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Political and Institutional Factors in Regime Changes in the ERM: An Application of Duration Analysis *

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Abstract

This paper analyses the functioning of the European Exchange Rate Mechanism (ERM). To that end, we apply duration models to estimate an augmented target-zone model, explicitly incorporating political and institutional factors into the explanation of European exchange rate policies. The estimations are based on quarterly data of eight currencies participating in the ERM, covering the complete history of the European Monetary System. Our results suggest that both economic and political factors are important determinants of the ERM currency policies. Concerning economic factors, the money supply, the real exchange rate, the interest in Germany and the central parity deviation would have negatively affected the duration of a given central parity, while credibility and the price level in Germany would have positively influenced such duration. Regarding political variables, elections, central bank independence and left-wing administrations would have increased the probability of maintaining the current regime, while unstable governments would have been associated with more frequent regime changes. Moreover, we show how the political augmented model outperforms, both in terms of explanatory power and goodness of fit, the model which just incorporates pure economic determinants.

JEL classification numbers: C41, D72, F31, F33

Key Words: Duration analysis, Political variables, Exchange rates, European Monetary System

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1. Introduction

The European Monetary System (EMS) was established in 1979 as tool for exchange rate stabilization and for encouraging convergence of economic and monetary policies. The centrepiece of the EMS was the Exchange Rate Mechanism (ERM), a system of pegged, but adjustable, exchange rate in which the central parity grid could be altered to take into account changing economic conditions and relative performance of the participant economies. Through a set of monitoring mechanisms (based in economic variables such as interest rates and inflation), the EMS authority tacked the convergence of the member economies and enforce a target zone on their exchange rates. If they decided by mutual agreement that a particular parity could not be defended, realignments of the central rates were permitted.

The ERM constituted an important intermediary step to Economic and Monetary Union (EMU) in Europe, the most ambitious experiment since the Bretton-Woods system. With the beginning of EMU in January 1999, the ERM ceased to have effect, being replaced by the new, modified exchange rate mechanism (the so-called ERM-II) designed to maintain exchange-rate stability between the euro and the national currencies of those European countries not participating in EMU.

After the Krugman (1991)'s seminal paper, there has been a burgeoning literature on examining the exchange rate dynamics in a target zone, stressing rate that it depends both on exchange rate fundamentals and on its own expected rate of expected change. On the other hand, another important line of research (see Mélitz, 1994; Bussière and Mulder, 1999) has demonstrated how the explicit incorporation of political and institutional factors into the analysis of currency crisis, improves considerably the explanatory power of just pure economic models. In spite of the suggestive evidence provided by these works, the application of the developments of the growing Political Economy literature has been largely restricted to the analysis of inflation, public debts or budget deficits (see Grilli et al., 1991; Roubini and Sachs, 1988) and, when applied to international macroeconomics, focused on the case of emerging economies.

Consequently, the aim of this paper is to combine these two lines of research (the target zone models and the influence of political variables) by mixing into a unique model the economic factors suggested by the literature with some political and institutional factors, in an attempt to provide a deep understanding of the functioning of the ERM. To that end, we depart from the previous papers by using duration analysis to examine the survival of the central parities in the ERM. We have applied this approach using quarterly data on eight countries participating in the ERM covering the complete EMS history (1979-1998)[1].

Concerning the political and institutional factors, two questions explored in the Political Economy literature are of special interest for our investigation:

- Do politicians try to (artificially) stimulate the economy before elections?
- Are there systematic differences in the policies implemented by parties of different ideological orientation?

The first question has been deeply explored by the Opportunistic models [see Nordhaus (1975), Lindbeck (1976), Rogoff and Sibert (1988), Rogoff (1990) or Persson and Tabellini (1990), among others], which analyse the incentives of politicians to manipulate the economy in the period just before an election, typically by means of expansionary policies. The analysis of the second question is the focus of the so-called Partisan models [see Hibbs (1977) and Alesina (1987)], which investigate the relationship between the macroeconomic policies implemented and the ideological orientation of the government. Typically, right-wing parties care about inflation and attach lower weights to unemployment, while left-wing are more willing to bear the costs of inflation to fight unemployment.

Moreover, it is interesting to note that the study of the so-called "Political Business Cycles" for the European case could be even more revealing than for the American case, since in the US the election dates are fixed and pre-established. By contrast, in the majority of the European countries the election dates are chosen by the ruling party while it is still governing. Therefore, one would expect that the government would select the election date in such a way that it coincides with a favourable economic situation that would favour the government's popularity. Furthermore, the

[1] The closer work is the paper from Eichengreen, Rose and Wyplosz (1995) who investigated the impact of some political variables (left-wing governments, elections, change in government, past and future

European case is also interesting since the process toward EMU would have either changed the incentives or impose severe restrictions over preferences for the different political parties (for example socialist parties giving more weight to the control of inflation in their political agendas).

The paper proceeds as follows. In Section 2, we review the theoretical framework used to explain exchange-rate movements inside official fluctuation bands. Section 3 briefly describes the methodology of duration model approach. In Section 4 we describe the data set used to capture the potential determinants of the survival of the central parities in the ERM, while Section 5 reports the empirical results. Finally, some concluding remarks are provided in Section 6.

2. Theoretical framework

In this paper we make use of the target zone models to identify potential determinants of regime changes in the ERM. Indeed, Krugman (1991)'s seminal paper was intentionally a highly stylised representation of the ERM whose exchange rate dynamics was sought to capture, providing some key insights into the way such regime might operate.

The flex-price "monetary" model, that underlies much of the current literature on target zones, consists of the following three equations:

$$q_t = s_t + p_t^* - p_t \tag{1}$$

$$m_t - p_t = \phi y_t - \lambda i_t - \varepsilon_t \tag{2}$$

$$i_t - i_t^* = E_t(ds_t / dt) \tag{3}$$

where s_t is the log of the exchange rate (domestic price of foreign currency), q_t is the log of the real exchange rate, p_t is the log of the goods price level, m_t is the log of the money supply, y_t is the log of the real output, i_t is the nominal interest rate, ε_t is a

government victory or defeat, new finance minister) on the exchange rate regimes of 20 OECD countries stochastic disturbance, E_t is the expectation operator conditional on information available at time t and an asterisk denotes a foreign variable. Equation (1) defines the real exchange rate (where p_t^* is assumed to be exogenous), equation (2) is the equilibrium condition in the money market and equation (3) is the uncovered interest parity condition (where i_t^* is assumed to be exogenous).

These three equations define a (non- linear) system with three endogenous variables: s_t, p_t and i_t. Solving (1) for p_t and (3) for i_t and substituting in (2) gives

$$s_t = m_t - \phi y_t + q_t + \lambda i_t^* - \varepsilon_t - p_t^* + \lambda E_t(ds_t / dt) \qquad (4)$$

and, defining

$$f_t = m_t - \phi y_t + q_t + \lambda i_t^* - \varepsilon_t - p_t^* \qquad (5)$$

we obtain

$$s_t = f_t + \lambda E_t(ds_t / dt) \qquad (6)$$

Equation (6) is the standard target zone model, inspired by Krugman (1991), where the log of the exchange rate depends both on a scalar measure of exchange rate fundamentals and on its own expected rate of expected change, with the parameter λ indexing the importance of the latter effects. This equation is a stochastic first-order differential equation. By ruling out speculative bubbles, the forward expectations solution can be derived (Bertola, 1994) where the saddle path exchange rate is equal to the discounted value of the future expected fundamentals:

$$s_t = \frac{1}{\lambda}\int_t^{\infty} E_t(f_\tau) e^{-(\tau - t)/\lambda} d\tau \qquad (7)$$

---

between 1959 and 1993, by means of event-study methodology.

In order to obtain a relationship between the contemporaneous exchange rate and the fundamentals:

$$s_t = s(f_t) \tag{8}$$

additional assumptions on the stochastic process of the fundamentals are needed.

2. 1. The free-float case

In the absence of intervention, f_t is assumed to follow a Brownian motion process with drift μ and rate of variance σ^2:

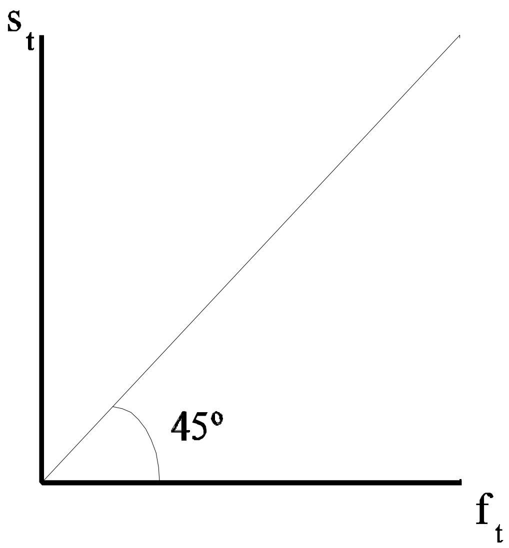
$$df_t = \mu dt + \sigma dW_t \tag{9}$$

where dw_t is a standard Weiner process. Then, integrating (7) yields:

$$s_t = f_t + \lambda\mu \tag{10}$$

Therefore, in a free-float exchange rate regime characterized by no interventions, there would be a linear relationship between the contemporaneous exchange rate and the fundamentals. In the simplest case when the drift μ is zero, such relationship could be represented as the 45 degree line (see Figure 1). Therefore, the freely floating exchange rate must not deviate excessively from the fundamentals when the latter takes arbitrary large (positive or negative) values.

Figure 1: The exchange rate-fundamental relationship under a free-float exchange rate regime



2.2. A target zone with perfectly credible bands

In Krugman's (1991) basic target zone model, it is assumed that monetary authorities intervene in order to keep the exchange rate within a specific band around a central parity:

$$\underline{s} \leq s_t \leq \overline{s} \tag{11}$$

where $\underline{s}$ and $\overline{s}$ are the lower and upper edges of the exchange rate bands. From (11), the fundamental indicator is restricted to a band that corresponds to the exchange rate band:

$$\underline{f} \leq f_t \leq \overline{f} \tag{12}$$

where the lower and upper edges of the fundamental band satisfy $\underline{s} = s(\underline{f})$ and $\overline{s} = s(\overline{f})$.

In order to derive the exchange rate function (8) for the target zone case, and assuming that interventions in the exchange rate market are marginal, the expected exchange rate depreciation term in (6) can be derived using Ito's lemma. This results in a second-order differential equation for the exchange rate as a function of the fundamentals, with general solution as follows:

$$s_t = \lambda\mu + f_t + A_1 e^{\kappa_1 f_t} + A_2 e^{\kappa_2 f_t} \tag{13}$$

where

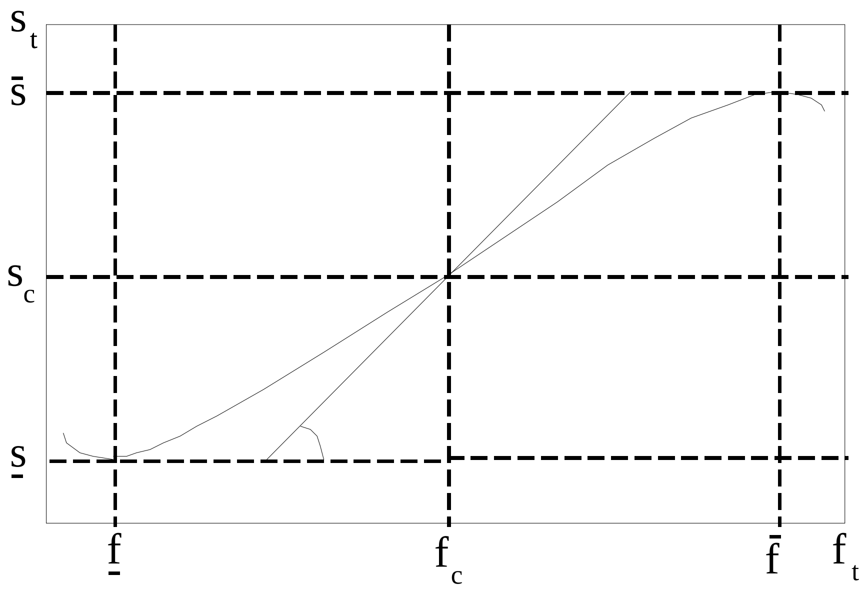
$$\kappa_1 = \frac{-\mu + \sqrt{\mu^2 + 2\sigma^2 / \lambda}}{\sigma^2} > 0$$

$$\kappa_2 = \frac{-\mu - \sqrt{\mu^2 + 2\sigma^2 / \lambda}}{\sigma^2} < 0 \tag{14}$$

A_1 and A_2 are constants of integration to be determined by the boundary conditions satisfied by the exchange rate function $s(f)$ at the edges of the fundamental band.

These boundary conditions are generally called "smooth pasting", which require that the path of s_t be tangent to the band, removing the possibility of one-way bets on the exchange rate at it approaches the boundaries. This smooth pasting property is one of the two main results of Krugman's model and implies that the exchange rate should be a non-linear function of the underlying fundamentals. The second main result is that the exchange rate function $s(f)$ looks life the *S*-curve in Figure 2 (again drawn for the simplest case when the drift μ is zero). Note that the exchange rate lies below the 45 degree line in the upper half of the figure and above it in the lower half. This is the so-called "honeymoon" effect: in a perfectly credible target zone, the expectations of future interventions to stabilize the exchange rates drag it towards the middle of the band, making it more stable than the underlying fundamental. Algebraically, this "bias due to the band" is represented by the exponential term in (13).

Figure 2: The exchange rate-fundamental relationship under a perfectly credible target zone



2.3. A target zone with credibility problems

Unlike Krugman's model, exchange rate realignments in the ERM did occur fairly frequently. Bertola and Caballero (1992) present a simple model of discrete exchange-rate intervention that allows for stochastic realignments. In addition to the fundamentals, the (log of the) central parity c_t, which is also a stochastic variable, is included in the determination of the exchange rate. For convenience, define:

$$s_t^{'} \equiv s_t - c_t \tag{15}$$

$$f_t^{'} \equiv f_t - c_t \tag{16}$$

so that $s^{'}$ and $f^{'}$ represents, respectively, the log deviation of the exchange rate and the fundamental from central from central parity. Using these identities, equation (6) can be re-written as:

$$s_t^{'} = f_t^{'} + \lambda E[(ds_t + dc_t)/dt] \tag{17}$$

Bertola and Caballero (1992) consider it possible for the official authorities to change the central parity only when the exchange rate reaches the bands. As a consequences, the term:

$$\frac{1}{dt}E[dc_t]$$

in (17) is zero inside the band, and therefore the solution is:

$$s_t^{*} = \lambda\mu + f_t^{*} + Ae^{\kappa_1 f_t^{*}} + Ae^{\kappa_2 f_t^{*}} \tag{18}$$

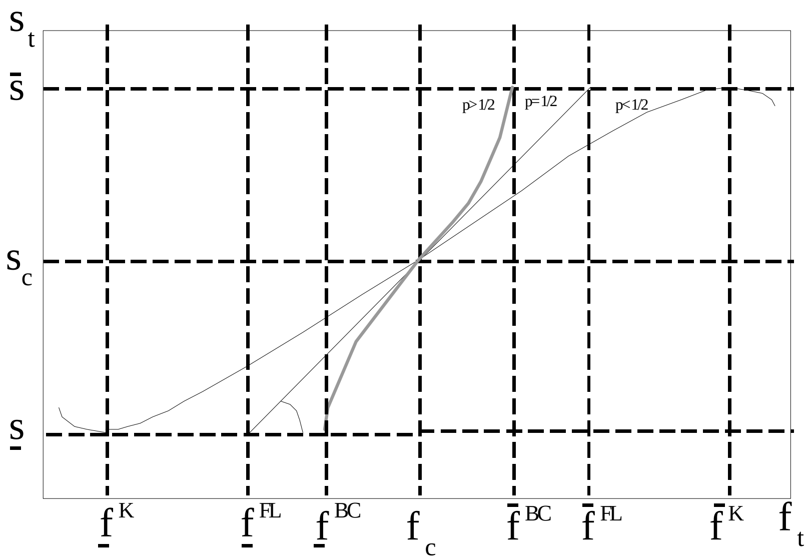
where κ_1 and κ_2 depend again on the parameters λ, μ and σ, and only one constant, *A*, is to be determined since we are assuming a symmetric band.

Using identities (15) and (16), equation (18) can also be expressed in terms of the fundamentals and the central parity:

$$s_t = \alpha\mu + f_t + Ae^{\kappa_1(f_t - c_t)} - Ae^{\kappa_2(f_t - c_t)} \tag{19}$$

When *f* reaches either of the boundaries, the authorities may either intervene to bring the exchange rate back to the initial central parity (c_t) (i.e. defend the current parity) or declare a new fluctuation band $c_{t+1} = c_t \pm (\overline{s} - \underline{s})$ and unchanged width (i.e. realign the central parity). Probabilities $(1-p)$ and p are assigned respectively to these two options. As a result, depending on the value of *p*, the relationship between the contemporaneous exchange rate and the fundamental $[s_t = s(f_t)]$ assumes different shapes. When $0 < p < \frac{1}{2}$, the perfect credible target zone model is obtained, producing the *S*-shaped relationship. When $p = \frac{1}{2}$, the market evaluates as equally probable both an intervention and a realignment, the solution then coinciding with the free-floating 45 degree line. Finally, when $p > \frac{1}{2}$ expectations of future changes in the exchange rate are triggered even before the exchange rate reaches the boundaries, the $s(f)$ function being everywhere steeper than it could be under free float. Therefore, the solution locus becomes an inverted *S*, now the band for fundamentals being smaller than the exchange rate band (see Figure 3, drawn for the simplest case when the drift μ is zero).

Figure 3: The exchange rate-fundamental relationship under an imperfectly credible target zone



3.- Econometric methodology: Duration Analysis

In this section, we offer a brief description of the main concepts and functions used in the duration analysis. This methodology is not new in economics. Various Labor Economics studies have applied this technique to investigate the factors that explain the observed exit/entry rates into the unemployment (a good example is the work from Bover *et al*, 1997). Other applications include the field of Industrial Organization, for example McCloughan and Stone (1998), who examine the life duration of some multinational subsidiaries in the UK.

Duration analysis is particularly suitable for the analysis of data which have two main characteristics: (1) the dependent variable is the waiting *time* until the occurrence of a well-defined event, and (2) there are some explanatory variables whose effect on this waiting time we wish to assess. In this paper we are going to relate these "well-defined" events with the changes of regime occurred within the ERM.

In the characterization of *T*, the (non-negative) random variable representing survival time[2], two functions play a central role: the *survivor* function, *S(t)*, defined as the complement of the c.d.f.[3], represents the probability of "surviving" past time *t*. On the contrary, the *hazard* function, *h(t)*, gives the (instantaneous) rate of occurrence of the event; that is, the probability that the phenomenon of interest is observed at time *t*. These two functions may be related by the following expression:

$$h(t) = \frac{f(t)}{S(t)} \qquad (20)$$

In words, the rate of occurrence of the event at duration *t* equals the density of events at *t*, divided by the probability of surviving to that duration without having experienced the event. When the hazard is not constant we say that the process exhibits duration dependence. Assuming that $h(\cdot)$ is differentiable, there will be positive (negative) duration dependence at time *t* if $\left[{dh(t)}/{dt}\right] > 0$ $\left(\left[{dh(t)}/{dt}\right] < 0\right)$. With positive (negative) duration dependence, the probability of observing a change increases (decreases) as time passes.

As a first approximation to study the spells between two consecutives changes, we can restrict our analysis to just the time elapsed without considering the effects of any other additional covariates; this is often cited as the non-parametric analysis and consists in the estimation of the empirical (i.e. unconditional) hazard and survivor functions.

As equation (20) shows, for each duration *t*, the empirical hazard is the proportion of cases that have survived up to *t* that change exactly in that moment. The

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[2] More precisely, *T* is assumed to be a non-negative continuous random variable with probability density function (p.d.f.) *f(t)* and cumulative distribution function (c.d.f.) *F(t)*=[Pr T≤ *t*]

[3] The exact definition of the survival function is: $S(t) = \Pr\{T > t\} = 1 - F(t) = \int_t^{\infty} f(x)dx$

product-limit Kaplan-Meier (see Kaplan and Meier, 1958) method is usually employed to compute this function according to the formula:

$$\hat{h}(t) = \frac{n_t}{d_t}$$

where n_t is the number of cases that changes at time t and d_t is the surviving population up to that instant.

With respect to the survivor function, the maximum-likelihood Kaplan-Meier estimator of the cumulative survivor function is defined according to:

$$\hat{S}(t) = \prod_{j|t_j \le t} \left(\frac{d_j - n_j}{d_j} \right)$$

Typically in economics, we will be more interested in estimating the effects of additional regressors on the expected hazard rates. This is the so-called parametric analysis where the two predominant approaches developed for modelling the additional effects are the Proportional Hazard (PH) and the Accelerated Failure-Time (AFT) models.

The first family of models, introduced by Cox (1972), provides an appealing setting to asses the influence of additional regressors on the hazard function. More precisely, the hazard at time t for an individual i with characteristics x_i is assumed to be:

$$h_i(t \mid x_i) = h_0(t)\exp\{x_i'\beta\} \qquad (21)$$

where $h_0(t)$ is the baseline hazard function. Note how this specification clearly separates the effect of time, captured by the baseline function, from that of the covariates, which is reflected either as a proportional increase or decrease in the hazard. Different PH models are obtained depending on the assumption made about the functional form of the baseline. For example, if our data exhibits a non-constant hazard rate the Weibull distribution would be an appropriate choice; in this case, the baseline function is given by the following expression:

$$h_0(t) = \theta t^{\theta-1} \tag{22}$$

where the ancillary parameter, θ, captures the duration dependence; note that when this parameter is greater than one, the hazard will increase with time (i.e. positive duration dependence) while if were lower then as time passed the hazard rate would decease indicating a negative dependence.

The Exponential distribution is a particular case of the Weibull when the ancillary parameter equals one. This case assumes that the influence of time is constant over time as the baseline reduces to:

$$h_0(t) = 1$$

Hence, this distribution is suitable for modeling data with constant hazard (i.e. no duration dependence).

An alternative method consists on leaving the baseline hazard completely unspecified and estimating the parameters using a partial likelihood function. This approach was proposed by Cox (1972) and may be helpful for checking the robustness of the results obtained from that a Weibull or an Exponential model.

The AFT approach proposes an alternative method to model the influence of additional variables on the waiting-time, namely running a simple regression where the dependent variable is the logarithm of the survival time. More precisely:

$$\log T_i = x_i'\beta + \varepsilon_i$$

where ε_i is an error term whose distribution have to be specified. As in the PH setting, different models are obtained by assuming different distributions for the error term.

A large fraction of papers in the empirical literature on target zones have attempted to shed light on the variables that determine the (observed) probability of experiencing a regime change. Since the PH models focus on the hazard function, whose connection with the concept of probability is quite clear, they provide a suitable framework for relating economic and political factors with the regime changes observed alongside the ERM history. Thus, in the empirical section of the paper we will make use of this particular class of parametric models.

4.- Data

4.1. Dependent variable

In our study we use quarterly data of eight currencies participating in the ERM of the EMS: the Belgian franc (BFR), the Danish crown (DKR), the Portuguese escudo (ESC), the French franc (FF), the Dutch guilder (HFL), the Irish pound (IRL), the Italian lira (LIT) and the Spanish peseta (PTA). Given the role of Germany as the nominal anchor of the EMS (see Bajo-Rubio *et al.*, 2001), our exchange rates are expressed *vis-á-vis* the Deustchemark. The sample period runs from the first quarter of 1979 to the fourth quarter of 1998, covering the complete history of the System.

Table 1 shows the main realignments and changes of these currencies in the EMS during the 1979-1998 period. As can be seen, although the fluctuation band was originally set at $\pm 2.25\%$, LIT, PTA and ESC used a wider band of fluctuation ($\pm 6\%$). After almost a year of unprecedented turmoil in the history of the EMS, the fluctuation bands of the ERM were broadened in August 1993 to $\pm 15\%$ except for HFL and Deutschemark, which remained with the narrow bands of $\pm 2.25\%$. On 1 January 1999 the EMS ceased to exist. On the one hand, as shown in Table 1, for our sample of currencies the ERM registered eighteen realignments, being twelve of them prior to the currency turmoil of the subperiod 1992-1993. On the other hand, many changes affected more than one currency, such as multiple realignments or modification of fluctuations bands.

Table 1: Main realignments and changes of the currency under study in the ERM (1979-1998)

13.03.1979	ERM starts to operate with the BFR, DKR, DM, FF, IRL, LIT and HFL. They are in the narrow band (± 2.25% fluctuation), except the LIT in the wide band (± 6% fluctuation).
24.09.1979	Realignment (DKR –3%, DM +2%)
30.11.1979	Realignment (DKR –5%)
23.03.1981	Realignment (LIT –6%)
5.10.1981	Realignment (DM +5.5%, FF –3%, HFL +5.5%, LIT –3%)
22.02.1982	Realignment (BFR –8.5%, DKR -3%)
14.06.1982	Realignment (DM +4.25%, FF –5.75%, HFL +4.25%, LIT –2.75%)
22.03.1983	Realignment (BFR +1.5%, DKR +2.5%, DM +5.5%, FF –2.5%, IRL –3.5%, HFL +3.5%, LIT –2.5%)
22.07.1985	Realignment (BFR +2%, DKR +2%, DM +2%, FF +2%, IRL +2%, HFL +2%, LIT –6%)
7.04.1986	Realignment (BFR +1%, DKR +1%, DM +3%, FF –3%, HFL +3%)
4.08.1986	Realignment (IRL –8%)
12.01.1987	Realignment (BFR +2%, DM +3%, HFL +3%)
19.06.1989	The PTA joins the ERM with the wide band (± 6%)
8.01.1990	The LIT joins the narrow band (± 2.25%). Realignment (LIT –3.6774%)
6.04.1992	The ESC joins the ERM with the wide band (± 6%)
14.09.1992	Realignment (BFR +3.5%, DKR +3.5%, DM +3.5%, ESC +3.5%, FF +3.5%, IRL +3.5%, HFL +3.5%, LIT –3.5%, PTA +3.5%)
17.09.1992	The LIT suspend its participation in the ERM. Realignment (PTA –5%)
23.11.1992	Realignment (ESC -6%, PTA –6%)
1.02.1993	Realignment (IRL -10%)
14.05.1993	Realignment (ESC –6.5%, PTA –8%)
2.08.1993	The ERM fluctuation bands are widened to ± 15%, except for the DM and the HFL
6.03.1995	Realignment (ESC –3.5%, PTA –7%)
25.11.1996	The LIT re-joins the ERM with the new wide band (± 15%)
16.03.1998	Realignment (IRL +3%).

Note: BFR, DKR, DM, ESC, FF, HFL, IRL, LIT and PTA denote, respectively, the Belgian franc, the Danish krone, the Deustchemark, the Portuguese escudo, the French franc, the Dutch guilder, the Irish pound, the Italian lira and the Spanish peseta.

As we have seen, duration analysis requires the definition of two key variables: one that accounts for the occurrence of the event under study (i.e. the indicator of the *regime changes*) and other which measures the time elapsed between consecutive changes (i.e. the *duration* of each regime).

The indicator of the regime changes is constructed using a dummy, which takes the value one whenever a regime change is observed and zero otherwise. For this purpose, we consider that a currency experience a regime change when any of the following situations occur: (1) the currency joins the ERM; (2) a realignment of its central parity is registered; (3) its fluctuation bands are modified[4]. This determines the structure of our dataset, although two relevant features need carefully consideration. First, the way in which a change is defined imposes the right-truncation of the data, since the ERM ceased before the last change for each currency had been registered. On the other hand, recall that each currency may experience several regime changes along the sample period; this phenomenon is known as multiple record data or multiple failure-time data. These two questions are appropriately dealt with in all estimations in the paper[5]. Finally, in order to avoid having too much zeros in the sample, we adopted the convention of keeping only observations where the currencies examined registered a regimen change. This convention is consistent with the systemic nature of the ERM, where although each currency had a central rate expressed in terms of ECU, these central rates determined a grid of bilateral central rates *vis-à-vis* all other participating currencies, and defined a band around these central rates within the exchange rates could fluctuate freely. More over, in order to keep these bilateral rates within the margins, the participating countries were obliged under the ERM to intervene in the foreign exchange market if a currency approached the limits of its band. Therefore, the responsibility for maintaining each bilateral exchange rate within its margin was explicitly shared by both countries.

Concerning duration, we define this variable as the number of quarters elapsed between two consecutive changes. *Change* and *duration* define the survival-time data associated with each regime. Their summary statistics are presented in Table 2. As can be seen, for the eight currencies considered we have a total of 154 observations, with the average duration being 6.6 quarters. The average (empirical) probability of change is 42%.

[4] For the Italian lira (LIT), we also consider as a change its temporary exit of the system in the third quarter of 1992 and its re-entrance in the fourth quarter of 1996.

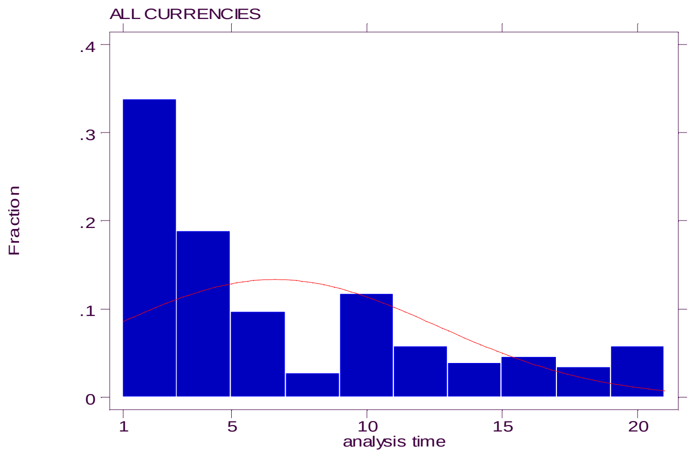
[5] All estimations were performed using STATA 8.1, which permits the appropriate treatment of both multiple-record and right censored data.

Table 2: Change and Duration. Descriptive statistics

	ALL CURRENCIES	
	Change	*Duration*
Mean	0.416	6.617
Std. Dev.	0.494	5.976
Skewness	0.34	1.004
Min	0	1
Max	1	21
N. of changes	64	
Observations	154	

Figure 4 plots the duration of the ERM regimes for the entire sample period (1979-1998). As shown, there is a high percentage of short durations (less than 5 quarters), representing the 52% of the total sample, while long durations (greater than 15 quarters) only account for 9%. This result shows that the regime changes are frequent in the sample; in particular the number of changes with duration less than 5 quarters is 49.

Figure 4: Duration of regimes in the EMS, 1979-1998.



4.2. Economic explanatory variables

Once the key variables in determining the structure of the survival-time data, have been properly defined, we can focus on the description of the economic and political variables that will be considered in our empirical investigation.

As we previously saw in equation (6), Krugman's canonical model of exchange rate dynamics in a target zone states it depends both on exchange rate fundamentals and on its own expected rate of expected change.

Regarding the fundamental variables, inline to the theoretical framework presented in Section 2, we consider the following variables as potential economic factors influencing the probability of a regime change:

1) The money supply: An increase in the domestic money supply, which results in an initial excess money supply, immediately drives prices up, depreciating the exchange rate and increasing the probability of realignment. We use M3 data from *the International Financial Statistics* (IFS) published by the International Monetary Fund: line 39mcc.
2) The production level: One would expect that an increase in the level of output (included in our specification through the industrial production index), would signal stronger economic performance and then would reduce the pressure on the domestic currency, leading to a lower probability of a regime change. We use data on the index of industrial production from the *Main Economic Indicators* (MEI) published by the Organisation for Economic Co-operation and Development (OECD).
3) The real exchange rate: An increase in the real exchange rate (which might indicate a loss external competitiveness), would result in a higher probability of a regime change. We compute this variable using data on exchange rates and consumer price indices from the Bank of Spain (for the Spanish peseta) and IFS (lines 64), respectively.
4) The interest rate in Germany: An increase in this variable would indicate greater risk of devaluation, and therefore would generate expectations of future realignment, negatively affecting the duration of a given regime. In particular we use data on short-term interest rate (IFS, line 60c).
5) The price level in Germany: A higher price level in Germany would reduce the probability of devaluation through a reduction in inflation differentials with the anchor country. In particular we use data on consumer price index from the IFS (line 64).

As for the expected rate of expected change in the exchange rate, we examine the role of the following variables in explaining the probability of a regime change:

6) A credibility measure: One would expect that growing credibility would be associated with significant reductions in the probability of a regime change. Following Ledesma-Rodríguez *et al.* (2005), we use the marginal credibility indicator $\delta_{t,}$ defined as:

$$s_t - E_{t-1}(s_t) = \gamma + \delta_t [c_t - E_{t-1}(s_t)] + u_t$$

Note that different value of δ_t are obtained for each time period in the sample.

7) The central parity deviation: The position of the exchange rate inside the band has been regarded as being an important variable in influencing the probability of a regime change [see, e. g., Thomas (1994), Chen and Giovannini (1994) and Mizrach (1995)]. The higher the deviation from the central parity, the more difficult to defend it and, therefore, the higher the probability of a regime change.

4.3. Political explanatory variables

As far as political variables are concerned, the data come from *The Comparative Political Data Set 1960-2001*, by Armingeon *et al.* (2002). This is a collection of political and institutional statistics which covers a period of about 30 years and includes information on more than 20 countries. The political and institutional variables suggested by different Political Economy models, and whose effects in the functioning of the ERM we aim to investigate are:

A. Cabinet composition: The partisan theory suggests that ideological differences between parties must be reflected in their attitudes towards the economy. Therefore, it is assumed that left-wing parties care about unemployment and growth, while right-wing ones are more concerned with inflation. However, it has been argued that left-wing parties could use of the exchange rate as a nominal anchor for credibility-enhancing purposes, signalling the commitment to stable policies desired by the market participants. In order to explore the evidence for the case of the exchange rate policy, we will consider a dummy variable (called *dmleft*) which will take the value one whenever left-wing parties have the hegemony in the cabinet and zero otherwise. If left-wing parties are effectively more prone to depreciate, as the Partisian Theory predicts, we will expect a positive sign on the associated coefficient. But if the credibility-enhancing argument is correct, we will expect a negative sign for such coefficient.

B. Elections: Politicians care about holding office (Alesina *et al.* 1997). Therefore, in order to maximize their re-election chances they are expected to (artificially) stimulate the economy in the run-up to an election. With respect to the exchange-rate policy, two contrary arguments may be used to hypothesize the influence on an imminent election. On the one hand, governments may use the exchange-rate to signal the reliability of their macroeconomic policies (Giavazzi and Pagano, 1988); in this case, policymakers will tend to delay depreciation until after the elections. On the other, it is the so-called "competitiveness" motive for depreciation; in countries where the tradable sector performs an outstanding role, a depreciation will boost the economy by making national goods more competitive both in world and home markets. In the case of the ERM, the aims that inspired the inception of the system and its own architecture make the competitiveness argument very unlikely. Under a pegged exchange rate, policymakers have limited ability to affect the real exchange rate at will[6]. Moreover, realignments within the system needed the approval of all other participating currencies. Furthermore, both EMS and her centrepiece, the ERM, constituted an important intermediary step to European Monetary Union (Sosvilla-Rivero and Pérez-Bermejo, 2006), an agreement to foster economic integration among European countries. Then, consistent with the "credibility-damaging" argument, we expect depreciations to be postponed after elections because of their inherent political costs. To investigate this intuition we will include a dummy (*el*), taking the value one whenever an election occurred in the

[6] Nonetheless, policies may have an impact in the real exchange rate. Froot and Rogoff (1991) find that among EMS countries, government spending tends to fall heavily on non-traded goods what will have increased the real exchange rate. However, as Rogoff (1992) emphasizes, any such effect must be transitory.

year in question[7]. If our *ex-ante* hypothesis were true, this variable should exhibit a negative sign.

C. <u>Type of Government</u>: Single party governments and multi-party temporarily coalitions are two extreme cases regarding government stability; between these two categories some intermediate figures, as minimal winning coalitions, surplus coalitions, single party minority governments or multi-party minority governments are feasible. The soundness of the macroeconomic policies implemented is expected to increase with the stability of the government, and this will translate into less frequent realignments as far as exchange rates are concerned. In order to investigate this intuition in the case of the ERM, we incorporate into the analysis a dummy (*dmtemporarily*) which accounts for unstable administrations (i.e. multi-party temporarily governments). If unstable governments effectively were associated with less consistent policies, the sign exhibited on this variable should be negative.

D. <u>Central bank independence</u>: Independent central banks are means of achieving credibility in policy making, thus reducing the average of inflation and its variability (Alesina *et al.*, 1997). As a low inflation facilitates the maintenance of a peg with a low-inflation anchor, like Germany in the case of the EMS, it may be expected a negative relation between the degree of central bank independence and the probability of a devaluation taking place. The variable considered here is an index created by Freitag (1999) that compiles the information of some other measures [Alesina (1988), Cukierman (1992), Eijffinger and Haan (1996) and Grilli *et al.* (1991)] that have investigated different aspects of this "independence". For example the index constructed by Alesina (1988) analyses whether the central bank has final authority over monetary policy, while the index by Cukierman (1992) is more focused on some legal aspects. Hence, the main advantage of the index of we make use is precisely that summarizes several dimensions of "independence" into a sole (continuous) variable.

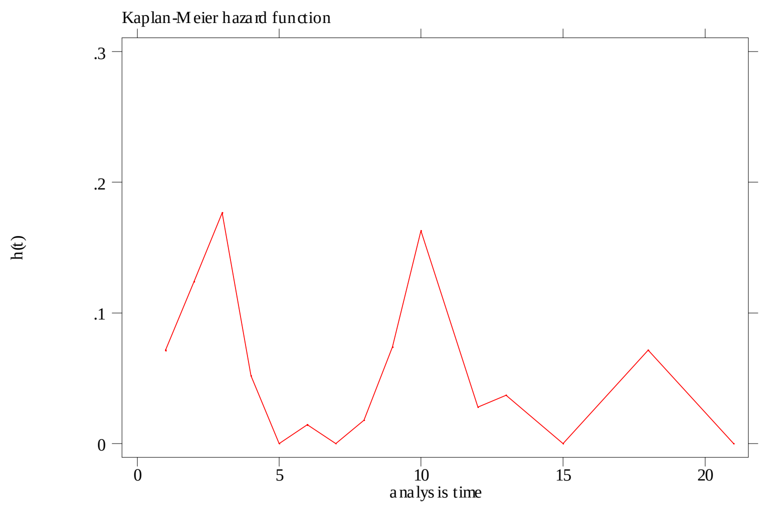
[7] We can adopt this definition because none of the eight countries under study experienced more than one electoral process in any particular year during the sample period considered.

5.- Empirical results

5.1 A first look at the empirical hazard and survivor functions: The Non-Parametric approach

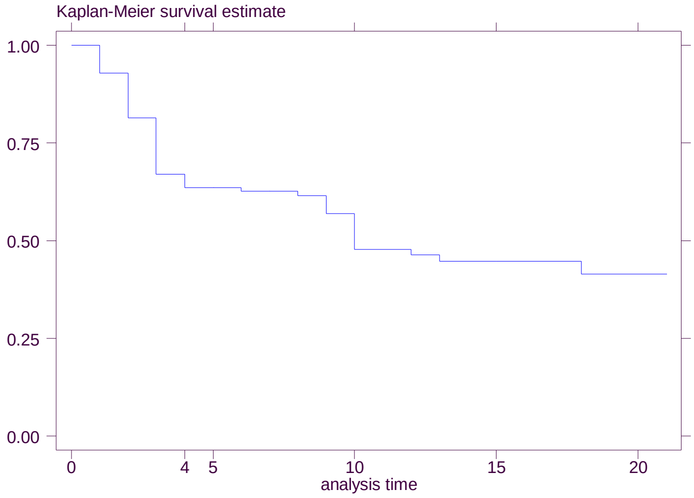
As we discussed in the econometric section, a first way of analyzing the duration dependence of the data is to examine the empirical hazard and survivor functions. The Kaplan-Meier hazard estimate for the eight currencies under study is depicted in Figure 5. The great heterogeneity registered in the evolution of the ERM makes the pattern of the empirical hazard far from being conclusive; up- and down-ward trends mix in a very irregular pattern reflecting not only differences in the conditions of the participating currencies but also some relevant changes in the functioning of the system itself. Only from the tenth quarter on we may infer negative duration dependence, though it should be noted that the accuracy of the estimator decreases as time passes since inferences about long durations are based on fewer observations.

Figure 5. Kaplan-Meier empirical hazard estimate



The Kaplan-Meier estimator for the survivor function is shown in Figure 6. As can be seen, the probability decreases sharply for durations less than 4 quarters; for intermediate durations, among 4 and 10 quarters, the fall is smoother but also noticeable. Finally, for durations longer than 10 quarters this probability remains almost stable up to reach the maximum (21 quarters). This behaviour suggests two different patterns in the evolution of the ERM: for those regimes with higher durations (more than 10 quarters) the ERM would have been stable, while for the regimes associated with lower durations (less than 4 quarters) the ERM would have been more unstable.

Figure 6. Kaplan-Meier survivor function



As a conclusion, the empirical approximation to the analysis of duration highlights the enormous variability present in the evolution of the ERM; striking differences between participating currencies, across different periods and in the functioning of the system itself enhance the need for incorporating additional variables into the analysis.

5.2. Evaluating the role of economic and political factors: The Parametric approach

Since one of the major contributions of this paper is the evaluation of some relevant political economy factors on the analysis of the ERM experience, and in the line with previous works [see, e. g., Bussière and Mulder (1999)], a useful starting point is to consider a benchmark model that provides a sufficiently clear picture of the role played by pure economic factors.

Table 3 summarises the results for the benchmark specification that only takes into account economic variables. Before turning to the analysis of the Political Economy factors and given that this model will be used as the starting point, it is valuable to discuss their main predictions.

Table 3: Parametric estimation of the benchmark model (only economic variables)

Variables	Expected sign	COX	WEIBULL	EXPONENTIAL
Money	+	0.21 (3.18)**	0.99 (3.40)**	0.47 (3.23)**
Production	-	-0.72 (2,62)**	-0.74 (2.63)**	-0.85 (2.71)**
Real exchange rate	+	0.25 (2.51)**	0.22 (2.55)**	0.27 (2.56)**
Interest rate in Germany	+	0.17 (2.36)**	0.26 (2.67)**	0.19 (2.91)**
Price Index in Germany	-	-0.66 (2.23)**	-0.82 (2.44)**	-0.53 (2.63)**
Credibility	-	-1.28 (2.96)**	-1.65 (3.66)**	-1.36 (3.00)**
Central parity deviation	+	0,01 (1,84)*	0.01 (2.19)**	0.01 (2.12)**
Constant			6.75 (3.12)	4.87 (3.70)
θ			1.43 (3.33)**	
AIC		583.12	274.77	291.68
Absolute z-statistic in parentheses Standard errors adjusted for clustering on currency * significant at 10%, ** significant at 5%				

As this table shows, all the coefficients are significant at the usual level and show the expected sign. More in detail, our results suggest that the level of production and prices in Germany and the credibility measure have a negative effect on the probability of a realignment occurring. On the contrary, the money supply, the real exchange rate, the interest rate in Germany and the deviations around the central parity have positively affected the probability of change.

These results are in line with Krugman’s canonical model of exchange rate dynamics in a target zone. As this model suggests, the persistence of weak economic fundamentals over time – represented in our specification by a high supply of money, an overvalued real exchange rate and high inflation and interest differentials with respect to the anchor of the system – will inevitably result in a regime change. On the other hand, there is also a role to be played by market expectations; market feelings are underlay in some variables – picked by a noticeable deviation from the central parity and a low credibility –that put additional pressures on the currency and may cause its realignment.

As a conclusion, these results demonstrate that the sustainability of a given exchange rate regime in the ERM was influenced by both fundamental variables and some proxies of the animal spirits Furthermore, this evidence is indicative that the implementation of sound economic policies is a necessary but not a sufficient perquisite to prevent a devaluation; policymakers must also strength their reputational capital to convince the markets.

After discussing our benchmark model, we now turn to the incorporation of the political and institutional factors previously commented. Table 4 summarizes the estimation results of the model combines both economic and political variables. As can be seen, all the coefficients included are significant at the usual level and most of them show the expected sign. It is interesting to note that the coefficients and significance for the economic variables of our benchmark model remain largely stable, providing additional robustness to that model. Furthermore, all of the parameters in Table 3 are within the 95% confidence interval that we have estimated in Table 4. This result can be interpreted as suggesting that, even though the policy variables do influence the probability of realignment inside the ERM, there is no significant change in the influence of the economic variables on this probability.

Table 4: Parametric estimation of the extended model

(both economic and political variables)

Variables	Expected sign	COX	WEIBULL	EXPONENTIAL
Money	+	0.27 (3.62)**	1.14 (3.51)**	0.49 (3.58)**
Production	-	-0.88 (4.12)**	-0.91 (2.83)**	-0.86 (2.79)**
Real exchange rate	+	0.36 (2.80)**	0.31 (2.49)**	0.32 (2.85)**
Interest rate in Germany	+	0.17 (3.24)**	0.31 (4.11)**	0.20 (3.12)**
Price Index in Germany	-	-0.77 (2.23)**	-0.82 (2.44)**	-0.56 (3.66)**
Credibility	-	-1.32 (4.14)**	-1.93 (3.91)**	-1.37 (3.30)**
Central parity deviation	+	0.01 (2.19)**	0.01 (2.26)**	0.01 (2.31)**
Left Government	+/-	-0.08 (2,41)**	-0.02 (2.51)**	-0,04 (2.29)**
Temporary Government	+	0.90 (2.37)**	1.22 (2,74)**	0.29 (2.30)**
Electoral year	-	-0.23 (2.81)**	-0.25 (2.72)**	-0.16 (2.86)**
Central bank independence	-	-0.17 (2.65)**	-0.21 (2.80)**	-0.12 (2.75)**
Constant			9.96 (4.20)**	6.75 (3.13)**
θ			1.59 (7.84)**	
AIC		414.94	179.11	202.20

Absolute z-statistic in parentheses
Standard errors adjusted for clustering on currency
* significant at 10%, ** significant at 5%

Given the noisy picture exhibited by the empirical hazard (see Figure 5), an interesting hypothesis to test for the presence of duration dependence, once we control (part of) the heterogeneity present in the data, is to conduct a test regarding the ancillary parameter in the Weibull model. Recall from equation (22) that if θ were greater (lower) than one, the duration dependence would be positive (negative) while if it were equal to unity the Weibull distribution would collapse to the Exponential, suggesting no duration dependence. As it is shown in Table 4, the point estimate of the parameter is 1.59, suggesting positive duration dependence; additionally, the test for the null $\theta = 1$ is rejected at the 1% level. We may conclude that, conditional on the economic and political factors included, the data exhibit positive duration dependence, indicating that (other things equal) the probability of a regime change increases over time. This result strengthens the use of duration models.

Concerning the interpretation of the political variables investigated, the results indicate that in the ERM experience left-wing governments, electoral years and independent central banks would have negatively affected the probability of a regime change, while less stable governments would have been more prone to realign the central parities. These relations largely agree with the main implications of the Political Economy models previously commented. Only the negative sign associated with the dummy representing left-wing governments would contradict the standard prediction of the Partisan theory. Nevertheless, it is consistent with the importance of the use of the exchange rate by left-wing governments as a nominal anchor for credibility-enhancing purposes. Moreover, this positive association between left-wing government and regime stability would be in line with the changes registered in the political agendas all over Europe as results of the EMU. For example, Mélitz (1995, p.26) argued that "[T]he French behaviour can be best explained on the basis of long-run political goals. By maintaining the policy of the franc fort, the French authorities wished to promote the aim of Monetary Union". In the same line, Drazen and Masson (1994) showed how "la politique de rigueur" implemented by Mitterand's first socialist government, enhanced the credibility for a "hard currency peg" policy, even at a cost of a higher unemployment. The commitment to a strong franc convinced investors that the priorities of the authorities had changed, what was reflected in shorten of (long-term) interest rate differentials with Germany. Finally, this finding is also consistent with the results in Frieden (2002), whose analysis of the EMS shows how left-wing governments were associated with less volatile currencies, as well as with those in Leblang (2002), who argues that left governments are more likely to use all policy tools at their disposal to prevent a speculative attack in the run up to an election.

5.3 Assessing the goodness of fit

After carrying out the estimation, a first question to ask is which of the three parametric models (i.e., Cox, Weibull and Exponential) is the best in terms of goodness of it. To discriminate among them we have employed two different criteria widely used in the duration analysis literature: the Akaike Information Criterion (AIC) and the Cox-Snell residuals.

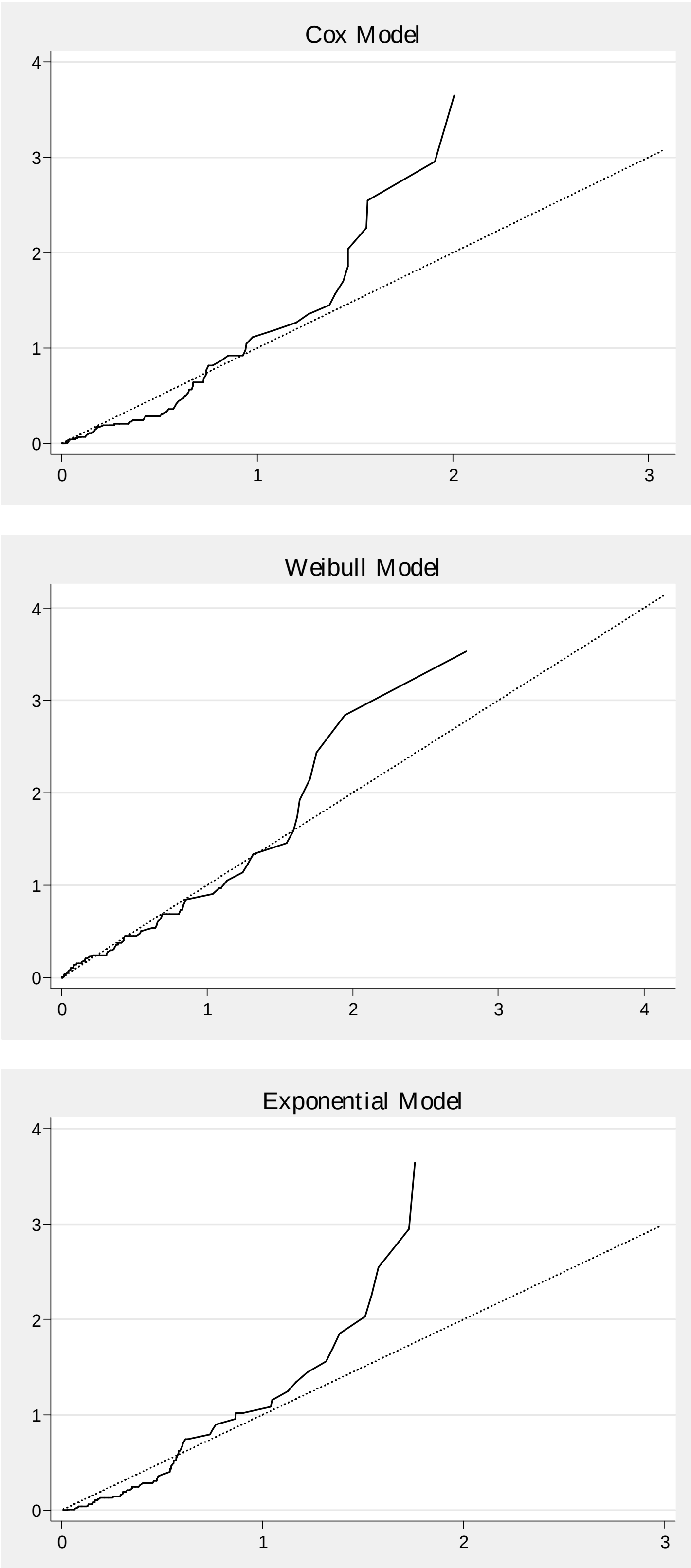
The AIC is particularly suitable for comparing models that are not nested. Akaike (1974) proposed penalizing each log likelihood to reflect the number of parameters being estimated in a particular model and then comparing them, choosing the one with the lowest AIC statistic. In our case, as Table 4 shows, the Weibull model exhibits the lower AIC and then, according to this criterion, should be the preferred.

A second way to assess the goodness of fit of the three parametric models is to look at their Cox-Snell residuals (Cox and Snell, 1968). These residuals are defined as follows:

$$\hat{e} = -\log\ S\left(t \middle| x\right)$$

where $S(t/x)$ is the estimated probability of surviving to time t. Then, if the model fits the data, these residuals should have a standard censored exponential distribution with hazard ratio equal to one (Cox, 1972). We can verify this intuition simply by plotting an empirical estimate of the cumulative hazard, taking the Cox-Snell residuals as the *time* variable, versus these residuals themselves. This plot should be a straight line with slope equal to one. As Figure 7 clearly shows, the Weibull model is the one with the lowest departures form the 45º reference line, indicating also the best fit in terms of this second criterion.

Figure 7. Cox-Snell residuals

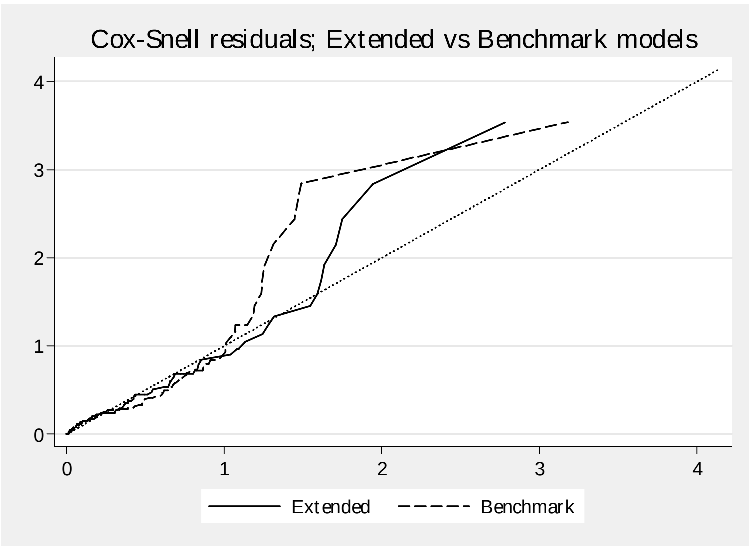


As a conclusion, the two criteria presented here yield conclusive evidence in favour of the Weibull model as that exhibiting the superior fit.

Perhaps a more interesting question is to compare the political augmented model with our benchmark both in terms of explanatory power and goodness of fit. Recall that both the AIC and the Cox-Snell residuals are still two valid criteria to perform the comparison. First, in terms of explanatory power, the AIC statistic for the political model is lower than that for the reference one (i.e. 179.11 *versus* 274.77), indicating an improvement in the explanatory power of the original model. Moreover, note that for the other two specifications (i.e. Cox and Exponential) the AIC for the augmented model is always lower than the benchmark, suggesting that the addition of the political variables helps to improve explanatory power.

Regarding the goodness of fit, Figure 8 depicts the Cox-Snell residuals for both the political augmented and the benchmark specifications. As can be seen, the residuals for the first model show fewer departures from the reference line than the benchmark[8]. Hence, according to this figure, we could assert that the fit of the political model outperforms that of the reference specification.

Figure 8: Cox-Snell residuals; Extended *vs* Benchmark models



[8] For the economy of space we have omitted the figures for the Cox and Exponential models (these graphs are available upon request). Again, in these two cases the political augmented model exhibits a superior fit.

5.4 Sensibility analysis

In order to check the robustness of our results, a distinction is made between two groups of currencies. A first group of currencies (that we shall denote as “core”) includes FF, BFR, HFL and DKR, while a second group (that we shall denote as “periphery”) is formed by IRL, LIT, PTA and ESC. It is interesting to note that these two groups roughly correspond to the distinction made by the European Commission (1995) between those countries whose currencies continuously participated in the ERM from its inception maintaining broadly stable bilateral exchange rates among themselves over the sample period, and those countries whose currencies either entered the ERM later or suspended its participation in the ERM, as well as fluctuating in value to a great extent relative to the Deutschmark. These two groups are also roughly the same found in Jacquemin and Sapir (1996), applying multivariate analysis techniques (i.e., principal components and cluster analysis) to a wide set of structural and macroeconomic indicators, to form an homogeneous group of countries.

As can be seen in Table 5, when estimating the extending model separately for both groups of countries all the coefficients are significant at the usual level and show the expected sign. Moreover, with the only exceptions are the interest rate in Germany for the core group and the central parity deviation for the periphery group, the estimated coefficients remain within the 95% confidence interval of those of the whole sample, therefore suggesting that there is no evidence of heterogeneity associated to currencies with different behaviour in the sample.

This result strongly suggests that the ERM would have effectively acted as a true system, where common interests would have had priority over the individual ones, and only real differences (at least as perceived by market participants) could have explained the different evolution of the participant currencies.

Table 5: Sensibility analysis for the extended model

(both economic and political variables)

Variables	**Whole sample**	**Core**	**Periphery**
Money	1.14 (3.51)**	0.78 (3.62)**	1.41 (3.55)**
Production	-0.91 (2.83)**	-1.54 (3.13)**	-0.56 (2.68)**
Real exchange rate	0.31 (2.49)**	0.33 (2.53)**	0.23 (2.87)**
Interest rate in Germany	0.31 (4.11)**	***0.43*** (3.97)**	0.15 (3.31)**
Price Index in Germany	-0.82 (2.44)**	-1.03 (2.49)**	-0.70 (3.05)**
Credibility	-1.93 (3.91)**	-1.94 (4.07)**	-1.88 (3.82)**
Central parity deviation	0.01 (2.26)**	0.01 (2.26)**	*0.05* (2.31)**
Left Government	-0.02 (2.51)**	-0.03 (2.38)**	-0,01 (2.47)**
Temporary Government	1.22 (2.74)**	1.58 (2.67)**	1.13 (2.85)**
Electoral year	-0.25 (2.72)**	-0.41 (2.84)**	-0.21 (2.83)**
Central bank independence	-0.21 (2.80)**	-0.22 (2.92)**	-0.12 (2.60)**
Constant	9.96 (4.20)**	9.04 (4.07)**	5.35 (3.79)**
θ	1.59 (7.84)**	1.69 (6.46)**	1.57 (6.34)**
AIC	179.11	192.97	194.37

Estimation results for the Weibull models
Absolute z-statistic in parentheses
Standard errors adjusted for clustering on currency
*significant at 10%, ** significant at 5%
In italics, estimated parameters that exceed the 95% confidence interval of those of the whole sample

6. Concluding remarks

This paper has attempted to expand the scarce research available on the role of political variables in explaining regime changes in international arrangements under which national monetary authorities attempt to keep their exchange rates within currency bands as the ERM. Our definition of regimen changes includes entries into the system and changes in the fluctuation bands. These changes do not necessarily imply an exchange rate crisis. Thus the issue of the paper is the broader one of changes in the official rules of membership in a fixed exchange rate agreement (which could reflect strictly political reasons or a possible desire to avert crises that are not yet imminent).

Indeed, since market participants incorporate information from a variety of sources into their expectations, we think that political variables may play a significant role in explaining such regime changes (which could reflect strictly political reasons or a possible desire to avert realignments or crisis that are not yet imminent). Therefore, we have explicitly incorporated political and institutional factors into the explanation of exchange rate policies, in contrast to almost all existing analyses that have focused entirely on economic factors. In addition, a second major contribution of this paper is the application of duration analysis, which we think to be appropriate in dealing with exchange rate regimes.

Our results indicate that both economic and political factors are important determinants of European currency policy. Considering just pure economic factors, we have used the target zone models as a theoretical framework to identify the potential determinants variables affecting regime duration. In particular, we find that the money supply, the real exchange rate, the interest in Germany and the central parity deviation would have negatively affected the duration of a given regime, while credibility and the price level in Germany would have positively influenced this duration. Regarding political factors, elections, central bank independence and left-wing government increase the probability of maintaining the current regime, while less stable governments would be associated with a regime change. These results are robust to the distinction of core and periphery countries.

The study provides several implications for macroeconomic policy. It reveals that the sustainability of a given regime in the ERM discipline was affected both by fundamental variables and by investor's expectations about government behaviour. Such a result might indicate that to prevent regime changes in a fixed exchange rate arrangement such as the ERM it is not sufficient to pursue sound economic policies, but policymakers must enhance their reputational capital with respect to their commitment to maintain the exchange rate around the central parity.

The findings also shed light on the role of policy variables during the EMS history through the expectations generated by the market. Our results suggest that unstable governments associated with less consistent policies would have been more prone to devaluate. In addition, we find a negative relation between the degree of central bank independence and the probability of a devaluation taking place, indicating that an independent central bank would have been able to stabilise the exchange rate more freely than a dependent one. Moreover, consistently with the opportunistic models, electoral years would have negatively affected the probability of a regime change, suggesting that realignments would have been postponed after elections because of their inherent political costs. Finally, in contrast to partisan models, left-wing governments would have positively influenced the duration of a given central parity. Nevertheless, this result may be consistent with the importance of the use of the exchange rate as a nominal anchor for credibility-enhancing purposes. Since left-wing governments had questionable credibility so far as price stability is concerned, they will be more likely to use all policy tools at their disposal to stabilise the economy, and therefore realignments would have been less likely when this government are in power.

Finally, we have shown how the political augmented model outperforms, both in terms of explanatory power and goodness of fit, our benchmark (economic) model, supporting the implications of previous papers (Mélitz, 1999; Bussière and Mulder, 1999) which emphasized the improvement in the results when political and institutional variables were incorporated into the analysis of currency crises.

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Fig 1a: BFR/DM exchange rate
(including ERM intervention limits)

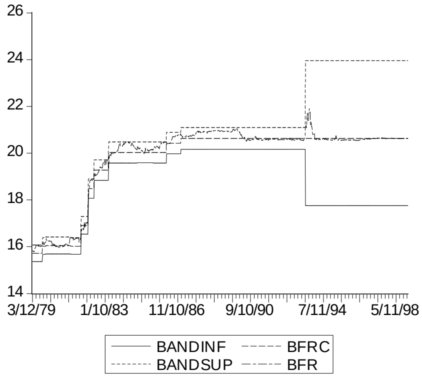

Fig 1b: DRK/DM exchange rate
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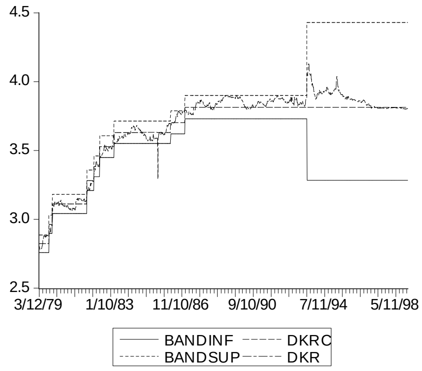

Fig 1c: ESC/DM exchange rate
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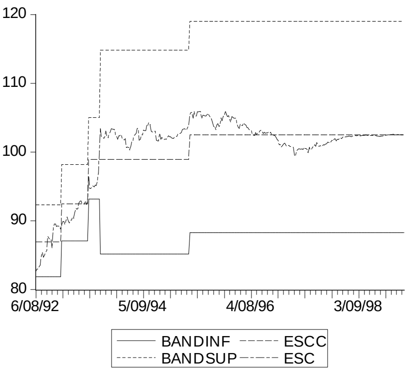

Fig 1d: FF/DM exchange rate
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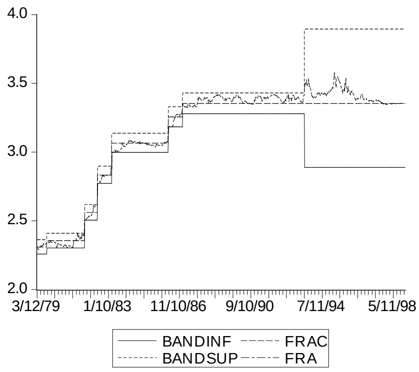

Fig 1e: HFL/DM exchange rate
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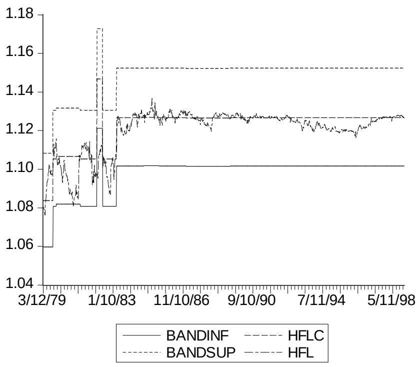

Fig 1f: IRL/DM exchange rate
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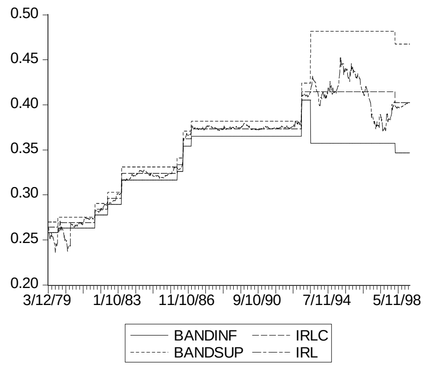

Fig 1g: ITL/DM exchange rate
(including ERM intervention limits)
intervention limits)

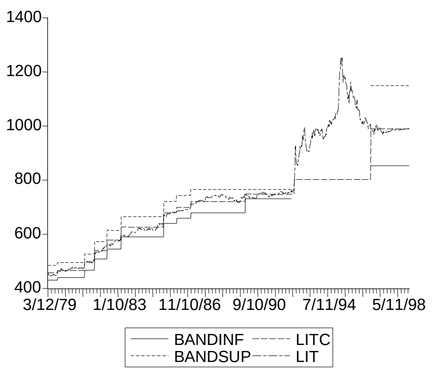

Fig 1h: PTA/DM exchange rate
(including ERM