new information that bears directly on the expected rate of return from holding the respective currencies.

According to this second line of argument then, politics is at the heart or the mechanism that causes switches in currency market equilibria. Like the economy, politics continuously produces unanticipated events that cause traders to reformulate their (optimal) decision rules. This, in turn, increases the likelihood of changes in the parameters of the random walk (currency market equilibrium). For instance, information indicating increased

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[7] Once more, this first argument is that the rational expectations of traders rule out any discernible effects of democratic politics. Dynamically, democratic political outcomes are martingale difference sequences just like the relevant economic fundamentals, or somehow political factors combine with purchasing power parity and uncovered interest rate parity in a monetary set-up to produce martingale difference sequences. Cf. DeVries 1992, esp. 368-9.

probability of the election of an inflation acceptant party may cause an increase in the probability of a switch to a random walk with a negative drift connoting currency depreciation whereas information indicating increased probability of a government dissolution may cause an increase in the probability of a switch to a random walk with a comparatively high variance.[8]

Political theory thus produces two competing propositions:

Proposition 1. The sources of switches in exchange rate regimes are not tied in any significant way to the workings of democratic institutions; political disequilibration is not a source of currency market disequilibrium. Information about workings of political institutions is gathered and processed efficiently by traders so that, regardless of what kind of electoral system prevails, opinion polls, electoral uncertainty and outcomes, threats of government dissolution, and other political events do not have any impact on the probability of a switch in exchange rate regimes.

Proposition 2. Shifts in exchange rate regimes are, in some part, an outgrowth of the workings of political institutions; political disequilibration is a source of currency market disequilibration. Traders are not able to gather and efficiently process information about democratic politics; traders cannot effectively hedge against politics. Political information forces currency traders to revise their decision rules. Polls, electoral uncertainty and outcomes, threats of government dissolution, and other political events therefore have a systematic effect on the probabilities of switches between exchange rate regimes.

Turning to the second set of questions, the comparative politics literature suggests that four institutional factors mitigate the impacts of politics on currency markets. The first is the use of a PR system. While, as noted above, in theory this electoral system may produce

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[8] Laver and Shepsle (1996) also show that under the opposite set of conditions (cf. fn. 6), cabinets can be quite unstable. In fact, when the party system has a dimension-by-dimension median with a nonempty winset, governments can cycle between different coalitions (1996, 68-9; 78ff).

As regards sitting coalition governments, mid-term elections or poll results can change parties' expectations of future electoral outcomes and cause them to defect from government coalitions or to refuse to support votes of confidence for sitting governments. When these governments fall, new coalitions form with policy ideal points that can be significantly different than their predecessors. The conditions under which such events are observed have to do with such things as the proximity to the next election, existence of "very strong parties" in the government coalition and, of course, magnitude of the political shocks (Lupia and Strom 1995, Laver and Shepsle 1996). In fact, Bernhard and Leblang (1998) have found evidence that the probability of cabinet dissolution is correlated with the monthly standard deviation in exchange rates in OECD countries. The larger implication is that traders may not comprehend the stability properties of governments in proportional representation systems. Hence, political shocks may produce unanticipated changes in government and policy leading to revised expectations and changes in the transition probabilities between exchange rate regimes.

unpredictable and unstable outcomes, a number of scholars have argued that, in practice, PR produces predictable, stable policies. It is this feature of PR systems that makes them more conducive to international trade than plurality systems (Rogowski 1987). The implication is that in countries like Germany and Sweden, which have PR systems, changes in the probability of government dissolution will not affect the probability of switches between currency market equlibria; information about such events will not create changes in traders' decision rules. The opposite will be true in countries like the UK and Canada that have plurality systems.

Central bank independence is a second institutional factor. As Garrett (1995, 667ff) and others have pointed out, in a world of floating exchange rates and increasingly mobile capital, small changes in economic policy can cause currency volatility and, by implication, changes in the probability of switches between currency market equilibria. This is because changes in policy affect traders' expectations about inflation and other macroeconomic variables. A parallel body of work (Alesina 1988) argues that independent central banks ensure predictable, stable policies that combat inflation. Concomitantly, independent central banks ensure that the election of particular parties or the threat of dissolution of particular government coalitions will not affect inflationary expectations. The implication is that in countries with independent central banks such as Germany and the U.S., political information about elections and government survival will not affect the probability of switches between currency market equilibria. Only where central banks are dependent on elected officials as in Australia and New Zealand will information about the electoral fortunes of parties and the survival of governments affect the probabilities of switches between currency regimes.

Students of democracy often stress that it is the combination of institutions that spawns policy uncertainty. Institutional structures induce political equilibria; institutional clusters moderate uncertainty. The conventional distinction in this respect is between

majoritarian-pluralist and consensual-corporatist forms of democracy. Roughly speaking, the first type downplays the need for unanimity at any point in time and equates popular sovereignty with majority rule; it is usually associated with a pluralist form of interest intermediation and plurality, single member district (SMD) electoral systems. The second type of democracy emphasizes the need for mutual agreement among citizens, restrains majorities, and disperses and limits political power; PR electoral systems are usually found in consensual systems (Lijphart 1994, 1984).[9]

Because it allows for comparatively quicker, more significant, and unpredictable changes in economic policies, majoritarian-pluralist democracy ought to be a greater source of risk and policy uncertainty for currency traders than consensual-corporatist democracy. In majoritarian-pluralist political systems, the outcomes of elections and interest group politics should not only be more unpredictable and hence more difficult to hedge, but the policy consequences of this unpredictability should be greater. Hence, these political systems should evidence greater impacts of polls and electoral outcomes on the transition probabilities between currency market equilibria. Consensual-corporatist democracy might be prone to some policy uncertainty. But, checks and balances between government branches, the gridlock of divided government, and other features of these democracies should make them less prone to policy surprises and hence to what for traders are unpredictable, costly fluctuations in policy. In sum this third body of work predicts that the transition probabilities governing switching between exchange rate regimes will be a function of political variables for currencies like the pound sterling because the United Kingdom has a majoritarian-

[9] As regards interest intermediation, the idea is that pluralism and interest group politics create a great deal of uncertainty about which coalitions will form and adopt various economic policies. Corporatism removes a large number of economic policy decisions from the purview of elected officials and interest groups. Corporatism places these decisions in the hands of well-disciplined producer groups or peak associations. Hence phenomena like political business cycles, in principle, should be less likely to occur in corporatist as opposed to pluralistic systems. See, for example, Freeman 1989, esp. chp. 4.

pluralist polity but not for currencies like the Deutsche mark and Swedish kroner because Germany and Sweden have consensual-corporatist polities.

A fourth distinction between democracies is their "political coherency" (Garrett 1998). Simply put, this is the idea that macroeconomic performance depends on whether the government power balance and scope of labor governance are compatible. Where the balance of government power is tipped toward the left (right) and strong (weak) labor organizations are (not) encompassing, there is political coherency. Economic policy is predictable and effective; and macroeconomic performance is relatively good (Ibid, Chp. 2). On the other hand, where the right controls government and labor organizations are encompassing or the left controls government and labor organizations are weak, there is political incoherency, policy inconsistency, and poor performance. This line of reasoning suggests a relationship between politics and currency market disequilibration for currencies like the Deutsche mark and, for a time, the Australian dollar: democratically incoherent systems like the German one and the Australian system of the early 1980s (Garrett 1995) produce policy surprises that force traders to revise their expectations leading, in turn, to changes in the probabilities of switches between Deutsche mark and Australian dollar regimes whereas no such effects are evident in coherent systems like that of the U.K. and U.S.

The literature on comparative democracy thus produces four additional propositions:

> The impact of opinion polls, electoral uncertainties, threat of government dissolution, and other political events on the probabilities of switches in exchange rate regimes will be greater in countries with
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> Proposition 2.1. plurality than PR electoral systems
>
> Proposition 2.2. dependent than independent central banks
>
> Proposition 2.3. majoritarian-pluralist than consensual-corporatist democracies
>
> Proposition 2.4. incoherent than coherent democracies.

3. The Experiment

Design. Following the economics literature, we focus on bilateral exchange rates. The most meaningful test of our propositions will be for foreign exchange markets that simultaneously satisfy four conditions: (1) the exchange market is "thick" and the respective currencies float or are unmanaged, (2) the two countries have roughly similar political institutions, (3) these institutions vary across country dyads in ways that allow us to test propositions 2.1, 2.2, 2.3, and 2.4 and (4) data are available to test the effects of electoral and other political factors on the transition probabilities governing regime switches. Four foreign exchange markets that meet these desiderata are U.K.-Ireland (pound-punt), U.S.-Canada (USdollar-Cdollar), Germany-Sweden (DM-kroner), and Australia-New Zealand (Adollar-NZdollar).

Table 1 summarizes how these cases provide a test of our propositions where, for simplicity and because of data availability, the political focus is on events in the larger of the two countries.[10] Consider Proposition 2.1. If PR electoral systems mitigate the effects of politics on currency market disequilibration we should not find any impacts of electoral and other kinds political uncertainty on the transition probabilities of the models for the DM-kroner. As regards Proposition 2.2, if central bank independence insulates foreign exchange markets from politics we should not find any political effects on regime switching for DM-kroner and U.S. dollar-Canadian dollar exchange rates since Germany and the U.S. have strong central banks. Because the British and Australian central banks are comparably weaker, politics in these countries should affect regime switching for the pound-punt and

[10] The large country is, in each case, the main trading partner of the small country (*Monthly Statistics of Foreign Trade*, OECD) so there is a thick market for each set of currency transactions. With the exception of Sweden, we were unable to collect complete approval and vote intention series over the span of our entire sample for the small countries.

Australian dollar-New Zealand dollar exchange rates.[11] Proposition 2.3 would be supported if political factors have an impact on the transition probabilities of the switching models for the pound-punt exchange rates but not for the DM-kroner exchange rate; the former has a majoritarian-pluralist system while the latter has a consensual-corporatist system. Because of a shift to more corporatist-consensual practices after 1983 in Australia (Castles et al. 1996), the Australian dollar-New Zealand dollar exchange rate might also fail to show any effects of politics on regime switching. But, as we note below, this case is complex.[12] Finally, Proposition 2.4 suggests the opposite pattern. Garrett's (1998) research shows that the U.S., Canada, and the U.K. were politically coherent in the 1980s and 1990s whereas Germany was incoherent; Australia was incoherent from 1980 to about 1983 (Garrett 1995) and, by all indications, coherent thereafter (Castles et al. 1996). So Proposition 2.4 suggests that political factors will affect the transition probabilities in the models for the DM-kroner and, in the early 1980s, the Australian dollar-New Zealand dollar, but not the transition probabilities for the pound-punt or U.S. dollar-Canadian dollar exchange rates.[13]

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[11] Since, as we explain below, our period of analysis is 1980-1995, we use the ranking in Alesina and Summers (1993). The authors classify Germany and the U.S. as two of the world's most independent central banks with scores of 4 and 3.5 respectively. The U.K. and Australia rank low each with a score of 2. [Canada, Sweden, and New Zealand have scores of 2.5, 2, and 1 respectively. Alesina and Summers do not rank Ireland.]

[12] Most scholars agree that the U.S. and Canada both are majoritarian-pluralist countries with plurality electoral systems and that Germany and Sweden are consensual-corporatist countries with PR systems (Lijphart and Crepaz 1991). However, it should be noted that certain aspects of the American system—for instance, its separation of powers (bicameralism and strong presidency)—are characteristic of more consensual systems. While the U.K. is clearly majoritarian with a plurality electoral system, there is much disagreement in the literature as to Ireland's classification. Some writers argue that in the late 1980s and early 1990s Ireland had corporatist "tendencies" (von Prondzynski 1991). Authors like Lijphart and Crepaz (1991) classify Ireland's system as "other" or "indeterminate." For example, they argue that Ireland's electoral system has features of both PR and plurality systems. The Australian-New Zealand dyad is the most difficult to classify. Lijphart and Crepaz (1991) classify both countries as majoritarian-pluralist. But this is for the period 1950-1980; our sample period is 1979-1995. Experts on Australia and New Zealand (Castles et al. 1996, 11-14, 44-47) contend that after 1983 the former was a system of "corporatism without business" while the latter was "commercialist." Throughout our sample period both countries had plurality/majority electoral systems.

[13] In his book, Garrett (1998) omits the Australian and New Zealand cases. Castles et al.'s (1996) work suggests that Australia was coherent after 1983. New Zealand was probably incoherent for much of the sample period since for much of the 1980s it had a left government and a weak labor movement. However, this government adopted conservative polices. So, once more, care must be exercised in interpreting the results for this dyad. Finally, Garrett (1998) also omits Ireland, probably because the combination of its coalitional and caretaker governments (Laver and Shepsle 1996, 139ff) and corporatist tendencies make it difficult to classify.

Monthly exchange rate data were taken from *International Financial Statistics* and used to construct four nominal exchange rate series: IRP/UKP, CND/USD, NZD/AD, and SEK/DM. These rates correspond to the number of Irish punts per British pound, Canadian dollars per U.S. dollar, New Zealand dollars per Australian dollar, and Swedish kroner per German mark, respectively. The period of analysis was 1979:3-1995:12.[14] This period is after the second oil shock when international financial markets were developing rapidly; all our currencies floated in this era.[15]

Several variables containing important political information were employed in the analysis. First, we included political variables that provide information about the likelihood of an inflation acceptant government coming to or remaining in power. For the U.S., U.K., and Australia, we used Alesina et al.'s (1997, Chapter 5) measure of electoral expectations. This measure uses public opinion data to calculate the probability of a party's victory at any time prior to elections. As an operationalization of Proposition 2 the idea is that the probability of a shift to a depreciating (appreciating), more (less) volatile currency regime is

[14] Because of data availability, the period of analysis for the Australian dollar-New Zealand dollar market was 1979:3-1994:11.

[15] Recall there is econometric evidence that exchange rate markets were comparatively more efficient after 1978. See page 3 above.

higher the more likely it is that an inflation acceptant Democratic (inflation averse Republican) government will remain in or enter office.[16]

In addition, we used Bernhard and Leblang's (1998) measure of the probability of cabinet dissolution for each month in Britain, Australia, and Germany. These probabilities are calculated from a theoretically grounded, discrete time hazard model. The implication of Proposition 2 is that the greater the probability of cabinet dissolution and hence political reequilibration, the more uncertain traders are about the future course of economic policy and therefore, in countries with plurality electoral systems, dependent central banks, pluralist-majoritarian systems, and (or) incoherent systems, the higher the probability of shifts to regimes with greater variance in exchange rates.[17]

To try to capture the difficulty of hedging political outcomes, a third measure of political uncertainty was used, one based on the concept of entropy. Uncertainty actually is greatest under conditions of <u>equal</u> probability of outcomes. A probability of either .90 or .10

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[16] Alesina et al. (1997, Chapter 5) use an "electoral option model" to calculate the probability that the Democratic party will receive a majority of the two party vote (i.e., a plurality) at any point in time or

$$P_t^D = \Pr\left[V_{t+\tau}{}^D > 50\% | V_t^D; \tau; \mu; \sigma\right]$$

where $V^D_{t+\tau}$ is the percent who intend to vote for the Democratic party t + τ months before the election, μ is the sample mean of changes in this poll, and σ is the sample standard deviation in month to month changes in the poll. These probabilities can be calculated by the formula

$$P_t^D = \Phi\left(\frac{V_t^D + \mu\tau - 50}{\sigma\sqrt{\tau}}\right)$$

where Φ is the cumulative standard normal distribution. Following Alesina et al. (1997), we use the "electoral option model" to calculate the probability of a left-wing victory in the twelve months prior to an election. For the remaining months in the sample we code the variable one when left-wing governments were in power and zero when right-wing governments were in power. The vote intention series for the U.S. and the U.K. are from Gallup polls. The vote intention series for Australia was constructed using the Gallup and Saulwick polls. These data were obtained from the Australian Social Science Data Archive. Because winning a plurality of the vote does not guarantee that a party will govern or even be included in a governing coalition in countries with PR electoral institutions, we cannot use the above formula in a straightforward manner to calculate the probability of a left-wing government either coming to or remaining in power in Germany.

[17] Bernhard and Leblang (1998) kindly supplied us with their series for the estimated probabilities of cabinet dissolution in the U.K., Australia, and Germany. Their discrete time hazard model is based on the duration of cabinets to a given point in time, time remaining before the next election, whether the system has exogenously determined electoral timing, government type, and party system characteristics. Their model produces patterns of cabinet dissolution that closely match the stylized facts about government dissolution.

connotes less uncertainty about an event than a probability of .50. Therefore, we constructed a third variable: $E=1-4(p-.5)^2$ where p is the probability of a left-wing election victory. The measure E has a maximum value of 1 when p is .50 and a minimum value of zero when p is either zero or unity. If proposition 2 is correct, when E is near 1, traders will have the most difficulties hedging and hence, particularly in systems with plurality electoral systems, dependent central banks, pluralist-majoritarian systems, and (or) incoherent systems, it will be more likely that the currency markets will shift to high variance regimes.[18]

For completeness and because it is unclear exactly how political uncertainty and equilibration affect the currency market switching, we also included variables for the raw level of political approval as well as dummy variables capturing election periods and change in the partisan identity of governments. The dummies were essentially the same as those used by Alesina and Roubini in their earlier work (1992) and by Blomberg and Hess (1997). As regards Proposition 2, the expectations are that as approval of incumbents increases there should be higher probability of shifts to currency regimes with low variance; the probability of shifts to currency regimes with high variance should be higher during election periods especially in systems with plurality electoral systems, dependent central banks, pluralist-majoritarian institutions, and (or) incoherent systems; and, shifts in the partisan identity of government should increase the probability of shifts to appreciating (inflation averse right-wing) or depreciating (inflation acceptant left-wing) exchange rate regimes.[19]

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[18] On political entropy see, for instance, Coleman (1972).

[19] The election dummy variable is equal to one in the two months prior to an election, the month of an election, and three months following an election. In all other months the election variable is zero. The Government variable is defined as one in periods of right-wing governments and negative one in periods of left-wing governments. These two variables gauge current and post election effects in contrast to the pre-election effects captured by the Alesina et al., Bernhard and Leblang, and entropy measures. Approval is a series indicating the percent of the electorate who approves of the American President's, British Prime Minister's and German coalition's performance each month. The American approval data is from Stimson's macropolity data set. The British approval data is from Gallup U.K. and the German approval data is from Politbarometer West (ICPSR 6913). Because the approval question was asked infrequently in the Australian surveys, we were unable to assemble a complete approval series for that country.

The switching models were constructed in three steps. First, several pretests were performed to establish the model structure for each pair of currencies. These tests were conducted in the context of a fixed transition probability model. They included both the Garcia (1998) and Hansen (1992) tests for one versus two currency regimes, Wald tests of the equality of means and variances across regimes, and simple versus Markov switching.[20] Next, time varying probability models were estimated with our political series. These models allowed the transition probabilities between regimes to be determined, in part, by our multiple measures of political uncertainty and disequilibration. A fuller explanation of model construction and diagnostics is provided in our Supplement (cf. fn. 5).

Findings. Table 2 contains the findings for the UK-Ireland case. The pretests (column 1) indicate there are two currency regimes; both the Garcia and Hansen test statistics are statistically significant.[21] Neither drift parameter is statistically significant. Rather the two regimes are distinguished by their degrees of volatility. In fact, the second is almost 15 times more volatile than the first. The test for simple switching is rejected so we have a Markov switching process where the probability of being in each currency regime depends on the previous state of the market.

Columns 2-6 of Table 2 report the impacts of our political variables on the transition probabilities for the punt-pound currency market. The coefficients β_{10} and β_{20} are the

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[20] Again, simple switching models are those in which the probability of being in a particular state is, unlike with the Markov switching set-up, the same regardless of the previous state. Unlike other researchers (Lobo and Tufte, 1998), we found no evidence of ARCH effects in any of the exchange rate series. We also fit a set of GARCH models and found no statistically significant GARCH coefficients in the conditional variance set-ups. The only exception was some mild evidence of IGARCH in the Swedish-German exchange rate. For a discussion of the advantages of regime switching models over ARCH and GARCH models, see Sola and Timmermann (1994) and Simonato (1992). Sola and Timmermann (1994) conduct a theoretical and empirical comparison between (E-)GARCH and Markov switching models and conclude that the latter provide a better fit of the unconditional moments of the data than the former. Comparable evidence is presented in Simonato (1992). In Simonato's empirical analysis, a simple switching model performs better than a GARCH specification. In fact, Lobo and Tufte's (1998) analysis does not remove all the kurtosis in their exchange rate series suggesting that regime-switching models may be needed.

constants in the logistic expression for p^{11} and p^{22} respectively while β_{11} and β_{21} are coefficients for the political variable ($x_{1,t-1}$) listed at the top of each column (cf. Figure 1 above). Political information clearly affects the behavior of currency traders. Individual coefficient tests and likelihood ratio tests for the Bernhard-Leblang and raw approval measures are statistically significant; both variables have a direct impact on the probability of persistence in one or both currency regimes.

The interpretation of the statistically significant coefficients is consistent with Proposition 2. Political uncertainty in Britain is associated with greater volatility in the punt-pound foreign exchange market. For example, at low levels of approval for British prime ministers the punt-pound market displays greater volatility whereas at high levels of approval the opposite is true. At 30% approval, for instance, the variance in the punt-pound market is 5.52. At 60% approval, the variance drops to 4.12. The result for the cabinet dissolution variable is similar. When the probability of cabinet dissolution is one percent (the average likelihood of cabinet dissolution for non-election months in our sample) the variance in

[21] Both Garcia and Hansen provide methods for testing the null hypothesis of a single regime. Garcia (1998) derives the asymptotic null distribution of the LR statistic to obtain critical values. Hansen (1992) uses empirical process theory to provide a bound for the distribution of his standardized LR statistic. These and other statistics are discussed in our Supplement (cf. fn. 5).

currency returns is 7.34. When this probability decreases by one standard deviation to one-half of a percent, the variance drops to 4.62.[22]

The second case, US-Canada, also shows that politics influences currency market equilibration (Table 3). Pretests again indicate the existence of two currency regimes; the Garcia and Hansen test statistics are each statistically significant. And, as in the UK-Ireland case, these regimes are distinguished by their volatility. The second Cdollar-USdollar regime is almost six times more volatile than the first. Unlike the UK-Ireland case, however, a Wald test of the hypothesis that $p^{22} = 1 - p^{11}$ suggests that a simple switching model captures the behavior of the US-Canada currency market. This means that the probability of the market being in one of the two regimes does not depend on the previous regime ($p^{11} = p^{21} = p^1$, $p^{22} = p^{12} = p^2$). The probability of the Cdollar-USdollar market being in either the high or low volatility regime depends on American politics. Specifically, currency market equilibrium depends on the probability of a Democratic victory (column 4) and on political uncertainty, what we call Entropy (column 5). Compared to the case of the punt-pound exchange rate, we find less evidence of an impact of approval ratings (column 3) on the switching in Canadian-US dollar exchange rate; the likelihood ratio statistic for the Presidential approval model is only marginally statistically significant with a p-value = .108.[23]

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[22] Increases in the probability of cabinet dissolution and decreases in the approval of the prime minister increase persistence in both the low and high volatility regimes. However, the overall impacts of the likelihood of cabinet dissolution and approval on exchange rate volatility depend on the relative effects on the two transition probabilities. For example, a high likelihood of cabinet dissolution increases the probability of staying in the low volatility regime slightly whereas it increases the probability of staying in the high volatility regime greatly. If we think of the model as a data generating mechanism, the exchange rate we observe is a mixture of draws from the two regimes. At high probabilities of cabinet dissolution, the number of draws from the high volatility regime relative to the number of draws from the low volatility regime is greater than at low probabilities of cabinet dissolution. Hence, overall volatility in the exchange rate is higher when the likelihood of cabinet dissolution is large. The numbers presented in the text were generated using simulation methods. These simulations assume that the information in $x_{1,t-1}$ stays constant. More details about these simulations are available from the authors.

[23] Careful readers will note that the estimate of the coefficient of β_{11} for the US-CND Alesina et al. model is not statistically significant. However, the likelihood ratio statistic is statistically significant. Engel and Hamilton (1990, fn. 6) cite Gallant (1987, 219) in arguing that, for nonlinear models of this kind, likelihood ratio tests are apt to be more robust than Wald [t] tests because asymmetries in the likelihood surface can create problems for the latter type of test.

The results for the Alesina et al. and Entropy variables imply that the probability of being in the low volatility state, p^1, is lower the higher the probability of a Democratic victory and degree of electoral uncertainty. This is consistent with the idea that the greater the likelihood or uncertainty about the victory of a more inflation-acceptant, Democratic government, the more turbulence there is in the Canada-US exchange rate. The results for approval are similar: declining presidential approval is associated with a reduced probability of being in the low volatility state.

Figures 3a and 3b depict the impact that the expected probability of a Democratic election victory and presidential approval ratings have on the model's transition probabilities. Consider first the impact that changes in the expected probability of a Democratic victory have on the Canadian-US dollar exchange rate in the months running up to an election (Figure 3a). When the expected probability of a Democratic victory is .30 the probability of being in the low volatility state is approximately .49 whereas when the expected probability of Democratic victory is .60 the likelihood of being in the low volatility regime drops to .38. When approval of the president is at 60%, the probability of being in the low volatility regime is .59 whereas when approval is at 30% the probability of being in the low volatility regime is only .24 (Figure 3b). Thus, neither the more consensual aspects of the U.S. system (fn. 12) nor its comparatively independent central bank insulate the Cdollar-USdollar currency market from the effects of electoral factors.

Table 4 contains the results for Australia-New Zealand. This case is interesting because Australia seemingly becomes more "coherent" during our sample period. Like the previous cases, there are two regimes in the data; these regimes are distinguished by their volatility with the second regime displaying 16 times more variance than the first regime. Again, politics matters. Both our Alesina and partisan dummy variables are statistically significant. When the expected probability of a Labor party victory increases, the probability

of remaining in the low volatility regime declines. Furthermore, the results of our partisan model show that after 1983, persistence in the high volatility regime is much higher whereas persistence in the low volatility regime is lower. This result is important because 1983 marks the return of the Labor party to power and the beginning of centralized wage bargaining. That is, after 1983 Australia became more consensual-corporatist and "coherent." Yet, this period is associated with greater volatility in the Australian dollar-New Zealand dollar rather than less.[24]

Table 5 contains the results for our fourth case, Germany-Sweden. Recall that this dyad is made up of two countries with consensual-corporatist governments. And Germany is considered politically incoherent (Garrett 1998). Our findings are quite different than those for the UK-Ireland, US-Canada, and Australia-New Zealand. The Garcia test indicates that there are two currency regimes.[25] However, these regimes seem to be distinguished not by degrees of volatility but rather by different drift parameters—different rates of appreciation of the Deutsche mark. In order to achieve convergence in the estimation of our time-varying transition probability models we restrict p^{22} to be zero. This restriction does not influence the log-likelihood value of the model or any of the coefficients (Column 2). It simply means that once the kroner-DM market switches to the second regime it switches back to the first regime after one period.

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[24] We also estimated models for the pre and post-1983 subsamples. There is only one regime in the data prior to 1983 and hence, in terms of our econometric framework, politics does not produce regime changes up to this date. In the post-1983 sample, however, there are two regimes and our political variables are highly statistically significant. Therefore, despite the fact that this is a period of consensual-corporatist politics (Castles et al. 1996) and "coherence" the arrival of new political information is an important determinant of the transition probabilities between currency regimes.

[25] Unfortunately, because our estimate for β_{20} lies on the boundary of the feasible parameter space (Column 1), our specification tests results are somewhat problematic. For this reason, we are unable to calculate the Hansen statistic for this case. Process theory is applicable only if all estimates lie inside the feasible parameter space. The smaller likelihood value for a one-state random walk model versus a Markov switching model suggests that we can reject the former in favor of the latter. But we have no asymptotic theory to tell us the distribution of the likelihood ratio statistic because one probability is zero; without this theoretical justification we have no critical value and hence no sound basis for applying the Hansen test in this case. Cf., for instance, Jackman (1997) and Signorino (1999).

Interestingly, there is no evidence that any of the political variables have an impact on the probability of regime switches in the SEK/DM exchange rate. Not one of the coefficients in columns 3-6 is statistically significant. German political institutions are such that public opinion polls and other measures of political uncertainty have no effect on currency market disequilibrium.

Discussion. Overall, the results clearly refute Proposition 1. There is much evidence that politics is a source of currency market equilibration (Proposition 2). In contrast, monetary and other economic variables do not affect the transition probabilities in the switching mechanisms; traders apparently are able to process economic information efficiently.[26] Democratic politics repeatedly forces currency traders to revise their expectations and thus causes exchange rates to exhibit different market regimes. One mechanism through which this occurs is political polling which provides information about the stability of governments and, in turn, about the prospects for adoption of policies of certain kinds, especially, inflationary policies. In this way, our results establish a connection between the market switching genre of economics and the work on government stability in political science (Lupia and Strom 1995, Laver and Shepsle 1996, Bachman 1992, Alesina et al. 1997, Bernhard and Leblang 1998).

As regards the intervening effects of political institutions, the results provide the most support for 2.1. The fact that we found much evidence of political factors affecting the switching process in the UK-Ireland, US-Canada, and Australia-New Zealand, but none in the Germany-Sweden case indicates that in contrast to PR electoral systems, majority-

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[26] We estimated four economic models for the Canada-U.S. and Sweden-Germany dyads. The economic data were taken from *International Financial Statistics* and the OECD's *Main Economic Indicators*. The choice of variables was motivated by standard monetary models of exchange rate determination (See Weinbach 1993). They include a real money growth differential (m-m*), an income differential (y-y*), an interest rate differential (i-i*), and an inflation differential (p-p*). The income and price models did not converge for the Canada-U.S. case. We did not estimate these models for Ireland-U.K. because of difficulties obtaining monthly economic data for Ireland. Also, because of data limitations, a smaller sample was used for Sweden-Germany (1979:3-1995:4). Political variables were not included in this analysis.

plurality electoral systems at worst exacerbate and at best do nothing to mitigate the effects of political (dis)equilibration on currency markets. Support for the other propositions is at best mixed. The independence of central banks explains the results for the UK-Ireland, Australia-New Zealand, and Germany-Sweden but not for the US-Canada. In spite of the relative independence of the U.S. central bank, political information about the electoral prospects of the Democratic Party has statistically significant effects on the exchange rate between U.S. and Canadian dollars. The results for Proposition 2.3 are similar. The findings for the U.K.-Ireland, U.S.-Canada, and Germany-Sweden are consistent with this proposition. However, those for Australia-New Zealand show that corporatist-consensual decision-making does not necessarily produce stable or predictable policies. Conceivably this is because Australia had "corporatism without business" (Castles et al. 1996) rather than full corporatism during the sample period. Finally, while it is difficult to classify some of the countries with respect to the concept of "political coherency," Proposition 2.4 receives almost no support.

4. Conclusion

The analysis in this paper should be extended in several ways. First, it is important to learn if polls and other kinds of political information affect the switching processes in other kinds of markets such as the markets for bonds and equities. The work of Alesina et al. (1997) and others suggests that this should be the case. Indeed, recent work by the authors confirms the existence of politically induced regime switching in government bond markets (Hays, Stix, and Freeman 1999). Comparisons with countries with nondemocratic governments also ought to be conducted. Related political factors such as civil unrest and succession crises might affect market switching in these countries as well. Finally, it is important to eventually incorporate connections between currency markets and to analyze the impacts of national and supranational politics on these connections. This involves introducing much more complex, simultaneous equation (VAR) Markov switching models,

models that presently are very difficult to estimate (Krolzig 1997, see also Ang and Bekaert 1998).

From a theoretical standpoint, what is needed is a deeper understanding of exactly how political information affects traders' calculations and how expectations of those effects enter into the calculi of political parties. We need a deeper understanding of how market agents understand the different processes whereby governments form and dissolve (Lupia and Strom 1995, Laver and Shepsle 1996), and how this understanding influences their expectations. At the same time, we need a better understanding of how political agents comprehend and take into account the workings of currency and other types of financial markets. What we have produced here is a set of stylized facts. We now know that the political information embodied in polls affects currency market regime switching. Any theory of financially open democracies (cf. Freeman and Houser 1998, for instance) will have to explain the findings produced in this paper.

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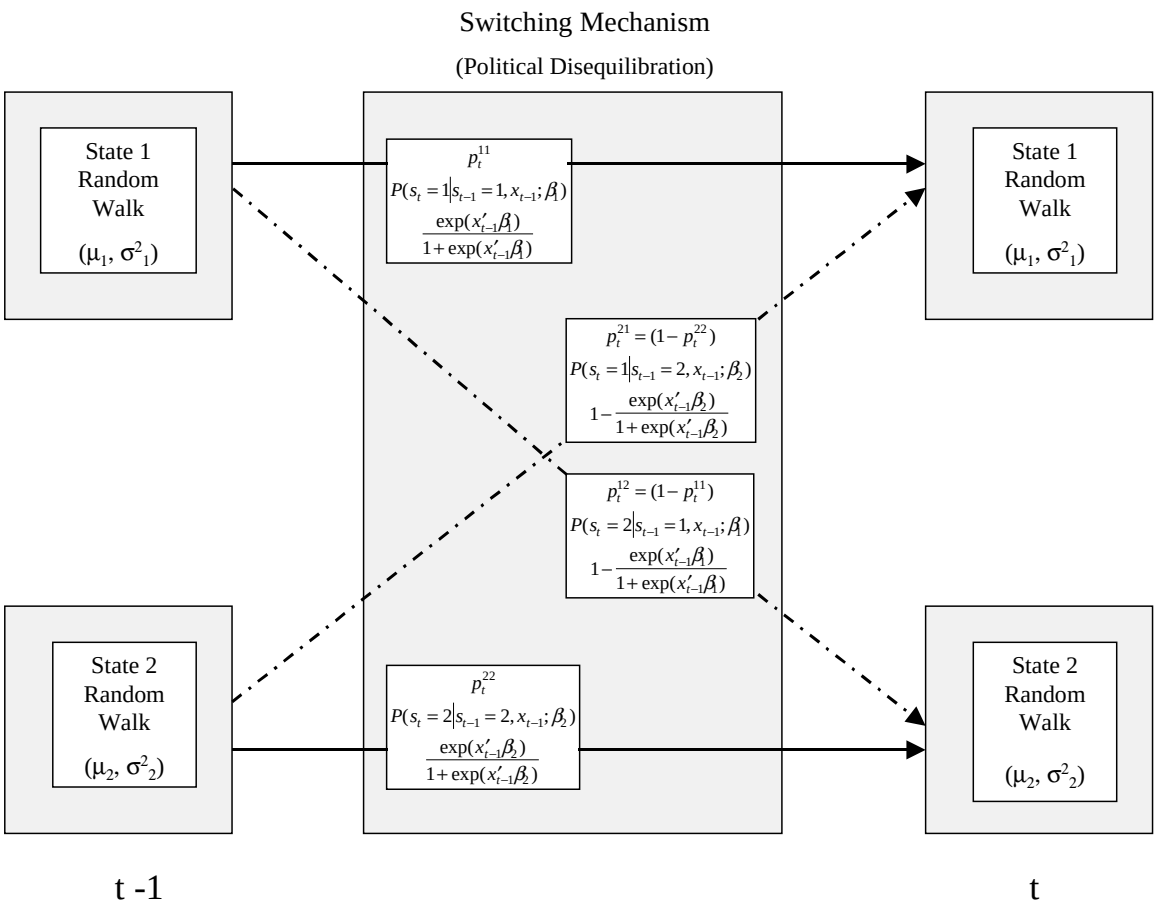
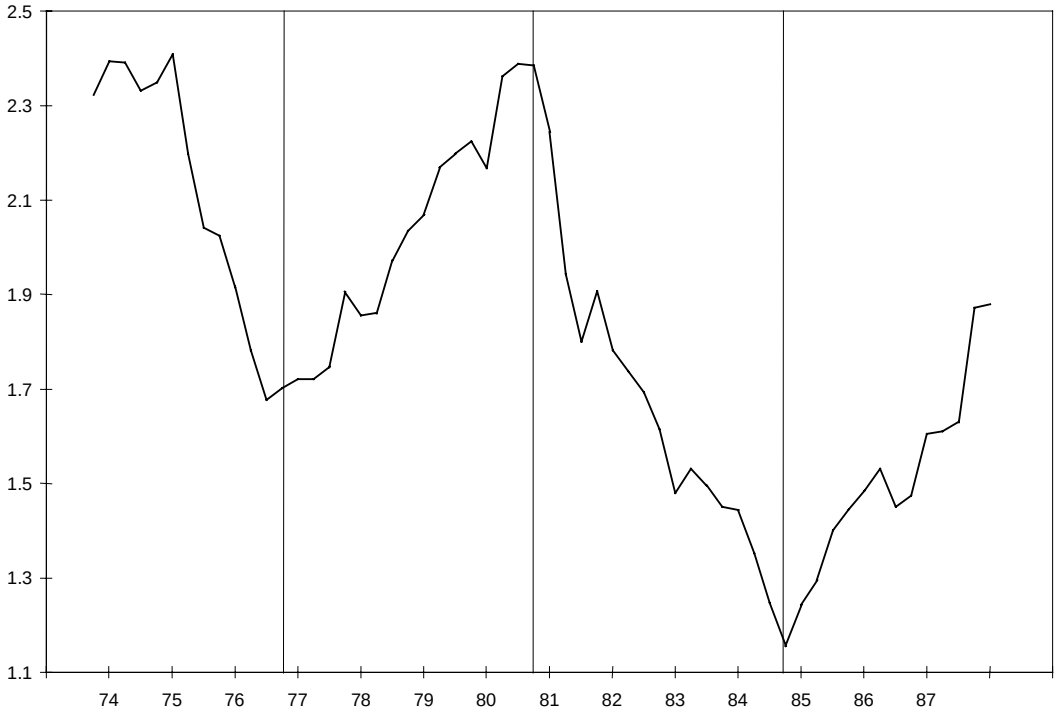
Figure 1. Markov Regime Switching Model of Exchange Rates



Note: $x_{t-1} = (1, x_{1,t-1}, ..., x_{(k-1),t-1})'$ and $\beta_i = (\beta_{i0,} \beta_{i1}, ..., \beta_{i(k-1)})', i = 1,2.$ When the last (k - 1) terms of the parameter vectors β_1 and β_2 are set to zero, the time varying transiton probability model collapses to the constant transition probability model. The transition probability notation is from Diebold, Lee, and Weinbach (1994, 285).

Figure 2. Regime Switches in the Dollar/Pound Exchange Rate



Source: Engel and Hamilton (1990, 696); vertical bars mark regime switches.

Figure 3a. Regime Probabilities and the Likelihood of a Democratic Election Victory

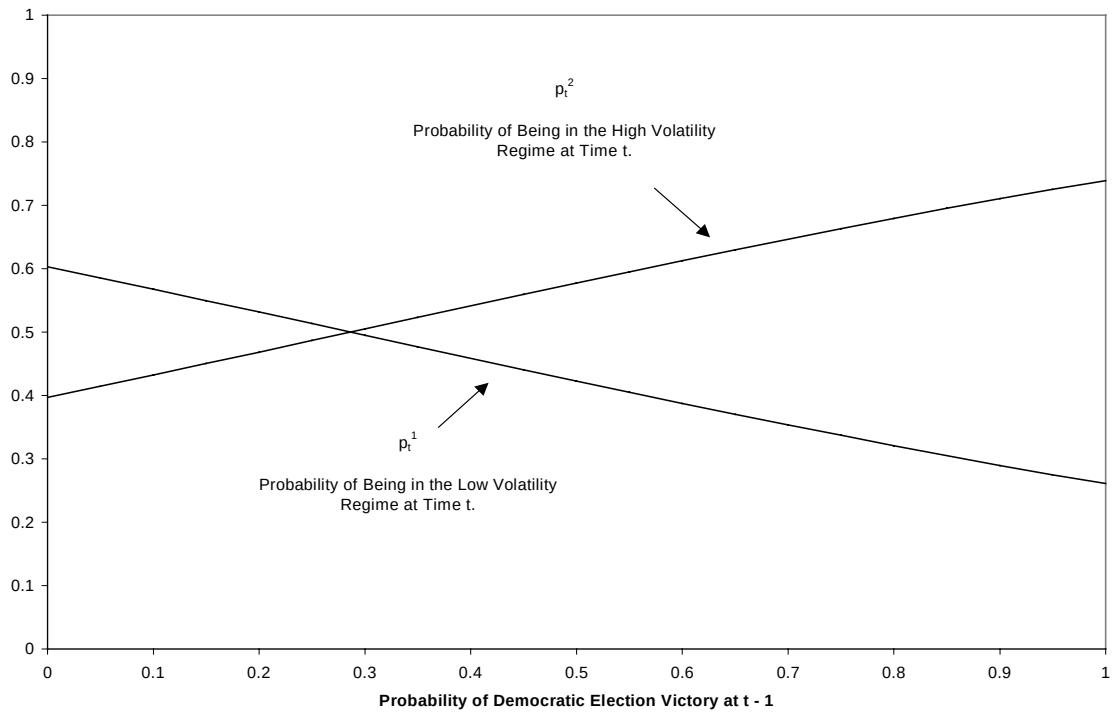


Figure 3b. Regime Probabilities and Approval of the President

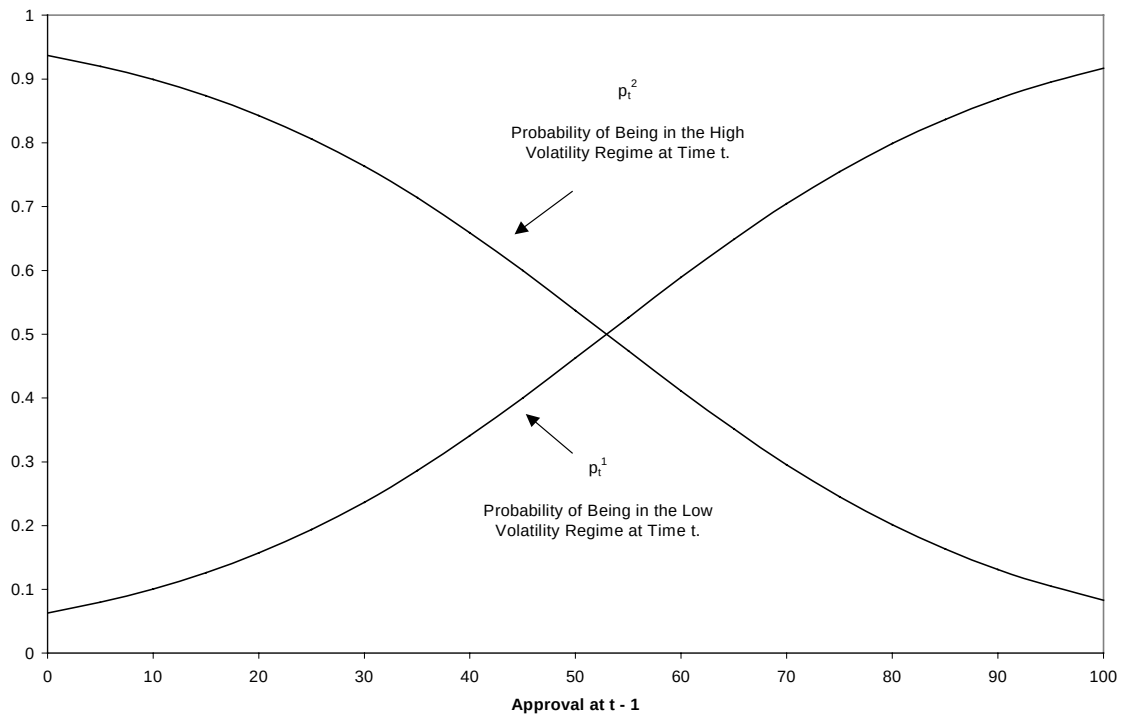


Table 1. Competing Propositions and Bilateral Exchange Rates: Does Political Disequilibration in the Large Country Affect Currency Market Equilibria?

Bilateral Exchange Rate	Proposition 1: Politics Fully Anticipated/Hedged	Proposition 2.1: Electoral Systems	Proposition 2.2: Central Bank Independence	Proposition 2.3: Majoritarian (MP) vs. Consensual (CC)	Proposition 2.4: Political (In)coherence
U.K.-Ireland	No	Plurality-Other† Yes	Weak-Indeterminate† Yes	MP-Indeterminate Yes	Coherent-Indeterminate† No
U.S.-Canada	No	Plurality-Plurality Yes	Strong-Weak No	MP-MP† Yes	Coherent-Coherent No
Australia-New Zealand	No	Majority-Plurality Yes	Weak-Weak Yes	1983-95, CC-MP No	1983-95, Coherent-Incoherent No
Germany-Sweden	No	PR-PR No	Strong-Weak No	CC-CC No	Incoherent-Coherent Yes

Note: †See footnotes 11-13.

TABLE 2
Switching Models for the UK pound Irish punt Exchange Rate with Time Varying Transition Probabilities

Parameter	Markov Switching Model	Bernhard-Leblang	Approval	Alesina et al. (fn. 16)	Entropy	Election (6 month)
μ_1	-.174 (.084)	-.230 (.038)	-.187 (.042)	-.174 (.102)	-.175 (.094)	-.192 (.118)
μ_2	.061 (.730)	.070 (.764)	.071 (.760)	.062 (.862)	.062 (.802)	.071 (.764)
σ_1^2	.550 (.000)	.456 (.000)	.464 (.000)	.557 (.000)	.557 (.000)	.573 (.001)
σ_2^2	8.06 (.000)	7.63 (.000)	8.22 (.000)	8.08 (.000)	8.07 (.000)	8.07 (.000)
β_{10}	2.31 (.000)	.628 (.590)	6.44 (.000)	2.37 (.002)	2.40 (.000)	2.70 (.002)
β_{11}		170 (.104)	-.110 (.000)	-.025 (.994)	-.106 (.946)	-1.49 (.316)
β_{20}	3.00 (.000)	-1.79 (.130)	8.70 (.012)	2.82 (.000)	2.84 (.000)	3.41 (.000)
β_{21}		559 (.002)	-.155 (.058)	5.14 (.496)	.018 (.536)	-1.77 (.142)
ρ	.345	.583	.434	.332	.350	.343
log(L):	-430.65	-428.34	-426.75	-430.28	-430.39	-429.46
Wald Tests						
H_0: $p^{22} = 1 - p^{11}$	189.83 (.000)					
H_0: $\mu_1 = \mu_2$	1.40 (.236)					
H_0: $\sigma_1^2 = \sigma_2^2$	35.1 (.000)					
Likelihood Ratio Tests						
Garcia	58.77*					
Hansen	5.26 (.000)					
Time Varying vs. Constant		4.62 (.099)	7.80 (.020)	.740 (.691)	.520 (.771)	2.38 (.304)

Note: P-values in parentheses; *p-value < .05.

TABLE 3
Switching Models for the US dollar Canadian dollar Exchange Rate with Time Varying Transition Probabilities

Parameter	Markov Switching Model	Simple Switching Model	Approval	Alesina et al. (fn. 16)	Entropy	Election (6 month)	Government
μ_1	-.071 (.604)	-.068 (.568)	-.095 (.382)	-.083 (.450)	-.083 (.442)	-.070 (.520)	-.084 (.484)
μ_2	.192 (.344)	.192 (.354)	.256 (.244)	.206 (.304)	.166 (.310)	.209 (.278)	.217 (.290)
σ_1^2	.458 (.036)	.463 (.002)	.544 (.002)	.453 (.000)	.416 (.000)	.488 (.000)	.475 (.004)
σ_2^2	2.77 (.002)	2.78 (.000)	2.95 (.000)	2.79 (.000)	2.50 (.000)	2.89 (.000)	2.84 (.000)
β_{10}	-.194 (.944)	-.072 (.916)	-2.70 (.188)	.418 (.386)	.091 (.838)	.003 (.904)	-.112 (.884)
β_{11}			.051 (.142)	-1.46 (.118)	-.195 (.078)	.432 (.598)	.279 (.522)
β_{20}	-.011 (.972)						
β_{21}							
ρ	.478	.482	.558	.479	.387	.513	.503
log(L):	-331.38	-331.39	-330.10	-329.40	-329.81	-331.30	-331.06
Wald Tests							
H_0: $p^{22} = 1 - p^{11}$	.004 (.947)						
H_0: $\mu_1 = \mu_2$	1.21 (.272)						
H_0: $\sigma_1^2 = \sigma_2^2$	8.67 (.003)						
Likelihood Ratio Tests							
Garcia	15.45*						
Hansen	3.33 (.03)						
Time Varying vs. Constant			2.58 (.108)	3.98 (.046)	3.16 (.075)	.180 (.670)	.580 (.566)

Note: P-values in parentheses; *p-value < .05.

TABLE 4
Switching Models for the Australian dollar New Zealand dollar Exchange Rate with Time Varying Transition Probabilities

Parameter	Markov Switching Model	Bernhard-Leblang	Alesina et al. (fn. 16)	Entropy	Election (6 month)	Government
μ_1	-.262 (.042)	-.278 (.024)	-.259 (.030)	-.244 (.038)	-.265 (.034)	-.276 (.024)
μ_2	.240 (.650)	.263 (.654)	.254 (.652)	.217 (.680)	.251 (.686)	.246 (.644)
σ_1^2	1.46 (.000)	1.44 (.000)	1.55 (.000)	1.48 (.000)	1.491 (.000)	1.26 (.000)
σ_2^2	23.41 (.001)	23.36 (.001)	24.08 (.002)	23.74 (.001)	23.61 (.001)	23.10 (.002)
β_{10}	3.116 (.000)	3.20 (.000)	25.32 (.036)	2.58 (.000)	3.43 (.002)	2.80 (.000)
β_{11}		-2.13 (.498)	-23.13 (.060)	5.24 (.340)	-1.00 (.480)	.684 (.400)
β_{20}	2.49 (.006)	.759 (.494)	1.32 (.500)	2.54 (.004)	2.41 (.002)	-6.80 (.304)
β_{21}		186.8 (.124)	1.39 (.552)	-1.90 (.906)	14.80 (.208)	-9.02 (.204)
ρ	.644	.708	.734	.564	.752	.806
log(L):	-425.75	-424.00	-422.63	-424.55	-424.53	-422.50
Wald Tests						
H_0: $p^{22} = 1 - p^{11}$	88.33 (.000)					
H_0: $\mu_1 = \mu_2$	.818 (.366)					
H_0: $\sigma_1^2 = \sigma_2^2$	7.875 (.005)					
Likelihood Ratio Tests						
Garcia	117.273*					
Hansen	7.69 (.000)					
Time Varying vs. Constant		3.50 (.174)	6.24 (.044)	2.40 (.301)	2.44 (.295)	6.50 (.039)

Note: P-values in parentheses; *p-value < .05.

TABLE 5
Switching Models for the German mark Swedish kroner Exchange Rate with Time Varying Transition Probabilities

Parameter	Markov Switching Model	Restricted Switching Model	Bernhard-Leblang	Approval	Election (6 month)	Government
μ_1	.141 (.232)	.141 (.230)	.141 (.228)	.141 (.234)	.141 (.228)	.141 (.232)
μ_2	13.33 (.000)	13.33 (.000)	13.33 (.000)	13.33 (.000)	13.33 (.000)	13.33 (.000)
σ_1^2	2.73 (.000)	2.73 (.000)	2.73 (.000)	2.73 (.000)	2.73 (.000)	2.73 (.000)
σ_2^2	2.00 (.014)	2.00 (.014)	2.00 (.014)	2.00 (.014)	2.00 (.014)	2.00 (.014)
β_{10}	4.18 (.000)	4.18 (.000)	3.08 (.004)	2.26 (.134)	4.01 (.000)	4.02 (.000)
β_{11}			61.7 (.248)	.039 (.188)	23.59 (.292)	.331 (.582)
β_{20}	-23.76 (.094)					
β_{21}						
ρ	.985	.985	.990	.995	.990	.995
log(L):	-403.25	-403.25	-402.96	-402.93	-402.75	-403.11
Wald Tests						
H_0: $p^{22} = 1 - p^{11}$	3.05 (.081)					
H_0: $\mu_1 = \mu_2$	255.8 (.000)					
H_0: $\sigma_1^2 = \sigma_2^2$	.702 (.402)					
Likelihood Ratio Tests						
Garcia	102.4*					
Time Varying vs. Constant			.580 (.446)	.640 (.424)	1.00 (.317)	.280 (.597)

Note: P-values in parentheses; *p-value < .05.

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