HOHENHEIMER DISKUSSIONSBEITRÄGE

The Political Economy of Fixed Exchange Rates: A Survival Analysis

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Nr. 265/2005

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ISSN 0930-8334

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Abstract

This paper examines the role that political and institutional factors played in the duration of fixed exchange rate regimes in 47 developing countries within the time period 1975-2000. As an innovation to the literature, we characterize and model the times to exit for a fixed exchange rate regime using a Cox model. The empirical analysis shows that exchange rate policymaking is not a purely theoretical issue, but strongly depends on partisan and institutional incentives such as the date of elections, the political color of the government in power, the number of veto players, and the degree of central bank independence.

JEL classification: F31, F33, E61

Keywords: political economy, exchange rate regime, survival analysis, Cox model

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*) The author thanks Ansgar Belke, Felix Hammermann, Hans Pitlik, Adi Schnytzer, and Rainer Schweickert as well as conference participants at the 2005 Annual Meeting of the European Economic Association in Amsterdam and the 2005 Annual Congress of the Swiss Society of Economics and Statistics in Zurich for very helpful comments. Jakob de Haan and Gian-Maria Milesi-Ferretti provided me with valuable data.

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1. Introduction

What factors determine a country's exchange rate policy? Since the collapse of the Bretton Woods system of fixed exchange rates in 1973, economists have been increasingly interested in answering this question. Analysts focused primarily on the possible influence of optimum currency area (OCA) criteria, such as a country's size, openness to trade, or factor mobility. More recent approaches emphasized the nature and the sources of shocks to which an economy is exposed or explicitly took imperfections on financial markets into account. However, despite a large body of work, little consensus has emerged about the determinants of exchange rate regime choice. The existing empirical literature could not identify a single variable as a clear predictor of exchange rate regime choice and even among economically comparable countries large discrepancies in exchange rate policy have been observed (Juhn and Mauro 2002).

Possibly motivated by the financial crises in the 1990s that caused both economic and political turmoil, some economists have recently directed their attention to the impact of polit-economic factors on exchange rate regime choice (see, e.g. Eichengreen et al. 1995, Simmons 1997, Frieden et al. 2001, or the contributions in the fall 2002 special issue of International Organization). In this view, exchange rate policy is the outcome of a political process with strong distributional and welfare implications. Differences in exchange rate policy can be explained by factors such as different parties having different macroeconomic preferences or by incumbents' efforts to increase their reelection prospects.

The aim of this paper is to expand this branch of the literature. The central claim is that political and institutional factors have an important, predictable impact on the duration of fixed exchange rate regimes in developing countries. The focus is on currency devaluations (and not on regime choice) because historically the exit from currency pegs and the associated sharp losses in a currency's value have been those exchange rate episodes with the strongest political effects. For developing countries in particular, currency devaluations have often been accompanied by political turbulence and changes in government.

Although a number of empirical studies have been concerned with similar questions, this study differs from previous research on this subject in at least two significant ways: First, the sample consists of 47 countries within the time period from 1975 to 2000, and it is thus larger and more diverse than most other studies that have been conducted. This enables us to not only test the structure of one particular theory (as most previous research has done), but allows us to ask, when looking at a large set of data, whether different sets of political and institutional variables systematically influenced the duration of currency pegs in a number of developing countries.

The use of a survival analysis approach in the context of exchange rate regime duration is a second innovation to the literature and establishes greater empirical meaning than standard probit or logit models. Specifically, this method of estimation optimally exploits the data's nature of time dependency; that is, it accounts for the fact that the length of time already spent on a currency peg is an important determinant of the probability of exit into a more flexible exchange rate regime. To our knowledge, the only previous studies using survival analysis in the context of currency pegs are Bodea (2003) and Blomberg et al. (2004). Undoubtedly, the allowance for time dependence in these studies is an important improvement compared to previous research. However, what is missing in both studies is a clear picture of a serious discussion of the most adequate econometric model for this type of analysis. Another possible area of improvement is the application of the survival analysis approach for a global sample of developing countries.

This paper proceeds as follows: In chapter 2, we derive testable hypotheses for the following empirical analysis. Chapter 3 describes the dataset. Chapter 4 introduces the Cox model in the context of exchange rate regime shifts. Chapter 5 presents and comments the estimation results. Finally, Chapter 6 contains concluding remarks.

2 Developing a theory of currency peg duration

A common feature to the explanation of currency peg breakdowns revolves around the policy trade off between the (short-term) political losses incurred if the political authorities resort to the

devaluations option and the (long-term) macroeconomic gains achieved by doing so. The political losses arise because politicians fear that voters punish governments that violate exchange rate stability. The benefits are largely due to higher international price competitiveness. By making exports cheaper and imports more expensive, devaluations promise to provide relief from unsustainable current account deficits, low employment and low output growth. Additional economic gains are expected due to the possibility to pursue a more relaxed economic policy stance. Thus, if one assumes that in the short term governments have the ability to maintain a fixed exchange rate, the central question concerns the conditions that increase or lower the willingness of policymakers to sustain the exchange rate commitment. This chapter identifies six political and institutional factors that are supposed to provide explanatory power with respect to the maintenance of currency pegs: the timing of elections, partisan motives, the number of veto players, the degree of central bank independence, the type of political system, and the strength of the government.

Elections

It is conventional wisdom that the state of the economy at the moment of an election has a major impact on voters' decisions (Remmer 1991). The probability of reelection is higher when the economy prospers than when economic conditions are bad. Voters are taken to express a general dissatisfaction when the economy is in recession and hold the government responsible. Inasmuch exchange rates influence the economic key indicators price level, employment, and real income, the exchange rate regime may be of strategic value for the incumbent to maximize its reelection prospects. A number of studies have shown that abandoning an exchange rate commitment entails significant political costs and, at least in the short term, is usually accompanied by contractionary effects (Cooper 1971). Hence, given that with an upcoming election the time horizon of governments is particularly short, incumbents will have a strong bias against devaluation in the pre-election period. Moreover, any potential gains from devaluing are presumably more than outweighed by the fact that devaluations cast doubt on the competence of the incumbent and its ability to govern. Maintaining a fixed exchange rate regime that delivers monetary stability is seen

as an important signal for successful economic policy. Thus, required exchange rate adjustments are likely to be delayed until after the election. The classical rule is, as Edwards (1994: 28) put it, to "devalue immediately and blame it on your predecessors." The incentive to delay devaluations until after the election is particularly strong in countries where the currency peg is part of an inflation-reducing exchange rate stabilization program. In such a case, the decision to abandon a fixed exchange rate regime and devalue is often interpreted in a way that other complementary parts of the stabilization program (such as a sound fiscal policy, liberalization of trade flows, or the privatization of state-owned companies) will not be maintained either. As a result, risk premium and public debt increase.

Additionally, market expectations that the government is eager to defend the exchange rate parity in the pre-election period should reduce the likelihood of a crisis in that period. Speculators with rational expectations will anticipate that policymakers have a higher willingness to defend an exchange rate peg prior to an election. Hence, they will delay a speculative attack until after polling day, when the political authorities will undertake fewer efforts to maintain the fixed regime (Leblang 2003). This behavior reduces the likelihood of the exit from a currency peg for the pre-election period and increases its likelihood for the post-election period.

Hypothesis 1a: In pre-election years, the probability of exit from a currency peg is lower than in non-election years.

Hypothesis 1b: In post-election years, the probability of exit from a currency peg is higher than in non-election years.

Partisan actors

Hibbs (1977) argues that political parties represent different core constituencies, i.e. they pursue policies that favor only a subgroup of the population and thus maximize different objective functions. Parties from the ideological right traditionally have strong ties to the business and financial sectors. Since these social groups retain more wealth and are more secured from

unemployment, the classical partisan theory presupposes that in terms of a stable Phillips curve trade off, right-wing parties attach a high priority to maintaining price stability while they are willing to tolerate certain level of unemployment rate because they dispose of safe jobs. Parties from the ideological left, on the other hand, have closer links to workers and trade unions, whose income strongly depends on employment opportunities. At the same time, inflation aversion is lower. Therefore, left-wing parties give priority to employment and distributional aspects, accepting a certain degree of inflation.[1] Consequently, they are more inclined to use expansionary macroeconomic policy to manage the domestic economy.

These distributional differences have important implications for the duration of exchange rate systems. Since left-wing governments are generally more inclined to use expansionary macroeconomic policy to manage the domestic economy, the danger of devaluation grows. As a consequence, left-wing parties are expected to experience the more short-lived duration of a currency peg. In contrast, right-wing governments, being more concerned about stabilizing the economy and securing the real value of investment and creditor savings, should have a greater incentive to maintain a currency peg.

However, empirical research has documented that when partisan influences are found, in about half of the studies partisanship worked the opposite of what theory would predict: i.e. that right-wing parties are less prone to currency pegs. While Leblang (2003) finds that right-wing governments are associated with a greater willingness to defend a currency peg than more leftist parties, results by Simmons (1997) and Bodea (2003) suggest that more conservative parties are less committed to currency pegs.

Such an opposing political cycle in the exchange rate regime may occur if one combines the partisan approach with the insights of the political business cycle theory. In fact, it might be precisely left-wing governments that seek to maintain a fixed exchange rate in the period prior to

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[1] A tolerance toward inflation is also justified because price increases improve the relative income position of the lower classes.

elections to signal concern for price stability. To illustrate this point, consider a left-wing government that has subsequently devalued its currency and is approaching an election. If this government cares about both remaining in office and setting policy, it would be unproductive to devalue even more in the election year. In fact, it could be useful to show some anti-inflationary concern and avoid devaluation. In this way, the government builds on an anti-inflationary reputation and increases its chances for re-election. Analogously, right-wing governments, which possess greater anti-inflationary reputations ex ante, can possibly afford to devalue in election years. The perceived political costs of an exchange rate adjustment will be lower because of their reputation of being tough with inflation (Milesi-Ferretti 1995; Leblang 2003).

Hypothesis 2a: In non-election periods, countries with a left-wing government have a higher probability of exiting from a currency peg than countries with governments from right-wing parties.
Hypothesis 2b: In pre-election periods, countries with a left-wing government have a lower probability of exiting from a currency peg than countries with governments from right-wing parties.

Veto players

Exchange rate policy may also differ among countries because their policymaking is governed by different institutions. The number of veto players is a case in point. Following Tsebelis (2002: 19), veto players refer to the number of institutional or partisan actors whose agreement is necessary for a change of policy. The veto player theory contains important implications for economic policy. The main prediction is that the number of veto players correlates positively with the maintenance of the status quo. Hence, the problem with a low number of veto players is that a policy commitment such as a fixed exchange rate could suffer from credibility problems because it is too easy to change. However, societies characterized by many veto players can be plagued by indecision and gridlock and hinder many issues from being addressed for long periods of time because political consensus is more difficult to achieve. Countries in which there is a separation of powers, where the government coalition consists of multiple parties, where different relevant legislative chambers exist, and where states or provinces have authority over spending, taxes, or legislating, will find it

hard to implement the necessary policy packages to sustain the exchange rate commitment in a timely fashion. Decisionmakers in these countries are more likely to have different views regarding the required policy that will lead to the postponement of unpopular decisions. Delays in decisionmaking will in turn hamper effective policy adjustments in the face of adverse economic shocks or an unfolding crisis. In the absence of many veto players, however, political decisionmaking addresses sources of conflicts faster and conflicting positions can be better resolved (Alesina and Drazen 1991).

Thus, one can interpret the insights of the veto player approach in two different ways. It is possible to think about many veto players as a credible commitment to not interfere in exchange rate matters. In this case, the existence of many veto players increases the sustainability of a fix. The assumption of the status quo bias in exchange rate policy is motivated by the idea that all veto players have to agree to the abandonment of the peg. But the belief of a longer duration of currency pegs with many veto players becomes more difficult to justify when exits from currency pegs are regularly enforced by the failure to respond to unfolding macroeconomic disequilibria. Alternatively, the status quo bias generated by many veto players can also lead to delays in the adjustment to economic shocks. In this case, political inertia increases exchange rate instability and leads to a lower persistence of currency pegs.

When will the direct effect of a stronger commitment device with many veto players prevail, and when will the indirect effect of the inability for political reforms take place? We argue that the relationship between veto players and the sustainability of currency pegs is U-shaped. A government's ability to maintain a currency peg is highest when there is an average number of veto players. A low number of veto players have difficulties to credibly commit. If political leaders face too few constraints to renege on the exchange rate commitment, markets cannot be confident that the exchange rate parity will not be subject to unpredictable changes. Therefore, with no (or few) institutional veto power options, currency pegs are expected to endure only briefly. By contrast, incompatible economic policy, which is more likely to persist with an institutional framework

divided by a large number of veto players, has undoubtedly been at the core of most currency crises and large devaluations in the past. Inconsistent fiscal policies lead to real overvaluation, losses in reserves and to a more rapid exit from the currency peg.

Hypothesis 3: The probability of exit from a currency peg in relation to the number of veto players is U-shaped. A low number and a high number of veto players increase the probability of exit.

Central Bank Independence

Much has been written explaining why politicians willingly relinquish a sizeable part of their power and delegate policy tasks to an independent agency. Most of the authors see the inflation bias time inconsistency problem as rationale for such delegation. The time inconsistency problem exists because ex post politicians have a strong incentive to deviate from a preannounced monetary policy and surprise voters with inefficiently high inflation. Such a policy generates greater growth and employment and thereby improves the incumbent's re-election prospects. Rational forward-looking agents, however, will anticipate this loose monetary policy and adjust their inflation expectations. The result of this behavior is higher inflation, but not higher growth.

Granting independence to central banks or pegging the exchange rate to a country with low inflation provides a solution to this dilemma. If successfully implemented, both forms of monetary commitment ensure a predictable and stable monetary policy that keeps inflation down and signals to economic agents that monetary policy will be insulated from short-term electoral manipulation (see Rogoff 1985 for central banks and Giavazzi and Pagano 1988 for currency pegs). In the case of independent central banks, monetary policy is delegated to a conservative central banker that has a longer time horizon and is more inflation averse than the government. In the case of pegged regimes, monetary policy is pursued by a foreign central bank with a high reputation of price stability. The implication is that independent central banks can be considered a substitute for a fixed regime to provide credibility. If the elimination of the inflation bias is achieved by an independent central bank, there is no need for countries with independent central banks to fix the exchange rate

and give up domestic control over monetary policy. Proponents of this view suggest that countries with independent central banks have a lower propensity to peg than their more dependent counterparts (Broz 2002).

While the previous considerations provide no satisfying answer to the question whether currency peg duration increases or decreases with central bank independence, a political-economic argument suggesting a negative impact of central bank independence on the duration of fixed exchange rate regimes is based on the constraints of the Mundell-Fleming model. If the currency is fixed and capital is mobile, monetary policy is rendered ineffective. Since the central bank is committed to a stable exchange rate, there is no leeway to use monetary policy for stabilizing output or adjusting the balance of payments. Whether the central bank is independent or not plays no role in this case. From a political-economic view, an independent central bank has its own interests that are likely to prefer a retreat from the peg. Such a change maximizes the central bank's influence on monetary policy on which it otherwise has (quite irrationally) hardly any influence. Only with flexible exchange rates can the central bank effectively use its policy instruments (discount rate, purchase and sale of government securities, and foreign currencies) and pursue its policy goals. This argument implies that the duration of a currency peg decreases with the implementation of central bank independence.[2]

Hypothesis 4: The probability of exit from a currency peg increases with the independence of the central bank.

Political regime type

The duration of currency pegs may also be influenced by a country's political regime type, i.e. whether a country has a democratic or an authoritarian political system. This study argues that greater transparency and accountability can be thought to increase the duration of a fixed exchange rate regime. Accountable politicians and a transparent institutional framework suggest that

[2] I thank Rainer Schweickert for a useful discussion on this point.

policymakers in democracies make better policy choices than those in autocracies. Since they provide markets greater quantities of accurate information, speculative attacks due to imperfect information (as suggested by Calvo and Mendoza 2000) are less prevalent. This claim is consistent with Bonomo and Terra (1999: 9) who argue in their analysis of political cycles for the Brazilian Real, that "contrary to widespread belief, a dictatorship may be less able to take necessary bitter measures than a democratic regime". Cukierman et al. (1992) also provide evidence for this claim, concluding that totalitarian regimes are more prone to inflation than their democratic counterparts.

Moreover, democracies cannot only be expected to have a greater ability to maintain an exchange rate peg. They should also have a higher willingness to do so. Large devaluations are often followed by political turbulence and changes in government (Cooper 1971). Government instability and the possibility of electoral defeat pose a much higher threat to decisionmakers in democratic countries than to the political leaders in authoritarian regimes. Hence, democratic governments face higher political costs when a peg is abandoned. This implies that democratic governments have a large incentive to stabilize the exchange rate and maintain a currency peg.

Hypothesis 5: The probability of exit from a currency peg decreases with the level of democracy.

Political instability

Méon and Rizzo (2002) model the influence of political instability on the credibility of a fixed exchange rate regime. They describe the choice of an exchange rate regime as a repeated game between the policymaker and the private sector in which the policymaker is subject to a time-inconsistency problem. In their model, only policymakers who can be assured that they will remain in office for an infinite amount of time, will resist the temptation to devalue and be able to defend the peg. Once political instability is taken into account and a policymaker's life expectancy shrinks, policymakers will choose to surprise the private sector and abandon the currency peg because the relief in the short-run through an unexpected devaluation exceeds the fear of an inflationary bias. Hence, political instability leads to a horizon-shortening effect that in most cases operates against

the sustainability of currency pegs. This impact is intuitive. A more stable government should be more willing to pursue long-run economic goals than a less stable one. Fragile governments will heavily discount the future benefits of economic reforms that increase the long-run sustainability of currency pegs. A government's myopia will promote policies determined by short-term considerations. This behavior is rational because, as second-generation currency crisis models have shown, short-term political inconsistencies will not necessarily lead to speculative behavior.

Hypothesis 6: The probability of exit from a currency peg increases with political instability

3. The Dataset

In order to follow the theoretical propositions closely, I apply the methodology of duration models to a unique dataset for 47 developing countries for the period from 1975 to 2000.[3] The dependent variable in this study is the length of time until a currency peg collapses, or in other words, the number of years between the beginning and the end of a fixed exchange rate regime. I analyze together all currency pegs, regardless of the underlying reason for the peg's abandonment. The incentive for the inclusion of all exits in the analysis is given by the fact that in developing countries, where the prime rationale for fixing is to stabilize the economy, every abandonment of a currency peg signals the move from a stabilization-oriented policy toward a more discretionary policy orientation with presumably higher inflation rates. Thus, as argued by Edwards (1996) and Collins (1996), every exit of a pegged regime entails some political costs.

In order to determine the duration of a fix, it is important to choose an appropriate exchange rate classification. The IMF de jure exchange rate regime classification as published in the Annual Report on Exchange Rate Arrangements and Exchange Restrictions is inappropriate because it fails to capture macroeconomic policies that are inconsistent with a peg. For instance, if the institutional

[3] The countries included in the sample are: Algeria, Argentina, Belarus, Bolivia, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Cote d` Ivoire, Croatia, Cyprus, Czech Republic, Dominican Republic, Ecuador, El Salvador, Estonia, Guatemala, Guyana, Haiti, Honduras, Jamaica, Latvia, Lebanon, Lithuania, Malaysia, Mexico, Moldova, Morocco, Nicaragua, Nigeria, Panama, Paraguay, Peru, Philippines, Poland, Republic of Korea, Romania, Russia, South Africa, Slovakia, Slovenia, Thailand, Turkey, Ukraine, Uruguay, and Venezuela.

setting prevents a country from maintaining exchange rate stability, but the country still claims to have its exchange rate fixed, the failure to sustain to the currency peg would not be reflected in the regression results. The natural classification by Reinhart and Rogoff (2002) has severe drawbacks for the purpose of my analysis as well. In this classification, actual exchange rate flexibility is measured on a five-year moving average time period. While this procedure is useful to distinguish long-term regimes from short-term periods of exchange rate stability, it also results in very few regime transitions and makes it difficult to pinpoint changes in exchange rate policy due to political shocks. This problem is addressed by Levy Yeyati and Sturzenegger (2002), whose classification is chosen because it best captures the actual behavior of policymakers. Exchange rate policy is measured on a yearly basis and deviations from exchange rate stability in a given year immediately reflect in a lower regime category.

The theoretical considerations in chapter 2 have identified various potential political and institutional determinants of the duration of currency pegs. Data definitions for these variables are provided in table 1. However, political and institutional factors alone cannot account for changes in exchange rate policy. As suggested by the OCA and currency crisis literature, a number of economic and financial variables are included as controls in the empirical model. However, one must also be aware that the inclusion of too many explanatory variables may lead to multicollinearity problems. The reason for the assumed occurrence of multicollinearity is the possibility that political variables may affect the exchange rate regime via the government's choice of macroeconomic policies. For instance, if a left-wing government engages in expansionary monetary policy, increasing inflation and thereby causing the exchange rate to devalue, estimation results could possibly attribute the abandonment of the peg to higher inflation rates although the underlying reason is the left-wing government's lower concern for economic stability. Hence, even purely economic variables may be related to political factors. Accordingly, an empirical

specification that combines political variables with economic variables that can be influenced by the government might wash out the political effects, which are clearly more exogenous.[4]

Our solution to this dilemma is as follows: First, we collect a number of structural variables that are clearly exogenous to the political variables. These variables include external debt (*debt*), size of the economy (*gdp*), trade openness (*open*), standard deviation of export growth (*sdexpor*t), and a variable that accounts for a possible time trend (*share*). Then, we form a second group of economic variables that are under control of policymakers, or that could at least be related to domestic political factors. These are capital openness (*capop*) and fiscal balance (*fiscal*). Table 1 provides a definition of all variables. We will be more cautious when controlling for this second group of variables and only include them in some selected specifications.

4. Modeling Exchange Rate Regime Duration

Most previous studies on the political economy of exchange rates have employed probit or logit. While these approaches are useful because they consider multiple explanatory variables simultaneously in the prediction, one of their major shortcomings is the implicit assumption of a constant hazard rate. As such, these studies ignore the possible time dependence of exchange rate regimes. In other words, what these studies assume is that the time in which a certain exchange rate regime exists does not determine the likelihood of its abolition. However, failing to account for time dependence can only be justified under two crucial assumptions: First, time should not matter. That is to say that depending on the economic and political covariates in the model, the probability of a regime shift in any year must be the same as in any other year. Second, one must assume that the model is correctly specified. Since time can be used as a proxy variable for unmeasured occurrences, no uncontrolled variables should exhibit an impact on exchange rate regime duration. If one (or both) of these assumptions is not fulfilled, the regression result may be biased. However,

[4] Still, political effects may continue to exist even after controlling for economic variables because, as suggested by second-generation currency crisis models, several equilibrium exchange rate values may be consistent with the same set of macroeconomic fundamentals.

both assumptions are hard to justify. For example, it seems inappropriate to assume that the probability that a country abandons an exchange rate peg is the same for a peg that has been in existence for one year than for a peg that has been maintained for ten years. The choice of an exchange rate regime is not a once-and-for-all decision, but is likely to change over time. Hence, it seems particularly useful to think of exchange rate regime choice in terms of the likelihood of the abandonment of the prevailing exchange rate regime. Studies of survival analysis account for these time effects and test for duration dependence, i.e. if exchange rate regime duration is a function of time.

In principle, three functions can be used to characterize the distribution of the survival time in a discrete time approach: the density function, the survivor function, and the hazard function.[5]

The density function is characterized by

$$f(t) = \Pr(T = t_i), \tag{1}$$

where T is a non-negative random variable that takes values t that measure the time spent in a particular state. The survivor function is defined as the probability that the event of interest has not occurred by duration t, i.e. the random variable T exceeds (or at least equals) the specified time t. For the discrete case it is given by

$$S(t) = \Pr(T \geq t_i) = \sum_{j \geq i} f(t_j), \tag{2}$$

where j denotes a failure time. $S(t)$ is a nonincreasing function with a value 1 at the time origin and a value 0 as t goes to infinity.

The relationship between the failure (or exit) rate and the time already spent in that state is determined by the hazard function. The hazard function emphasizes conditional probabilities: It describes the probability of a spell ending at some time point, given that the spell has lasted to that time point. The discrete-time hazard rate is defined as

$$\lambda(t) = f(t_i) / S(t_i). \tag{3}$$

[5] The following discussion on duration data models basically relies on Kiefer (1988) and Box-Steffensmeier and Jones (2004).

It depicts the conditional probability a regime ends at t_i, given that it lasts until t_i.[6]

Both Bodea (2003) and Blomberg et al. (2004) resort to the Weibull model, a parametric approach to fitting survival model. However, one should be cautious in terms of drawing conclusions about duration dependence from Weibull parametrization because it only allows for a monotonic shape of the underlying or baseline hazard function. In fact, the hazard of exiting from a peg could increase (or decrease) nonmonotonically with duration as well. In this case, the Weibull would fit the data poorly and the coefficient estimates would be biased. To allow for both nonmonotonic and monotonic hazards, semiparametric approaches, such as the Cox proportional hazards model, are more appropriate because they allow for more flexibility in the shape of the baseline hazard function. The characteristic feature of the semiparametric models is that the baseline hazard $\lambda_0(t)$ is left completely unspecified. The hazards are made dependent on a vector of explanatory variables x with coefficients β that are to be estimated and the baseline hazard λ_0. The setting is then as follows:

$$\lambda(t, x, \beta, \lambda_0) = \lambda_0(t)\phi(x, \beta), \tag{4}$$

where φ is a positive function of x and β, and $\lambda_0(t)$ characterizes how the hazard function changes as a function of time. The baseline hazard depends on t, but not on x, meaning that it captures individual heterogeneity that is unexplained by the covariates. Alternatively, the baseline hazard can be interpreted as the probability of an exchange rate regime to change conditional on all the covariates of zero. The most commonly used semiparametric procedure was developed by Cox (1972). He proposed to specify the relative hazard function $\phi(x, \beta)$ in the following way:

$$\phi(x, \beta) = \exp(x'\beta). \tag{5}$$

The advantage of this model is that nonnegativity of φ does not impose restrictions on β.[7] To estimate the hazard function, observed spells are ordered by length from smallest to largest,

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[6] In the present study, it expresses, e.g., the probability of a currency peg to change in the sixth year, given that it has existed for five years. By contrast, specifications in terms of a density function emphasize unconditional probabilities (e.g., the probability of a currency peg to persist exactly 6 years).

$t_1<\ldots<t_n$. The conditional probability that the first observation abandons a spell at time t_1, given that any of the n observations could have been failed at t_1, is

$$\frac{\exp(x_1,\beta)}{\sum_{i=1}^{n}\exp(x_i,\beta)}. \tag{6}$$

This quantity is the contribution of the shortest observation to the partial likelihood. Generally, the contribution of the j-th shortest observation j to the partial likelihood is given by

$$\frac{\exp(x_j,\beta)}{\sum_{i=j}^{n}\exp(x_i,\beta)}. \tag{7}$$

Translating this technique into that of exchange rate regimes, the numerator is the hazard for the country whose currency peg completes at time t_1, while the denominator is the sum of the hazards for countries whose spells were still maintained just prior to time t_j (i.e. those whose spells formed the risk set and could have ended at time t_j). The likelihood is formed as the product of these contributions and may be written as

$$L(\beta)=\prod_{i=1}^{n}\frac{\exp(x_j,\beta)}{\sum_{i=j}^{n}\exp(x_i,\beta)}. \tag{8}$$

The likelihood function depends only on the unknown coefficient vector β and can then be maximized using standard methods.[8] The functional form of the hazard rate does not need to be specified. The Cox log likelihood function is then as follows:

$$ln\,L(\beta)=\sum_{i=1}^{n}\left\{\ln\phi(x_i,\beta)-\ln\left[\sum_{j=i}^{n}\phi(x_j,\beta)\right]\right\}, \tag{9}$$

where $\phi(x_i,\beta)=\exp(x_1,\beta)$.

One of the advantages of the survival analysis is that the partial likelihood framework accommodates for censored data.[9] This is done by including censored observations in the

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7 The variable must take on non-negative values as there is no negative risk of failure.

8 It is referred to as a partial likelihood because it makes no assumption about the baseline hazard rate at times when failures do not occur.

summation of the denominator of the partial likelihood function terms corresponding to observations that fail before their censoring point. Censored observations do not enter in the denominator of observations that fail after their censoring point and they are never included in the numerator of a contribution to likelihood.

5. Estimation Results

The main focus of the analysis is on the duration of currency pegs. Thus, some closer inspection of periods of fixed exchange rate regimes is in order. The variable *duration* characterizes the "life" of a fixed exchange rate regime or the consecutive number of years that a currency peg has persisted until it is abandoned. By definition, the minimum number of years that a pegged exchange rate regime lasts is one year and the maximum is 26 years (the number of years covered by the 1975-2000 sample). Overall, regime persistence is very low. The average currency peg duration is 3.97 years. It is important to note that this number has a downward bias because the operational design restricts the maximum length of a currency peg to be 26 years and since some of the pegs are either left- or right-censored.

Figure 1 further illustrates this point. It plots an estimate of the smoothed hazard function. The graph agrees with former analysis on currency peg duration (see, e.g., Duttagupta and Ötker-Robe 2003), showing an increasing hazard first and a decreasing hazard afterward. In other words, the conditional probability of abandonment depends upon the amount of time that the peg has existed. The clearly nonmonotonic pattern of duration dependence may be explained by a time lag between the introduction of a peg and gains in credibility. Achieving credibility is a long-lasting process and

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9 Censoring occurs whenever a spell's full event history is unobserved. Specifically, the present dataset includes no information on exchange rate regimes for the years prior to 1975 or following the end of the observation period (post 2000). This means that I am uncertain about the beginning (left-censoring) and/or ending (right-censoring) date for some currency pegs. For right-censored data, e.g., a bias may be introduced because an exit from a currency peg in 2001 is not taken into account at all in the regression even if the instability that led to it was presumably present in the time frame under study. Previous work on exchange rate regime duration, such as Duttagupta and Ötker-Robe (2003: 10), has often simply omitted censored observations from the dataset. However, this may induce a form of case selection bias in the results because censored observations have, on average, a longer regime persistence than uncensored spells and would thus be underrepresented in the sample.

thus, only if the peg has persisted for a long time, the conditional probability of exit decreases. In any case, the nonmonotonic pattern provides a strong case for the use of duration models such as the Cox that allow nonmonotonity in the hazard rate.

In the following, the semi-parametric approach by Cox (1972) is used to derive conclusions about the impact of the various variables defined in chapter 3. In order to avoid the above-mentioned multicollinearity problems, four Cox models were measured. Some explanatory variables are alternately dropped from the regression equations.[10]

Table 2 presents the regression results. Let us begin with the interpretation of the results for the partial-likelihood estimate of the first political model presented in column (1). Coefficients for any β_i parameter significantly above zero indicate that an increase in the corresponding variable leads to a faster exit, and conversely for a negative coefficient parameter. Thus, we see that election years are significant and positively related to the risk of abandoning a peg. This is support for the notion that short time horizons raise the probability of abandonment. Statements about the magnitude of the impact can be drawn by calculating hazard ratios, which are exponentiated coefficients (i.e., e^{β_i}). For dummy variables, the exponentiated coefficients are easily interpreted as time-ratios. This implies that in election years the probability of exiting a currency peg is 111 percent higher than in non-election years. In line with hypothesis 2a, *left* has a higher probability of abandoning a currency peg than *center*. More exactly, the hazard at the same time for left parties is 15 percent higher than for more conservative parties.

The statistically significant positive parameter estimate of 0.57 for *veto* in model (1) means that every additional veto player above the mean (or, analogously, the loss of one veto player below the mean) increases the time-to-exit for a fixed exchange rate regime by 76 percent, a result that is consistent with the predicted U-shaped relationship between veto players and currency peg duration

[10] The application of the Cox method requires that time spans of exchange rate regimes can be measured exactly, meaning that no tied failures occur. In the present context, however, tied failures exist since only the yearly time interval in which the abandonment of a currency peg occurs is given. Thus, some currency pegs will share its observed duration time with other pegs. To handle this problem, all estimates use the exact partial likelihood method as an approximation. This method treats the data as discrete and is especially attractive if the number of failures in a specific time interval is large (Box-Steffensmeier and Jones 2004: 56).

(hypothesis 3). The hazard ratio for *cbi*, as a proxy for the actual degree of central bank independence, is also significant at the 5 percent level. The negative coefficient indicates that independent central banks have a higher probability of abandoning a peg. This is in line with the idea of a substitutive relationship between independent central banks and fixed regimes (hypothesis 4). A one standard deviation increase in central bank independence would be predicted to increase the probability of exit by 16 percent. With respect to *polity*, the positive parameter estimate combined with the low p-value implies that the level of democracy does matter for explaining the duration of pegs. However, contrary to what has been suggested in hypothesis 5, more democratic countries display a faster exit from currency pegs. A one-point increase in the 21-point polity index increases the probability of exit by 11 percent. This result broadly survived when I experimented with the 11-point index of *democracy* as an alternative measure for the level of democracy.

Even more puzzling, the degree of political instability also influences currency peg durability in a counterintuitive way. A higher level of political instability leads, ceteris paribus, to a lower persistence of currency pegs. Again, the result is significant at the 5 percent level and the magnitude of the effect is quite large. A one standard deviation increase in political instability leads to a 50 percent lower probability of abandoning the currency peg. One possible explanation for this puzzle is that previous studies, such as those by Edwards (1996) and Berger et al. (2000) that found a positive relationship between political instability and the choice of a fixed regime have omitted to control for the type of political regime. Since the present study suggests that democratic countries are assumed to have a higher government turnover rate[11] and a lower currency peg duration, a correlation between political instability and the duration of a fix that does not control for these effects is spurious. However, further (unreported) regressions reveal that even when omitting the democracy variable from the regressions, the puzzling coefficient for *partyinst* remains. This result does also hold if I exclude the countries with the highest political turnover ratio (Bolivia and Haiti) or when I use the government party turnover ratio (*govinst*) as a measure for political instability.

[11] The pairwise correlation between these two variables is r=0.35.

Columns (2) through (4) display alternative specifications of the model. With respect to the basic variables just discussed, the results remain very much the same. All variables keep its sign from the first estimation model. Thus, I will only discuss the most important changes to these variables in the following. To the model in column (2), I add the two dummy variables *preelect* and *postelect*. The parameter estimates indicate a lower probability of exit in both pre-election and post-election periods. The former is consistent with hypothesis 1a. The negative sign for *postelect* contradicts the expectation of a higher risk of exit after the election. Thus, I obtain support for hypothesis 1a and no support for hypothesis 1b. Model (3) asks whether there are any differences in the pre-electoral period between left- and right-wing parties. The interaction variable *preleft* has a negative sign. If pre-election periods are controlled for, the absolute magnitude of the impact of both left-wing parties increases considerably in this specification. Thus, data in column (3) reveal that in non-election periods, leftist parties have a higher probability to abandon a currency peg (the relative hazard for leftist parties compared to rightist parties is 1.82), while in pre-election periods right-wing parties are more likely to exit (in these periods the relative hazard for *left* is 0.14). This result is perfectly consistent with the view that despite its overall preference for flexible exchange rates, left-wing parties are unwilling to abandon a currency peg in pre-election periods to signal their concern for price stability (hypotheses 2a and 2b). Right-wing parties, by contrast, have a greater reputation for being tough on inflation and thereby have fewer electoral consequences to fear if they abandon a peg in election periods.

Model (4) adds further economic variables, which are not necessarily exogenous to the political variables. The positive coefficient for *capop* indicates that countries with capital controls have a higher likelihood of abandoning a peg. This result is consistent with previous empirical work on the relationship between exchange rate regime policymaking and capital controls (Leblang 2003; Blomberg et al. 2004). Moreover, it also confirms the view that the introduction of capital controls may send a negative signal to currency and financial markets, and thus increases the likelihood of

speculative attacks.[12] The coefficient of *fiscal* enters statistically significant and displays the expected sign, indicating that countries with fiscal imbalances have difficulties in maintaining a fixed exchange rate system.

With the introduction of the macroeconomic variables most of the political and institutional variables lose their significant explanatory power. Interestingly, the coefficient of *left* changes sign. This suggests, e.g., that the higher probability of exit under left-wing governments can be partly attributed to their looser fiscal policy.

Quite importantly, the link test indicates that the specification seems to fit the data quite well. A common way to assess the model fit in Cox models is to calculate Cox-Snell residuals. If the fitted model is correct, the Cox-Snell residuals should have a standard censored exponential distribution with hazard ratio equal to one for all *t*. Therefore, a plot of the cumulative hazard function (based on the Nelson-Aalen estimator) for these data should lie on a straight line from the origin with slope equal to one. Figure 2 plots the Cox-Snell residuals for the different specifications of the political model. The graphic analysis indicates that the different models are reasonably specified. The plots satisfy the exponential requirement most of the time: model (4) in particular fit the data rather well. Note that some deviation of the 45º line is expected due to the reduced effective sample caused by censoring. The deviation is higher in the right-hand tail of the plot where the sparseness of data reduce the adequacy of the model, while the large number of smaller residuals in the left-hand tail of the figure cluster more closely around the straight line with slope equal to one.

In order to increase the robustness of the results, a second estimation routine resorts to complementary log-log (cloglog). The advantage of cloglog over alternative estimation strategies to handle discrete duration data, such as logit or probit, is that the response curve has a fat tail as it departs from *0*, whereas it approaches *1* more rapidly than both the logit and the probit function. This suggests that the cloglog function is particularly appropriate in datasets where there are

12 This outcome suggests that the reverse causality problem is not entirely solved even though lagged values of the capital openness indicator are used.

relatively few failures (Box-Steffensmeier/Jones 2004: 74). Table 3 presents the results for the re-estimation of the above specifications using the cloglog model. In order to get rid of the time dependence property, a cubic spline function on the basis of three knots was estimated (Beck et al. 1997: 11-12). Accordingly, the estimated model includes, in addition to the independent variables described above, three splines, which produce an estimate of the form of duration dependence. Overall, results are in line with the Cox models. Quite importantly in terms of robustness, all political and institutional variables keep its sign. The impact of the institutional variables is weaker than in the Cox specifications. However, the results confirm the important role of electoral and partisan motives.

6. Conclusions and discussion

This study has examined political-economic determinants of fixed exchange rate regime duration in the framework of survival analysis. It has been argued that standard statistical methods such as logit or probit do not adequately capture the duration of currency pegs for three reasons: First, they ignore time dependence and do not account for the fact that the exit of a currency peg is more likely to happen at some time. Second, they are not suitable to handle multiple-failure data. Third, they treat censored and uncensored observations as the same. Therefore, the empirical analysis relied on discrete Cox regression models, in which the time dependent structure of the data is implicitly implemented.

Evidence was presented that political and institutional factors have an important impact on the duration of pegged exchange rate regimes. With regard to elections, hypothesis 1a (which proposes a lower likelihood of exchange rate adjustments in pre-election periods) was confirmed. By contrast, hypothesis 1b was clearly rejected. In terms of partisanship, we found also some evidence for the notion that the risk of exit from a peg is higher for left-wing governments than for conservative governments (hypothesis 2a). However, this result changed when macroeconomic variables, such as a country's fiscal balance, weree included in the regression. Apparently, the lower

duration of currency pegs under left-wing governments is caused by laxer fiscal policy. The negative sign of the interaction variable *preleft*, which measures the pre-election effects under left-wing governments, is consistent with such a view. Left-wing governments have a higher propensity to devalue; however, they may prefer maintaining a fixed regime in the pre-election period in order to build up some anti-inflationary credibility (hypothesis 2b).

Political institutions seem to be a weaker predictor of exchange rate instability than any electoral and partisan impacts. Still, the results suggest that as the variable *veto* increases (that is, as the deviation from the mean of veto players increases), the likelihood of abandoning a fixed exchange rate regime rises (hypothesis 3). The fourth hypothesis, which holds that the probability of exiting from a currency peg increases with the independence of the central bank could also be plainly confirmed. Contrary to expectations, highly democratic regimes and government stability tend to be negatively associated with a country's willingness to sustain exchange rate stability. The latter result in particular is robust to various specifications, which allows us to suggest that the greater political costs instable governments incur when they abandon the peg explain the difference.[13] Since weak governments are more desperately in need of the anti-inflationary credibility that accompanies a currency peg, they are expected to undertake large efforts to maintain exchange rate stability (Edwards 1996: 159).

Thus, seen on the whole, five of eight hypotheses could be confirmed by the data. The date of elections, the ideological orientation of the governing party, the degree of central bank independence, and the number of veto players have a significant impact on a country's probability to maintain an exchange rate fix. These political and institutional differences may help to explain why some countries have maintained fixed exchange rates and others have not. In particular, the analysis might provide an explanation to why economically comparable countries pursue different exchange rate policies.

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[13] See also Poirson (2001) and Frieden et al. (2001) for similar empirical results.

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Appendix

Figure 1: *Estimated hazard function for currency pegs, Kaplan-Meier estimator*

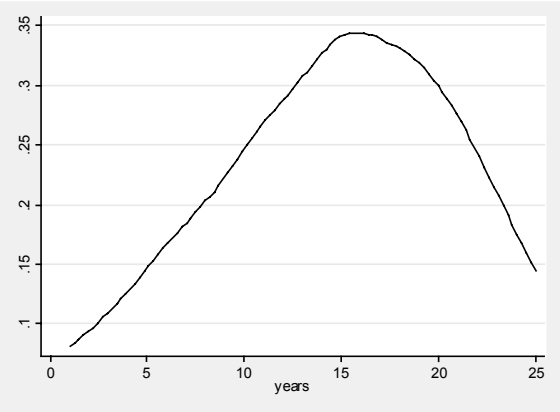
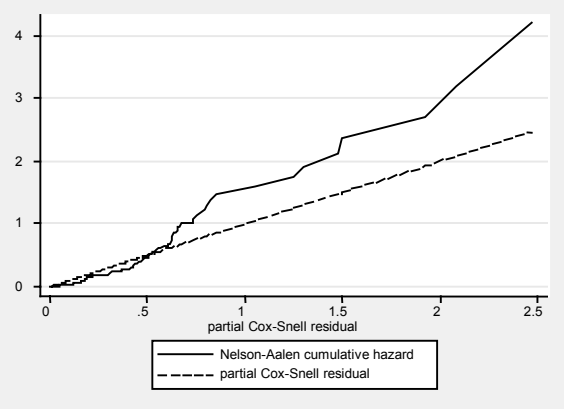
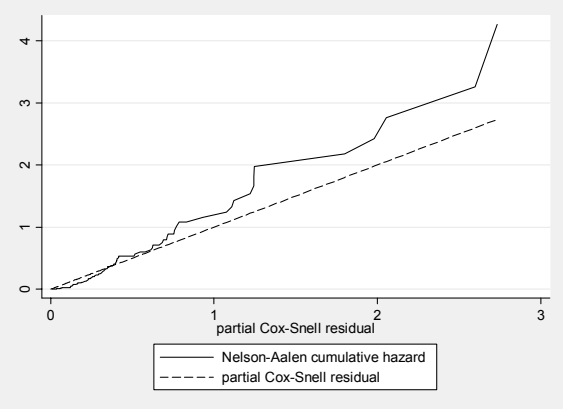


Figure 2: *Cox-Snell residuals (based on Cox estimates)*

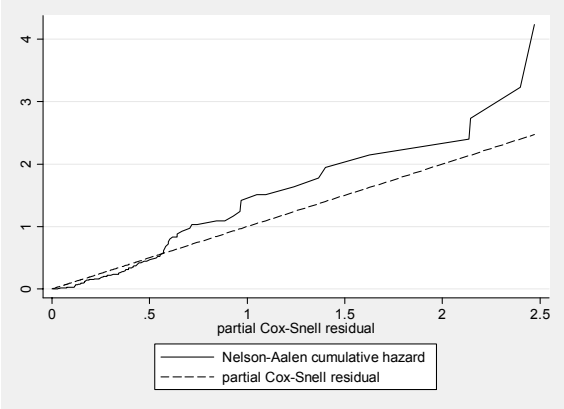
a) Model (1)



b) Model (2)



c) Model (3)



d) Model (4)

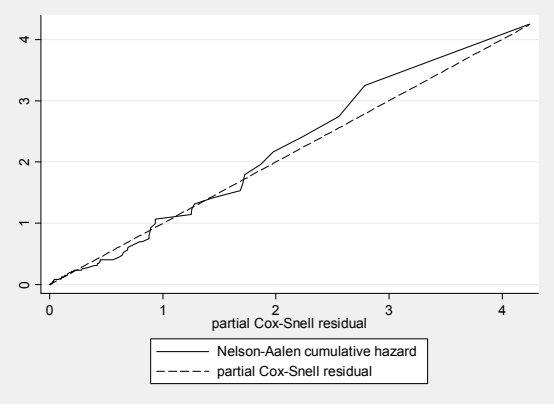


Table 1: *Data description and sources of variables*

Variable	Description	Source
duration	spell length of fixed exchange rate regime (definition of Levy Yeyati/Sturzenegger 2002)	Levy Yeyati and Sturzenegger (2002)
exit	dummy variable, value equals 1 when de facto currency peg is abandoned, 0 otherwise	Levy Yeyati and Sturzenegger (2002)
elect	dummy variable for election periods, value equals 1 if election takes place in the respective period, 0 otherwise.	Lijphart (2004), Popescu and Hannavy (2004), CDP (2004)
preelect	dummy variable for pre-election periods, value equals 1 if election takes place in the following year, 0 otherwise.	Lijphart (2004), Popescu and Hannavy (2004), CDP (2004)
postelect	dummy variable for post-election periods, value equals 1 if election has taken place in the year before, 0 otherwise.	Lijphart (2004), Popescu and Hannavy (2004), CDP (2004)
left	dummy variable for partisanship, value equals 1 if government party is from ideological left, 0 otherwise.	Beck et al. (2001)
preleft	interaction variable, value equals 1 if both left and preelect equal 1, 0 otherwise	see sources for partisan and election variables
veto	deviation from average number of veto players	Keefer and Stasavage (2003)
cbi	number of turnovers in central bank governors divided by years in sample	de Haan and Kooi (1998), national central banks
polity	index variable that captures essential democratic elements, from -10 (highly autocratic) to +10 (highly democratic)	Marshall and Jaggers (2002)
democracy	index variable for democracy, from 0 (low democracy) to +10 (high democracy)	Marshall and Jaggers (2002)
govinst	5-year moving average government turnover rate	Zárate (2004)
partyinst	5-year moving average ruling party turnover rate	Zárate (2004)
debt	outstanding amount of debt owed to nonresidents by residents of an economy as percent of GDP	World Bank (2003)
gdp	gross domestic product (in billion US dollar)	World Bank (2003)
open	share of exports and imports over GDP	World Bank (2003)
sdexport	standard deviation of real export growth	World Bank (2003)
capop	dummy variable, value equals 1 when capital flows are restricted	IMF (2003), Carmen Reinhart
fiscal	overall fiscal surplus as percent of GDP	World Bank (2003)
share	proportion of countries in sample with de facto fixed exchange rate regime	own calculation

Note: All variables are collected on a yearly basis. In the empirical analysis, lagged versions of macroeconomic variables are used.

Table 2: *Duration of currency pegs, Cox model*

	(1)	(2)	(3)	(4)
elect	0.746*		0.555	0.488
	(0.399)		(0.406)	(0.592)
left	0.142	0.181	0.600	-1.493*
	(0.466)	(0.429)	(0.444)	(0.770)
veto	0.567**	0.548**	0.518**	0.821**
	(0.258)	(0.264)	(0.264)	(0.399)
cbi	-1.816*	-2.241**	-1.946**	-6.044***
	(0.946)	(0.953)	(0.916)	(1.521)
polity	0.100***	0.110***	0.089***	0.177***
	(0.038)	(0.037)	(0.034)	(0.051)
partyinst	-0.512**	-0.550**	-0.529**	-0.623*
	(0.256)	(0.269)	(0.263)	(0.346)
gdp (log)	0.203*	0.265**	0.247**	0.649***
	(0.121)	(0.108)	(0.105)	(0.203)
debt (log)	0.245	0.286*	0.231	0.450
	(0.168)	(0.169)	(0.157)	(0.397)
share	1.564	1.422		
	(1.807)	(1.680)		
sdexport (log)	0.246			
	(0.511)			
open	0.000			
	(0.005)			
preelect		-0.764*		
		(0.448)		
postelect		-0.538		
		(0.513)		
preleft			-1.976	-0.482
			(1.249)	(1.372)
fiscal				-0.204***
				(0.061)
capop				0.588
				(0.597)
Observations	274	259	259	198
Wald chi^2	31.12	35.65	36.46	64.73
Prob>chi^2	0.00	0.00	0.00	0.00
Link test	0.62	0.60	0.27	0.08
AIC	200.81	188.86	186.05	99.80
BIC	240.55	224.43	218.06	135.97

*, **, *** indicate significance at the 10%, 5%, 1% level respectively. Standard deviations are reported below each value in brackets. Macroeconomic variables are used in lags.

Table 3*: Duration of currency pegs, clog-log model*

	(1)	(2)	(3)	(4)
elect	1.121***		0.984***	0.789**
	(0.317)		(0.281)	(0.362)
left	0.168	0.024	0.215	-0.736*
	(0.324)	(0.323)	(0.352)	(0.402)
veto	0.163	0.167	0.143	0.239
	(0.177)	(0.165)	(0.170)	(0.227)
cbi	-1.284	-1.619*	-1.348*	-4.163***
	(0.905)	(0.830)	(0.814)	(1.333)
polity	0.048*	0.069**	0.059**	0.130***
	(0.027)	(0.028)	(0.028)	(0.042)
partyinst	-0.337	-0.323	-0.333	-0.410*
	(0.242)	(0.243)	(0.232)	(0.216)
open	-0.005	-0.006*	-0.006*	-0.019**
	(0.003)	(0.003)	(0.003)	(0.008)
debt (log)	0.275	0.358	0.339	0.490
	(0.259)	(0.262)	(0.260)	(0.378)
T1 cubed	0.416***	0.388***	0.408***	0.547***
	(0.156)	(0.126)	(0.139)	(0.183)
T2 cubed	-0.271***	-0.254***	-0.265***	-0.367***
	(0.104)	(0.084)	(0.093)	(0.126)
T3 cubed	0.022**	0.022***	0.022**	0.036***
	(0.009)	(0.008)	(0.009)	(0.013)
sdexport (log)	0.149			
	(0.410)			
gdp (log)	0.047			
	(0.112)			
preelect		-0.381		
		(0.378)		
postelect		-0.558		
		(0.451)		
preleft			-1.208	-0.596
			(0.960)	(1.081)
fiscal				-0.086***
				(0.024)
capop				0.045
				(0.584)
Observations	273	259	259	198
Wald chi^2	82.90	40.59	62.50	79.98
Prob>chi^2	0.00	0.00	0.00	0.00
Link test	0.52	0.60	0.99	0.83
AIC	274.63	272.55	261.90	168.60
BIC	325.16	318.79	308.14	217.93

*, **, *** indicate significance at the 10%, 5%, 1% level respectively. Standard deviations are reported below each value in brackets. Macroeconomic variables are used in lags.

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