The Stability of the Inter-war Gold Exchange Standard
Did Politics Matter?

by

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Abstract

The collapse of the inter-war gold standard has frequently been studied in economic history. This paper proposes a discrete time duration model to analyze how economic and political indicators affected the length of time a country remained on the gold standard. We rely on a panel data set of 24 countries over the years 1922-1938, and incorporate new measures of political and institutional variables. The results of this study identify high per capita income growth, large foreign currency and gold reserves, trade with other countries on gold, international creditor status, and the prior experience of hyperinflation as factors that increased the probability that a country would remain on gold. In contrast, democratic regimes that were exposed to a relatively high percentage of left-wing representation in parliament left the gold standard early. We also offer predicted survival probabilities for selected key countries on the gold standard. These survival rates show that Britain abandoned the gold exchange standard at a much higher survival probability, compared with other countries in the system.

1 Introduction

In contrast to the classical gold standard (1870-1914), the inter-war gold standard lasted a mere six years, before it collapsed in the early 1930s. A multitude of theories and hypotheses address the question of why the inter-war gold exchange standard was so fragile. Economists have traditionally cited structural problems within the system (Feinstein, Temin and Toniolo 1997), gold imbalances (Triffin 1947), the lack of an international hegemon (Kindleberger 1976), or persistent deflation (Bernanke and James 1991, Eichengreen 1992) as possible causes. More recently, researchers have suggested that the changing social and political structures in the inter-war years contributed to the economic difficulties (Eichengreen (1992), Simmons (1994), Tortella (2003)), arguing that the reconstruction of the gold standard as gold exchange standard in the years following WW I was incompatible with the rise of democracy.

The question of when and why countries choose to abandon fixed exchange rate regimes is particularly interesting with respect to the relationship between exchange rate regime choice and the propagation of financial crises. The inter-war gold exchange standard has been characterized by Keynes as the 'Golden Fetters' that had to be shed by Britain to avoid a prolonged crisis (Keynes 1932) and thus provides an excellent example to deepen our understanding of the factors that contribute to instabilities in fixed exchange rate regimes.

This paper offers a rigorous approach to simultaneously test the influence of economic and political factors on the disintegration of the inter-war gold standard in a dynamic framework. The dynamic approach allows one to model the timing of when countries chose to leave the regime. It is implemented by applying a duration model of 24 countries. Political factors are integrated through a partisan veto player approach following Tsebelis (1995). Moreover, we explicitly model the survival probabilities of different countries on the gold standard over time, emphasizing that the choice to leave the regime was taken at very different survival rates by various countries.

We find that high per capita growth, large foreign currency and gold reserves, trade with other countries on gold, international creditor status, and the prior experience of hyperinflation extended the time a country would remain on gold. In contrast, democracy, a relatively high percentage of left-wing representation in parliament, sterling bloc membership, and high inflation rates shortened the time a country would stay on the gold standard. Also,

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from our analysis Britain could be characterized as a fair weather friend that left the gold standard when it had a 60% survival probability, while other key countries in the system remained on gold until survival probabilities had fallen below 20%.

2   The Inter-war Gold Exchange Standard - A Brief History

By the end of WW I most countries that had previously adhered to the gold standard had abandoned their peg to gold. Exchange rates were freely floating and extremely volatile. In search for a new monetary order, governments and central bankers demanded an international currency system with stable exchange rates. There was a longing for the pre-war order of the classical gold standard that had promoted trade, financial integration, and prosperity.[1] But officials hesitated to re-instate the pre-war system, out of fear that the gold standard restoration would induce a global shortage of gold. Wartime inflation had shifted price levels, so that for many countries a return to gold at the pre-war parity would have implied an overvaluation of their currencies. Thus, the pressure to return to pre-war parities would induce deflation and delay reconstruction and the resumption of economic growth. A return at new exchange rates, in contrast, might have worsened a worldwide gold scramble and would have raised questions about the credibility of the new regime.[2]

The establishment of an inter-war monetary system was further complicated by a number of historical events, the most important of which was the problem of post-war reparation payments (Kindleberger 1993). Although the peace treaties held Germany and its allies responsible for the war and burdened them with reparation payments, the actual amount of the payments was negotiated country by country throughout the early 1920s. The reparation demands of the war 'winners' and the official judgement of what the 'losers' would be able to pay differed widely. For Germany the large reparation demands, as well as the French commitment to extract them by force, led to a devastating budget situation and accelerated the hyperinflation (Holtfrerich 1986).

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[1] An explicit discussion of how the classical gold standard promoted trade and financial integration can be found, for example, in O'Rourke and Williamson (1999).

[2] For an explicit discussion of the credibility of the inter-war gold exchange standard, refer to Bordo, Edelstein and Rockoff (1999).

Moreover, the war-torn economies of Europe were in dire need for international support to finance reconstruction, but the war had left the major powers entangled in a web of accumulated debts. The United States had advanced to be the major creditor to Europe and was the only country economically capable of granting financial assistance in the immediate post-war years.

The emergence of the inter-war gold standard was linked to the adoption of gold by Britain in April 1925. By then, Britain felt pressured to return to gold, as other countries were contemplating the stabilization of their currencies. Without Britain on gold, the adoption of gold as monetary anchor by other countries would have implied a further shift of gold reserves and deposits away from London and to New York. To halt the gold outflow, Britain returned to gold at the pre-war parity, a choice that was regarded as a key signal of stability and credibility for the new system. In fact, already by the end of the year 1925, a number of countries had adopted gold as their monetary anchor again. Figure 1 shows the emergence of the gold standard during the late 1920's for the 24 countries used in this analysis. The system began to build slowly in the 1920s, spread more quickly after Britain's adoption of gold in 1925, and reached its height in the years 1927–1931. It then fell apart in the 1930s. Table 1 lists when the individual countries included in this analysis adopted and abandoned the gold exchange standard.

The inter-war gold standard operated as an exchange standard system centered around key currencies. Adopting the gold standard brought stability to the international financial markets and introduced a brief period of economic growth. Nevertheless the system could not repeat the classical gold standard's success and problems of operation soon became apparent. Relations between the U.S. and Britain were tainted by differing ideas over the merits of the gold exchange standard over the pure gold standard and worsened after Benjamin Strong's death in 1928 (Clarke 1967). At the same time Britain and France continued to compete for dominance in Europe. These difficulties restricted the ability of the monetary system to respond effectively to world-wide economic problems.

3 The Fragility of the Inter-war System

A variety of arguments have been used to explain the inter-war system's fragility and its short operation time. The following section differentiates between economic arguments on the one hand and political and institutional factors on the other.

3.1 Economic Arguments

Already in 1947, Triffin pointed to the instabilities of the inter-war system. The exchange nature of the gold standard limited the overall gold needs of the system, but it also led to an inherent imbalance. The system placed pressure on the center countries to maintain their gold convertibility, but countries on the periphery, that held their reserves in the currencies of the center countries, possessed no enforcement mechanism over the center countries. As the world economy grew, and with it the demand for reserve currency, the center countries were tempted to increase their money stock. But increasing the liquidity of the reserve currency, in turn, entailed the risk of a crisis of confidence for the entire system because it jeopardized the center currencies' link to gold.[3]

Besides this inherent flaw in the system's design, the inter-war system was also characterized by structural problems and persistent gold imbalances between the center countries (Temin 1989). France and the U.S. had policies to sterilize gold inflows, leading to the accumulation of gold reserves in both countries. Britain, in contrast, suffered from large gold outflows. Unfortunately, the adjustment mechanism of the gold standard did not succeed in eliminating these balance of payments surpluses and deficits. Deficit countries were constrained by reserve losses and had to deflate in order to maintain fixed parities. Surplus countries by contrast allowed their foreign investments to increase without making an upward adjustment in their money supply or price levels. This led to a steady decline in world prices contributing to the problem of widespread deflation (Eichengreen 1992). Simmons (1996) furthermore specifies that the growth of central bank independence in the years following WW I contributed to the growing deflation problem. Independent central banks, being concerned about inflation, put an extreme focus on price stability, thereby reinforcing the deflation that

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[3]This effect is often cited with respect to currency blocs, especially the Sterling bloc. A recent discussion on the importance of these currency blocs can be found in Ritschl and Wolff (2004).

was already present through the limited availability of gold.

The gold imbalances observed for the inter-war years document the lack of cooperation between central banks. While during the classical gold standard years countries in financial difficulties could borrow from their neighbors, this international support was no longer available in the years after the war.[4] A gold shortage in one country could therefore turn into a crisis of confidence for the entire system, rather than being solved cooperatively. This lack of leadership has also been associated with the shift of financial power from London to New York which eliminated England's capacity to maintain global balance through movements of its discount rate (Kindleberger 1976).

More recently, Obstfeld, Shambaugh and Taylor (2004) have characterized the difficulties of the inter-war standard as classical open economy trilemma, namely the inability of policy makers to simultaneously pursue a fixed exchange rate, open capital markets, and autonomous monetary policy. The open economy imposes constraints on domestic policy makers that force them to decide between fixed exchange rates and an autonomous monetary policy.

3.2 Political Arguments

Political interpretations of the fragility of the gold standard regime include Eichengreen (1992), Simmons (1994), and more recently Tortella (2003) and Voth (2003). While Voth illustrates the importance of political events and their transmission to the stock markets, Eichengreen and Tortella both focus on the extension of the political franchise to the working class. This new political environment changed the willingness of governments to place external adjustment over the domestic concerns of rising unemployment and economic inequality. Especially heavily indebted small open economies could only rely on expanded exports and limited imports to defend gold convertibility. But falling commodity prices in the late 1920s made this strategy difficult to maintain and forced countries to suspend external debt service or abandon the gold standard. If governments were willing to let the exchange rate depreciate, they would not be forced to pursue policies designed to compress domestic spending. On the other hand, convertibility served as a signal of confidence for domestic savers and inter-

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[4]Britain for example did so during the Baring Crisis in 1890 (Triner and Wandschneider 2006).

national investors (Eichengreen 1992). Table 1shows how countries actually chose different ways of leaving the regime. In particular, countries with large outstanding external debts, such as Austria and Germany, opted for exchange controls before official suspension to not increase their liabilities.

According to Simmons (1994), democratic regimes and countries with a higher degree of openness were more likely to leave the gold standard. In contrast, central bank independence, higher net national product, a greater net external investment position and a higher left-wing participation in government increased a country's probability of staying on gold. Simmons' study is the closest example for the analysis carried out in this paper, the main empirical difference being that her findings are based an a static probit model, rather than a dynamic framework as applied in this article. Our analysis confirms Simmons' findings with respect to democracy, national product and the investment position, but our results differ with regard to the influence of trade, central bank independence and left-wing participation. Moreover our analysis explicitly models the survival probabilities of key countries on the gold standard, an extension only possible in the dynamic framework.

The interpretation of political pressure and its effects on the stability of the regime can be related to some of the recent literature on exchange rate regime choice, currency crises and the relationship between institutions and economic outcomes. Several researchers, among them Drazen (1999), Bernhard and Leblang (2002), Leblang (2003), and Persson and Tabellini (2003) have pointed out that the decision to leave an exchange rate regime is not only an economic but also a political question. Factors that matter for the willingness to defend or devalue a currency are electoral timing, constituent interests, and government partisanship. The desire to defend the existing regime often increases in the run-up to an election, but falls with the arrival of a new government or new political regime. Abandoning the peg often comes with voter disapproval and loss of pride.

Government partisanship relates to the idea that parties on the left place more emphasis on employment and income distribution while parties on the right are more concerned with fighting inflation and maintaining price stability (Leblang 2003). Therefore left of center political parties might be more responsive to the the demands of the domestic working class and place internal stimulation of the economy over external balance. Sometimes however a reverse effect can be observed, where left of center governments hold onto fixed exchange

rate regimes as a signal for their commitment to external stability (Bernhard, Broz and Clark 2002). During the inter-war years, many governments were bound by coalition agreements or were in a minority governing position, which restricted their policy choices and might have induced left of center governments to behave more centrist, or right of center governments to be more socialist. Ritschl (2002), for example, describes the case of Germany following the September 1930 elections. The centrist government led by Brüning was squeezed between the demands of the Social Democrats on the left and the advances of the NSDAP on the right of the political spectrum. Similarly, Eichengreen (1992) outlines in detail the deadlock in the British parliament on the decision to abandon the gold standard. The reigning labor government was incapable of remedying the budgetary problems and was therefore forced to abandon the gold standard regime.

The empirical analysis in this study highlights the importance of democracy when analyzing the fragility of the inter-war years. We explore a new way of integrating political instability by creating a partisan veto player variable that includes the number of parties included in a governing coalition. Following Tsebelis (1995), a veto player is defined as an individual or collective whose agreement is required for a policy decision. The characterization of different veto players captures the various interest groups and their relative influence over the policy making process. Rather than taking all political decisions as 'either-or' cases, accounting for the presence of several veto players allows us to assess the overall potential for political change. In general, political stability increases with the number of veto players, but for the inter-war years a rising number of veto players can also indicate political deadlock, such as in Weimar Germany.

4 Empirical Analysis

In the following we use duration analysis to test for the effects of various political and economic indicators on the stability of the gold exchange system. Duration models estimate the association between explanatory variables and the time conditional probability (hazard rate) of making a transition from one state to another. They use the cross-sectional and time series variation in the explanatory variables to identify the relationship between the covariates and the event of interest. Duration models therefore allow us to incorporate the dynamic nature

of the problem when looking at the timing of devaluations.

Duration analysis is employed in labor economics to analyze employment spells[5], but it has recently found applications in international economics, as well as in economic history. Meissner (2005) analyzes the timing of adoption of the classical gold standard post 1870. His findings conclude that trade networks and better access to capital markets determined a country's choice to join the gold standard and led to early adoption of the regime. Bratberg, Legernes and Vardal (1999) focus on the decline of fixed exchange rate regimes in the post Bretton Woods period. In their analysis a country's size, its inflation differential with the rest of the world, and its openness are the primary factors to explain the regime choice. Other examples of duration models in an international economics context include Sosvilla-Rivero and Maroto-Illera (2003), and Joyce (2003).

The present duration analysis focuses on the time conditional probability that a country would leave the gold standard in time period t. For this sample of countries, all countries start in the fixed exchange rate regime and only transition once to a floating regime. We can therefore limit the empirical analysis to a single event. Moreover, for the purpose of this analysis, leaving the gold standard regime is defined as either officially announcing the abandoning of gold as monetary anchor, imposing exchange controls, or suspending convertibility. Differentiating between these choices would have severely constrained the sample, but presents an interesting avenue for future research.

For a standard continuous time duration model, let T be a random variable with density function $f(t)$ and distribution function $F(t)$. Consider the conditional density of devaluation, i.e. abandoning the gold standard, given that devaluation has not yet occurred up to time t. The survival function is then given by:

$$S(t) = 1 - F(t) = P[T > t], \tag{1}$$

and the hazard function is :

$$\lambda(t) = \frac{f(t)}{[1 - F(t)]}. \tag{2}$$

For the inter-war period, data limitations do not allow us to take into account the exact date

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[5]See for example Meyer (1990)

on which a country abandoned the gold exchange standard. Thus the dependent variable is grouped in annual intervals. It is therefore necessary to work with discrete hazard rates. Jenkins (1995) illustrates how continuous time duration models can be transformed to discrete time. Let the discrete hazard h_t be the probability that a transition occurs in the interval $[t, t+1)$, conditional on no transition until time t. The discrete time hazard for each country i is then given by

$$h_t(X_{it}) = 1 - \exp\{-\exp\{X'_{it}b + \theta(t)\}\}, \tag{3}$$

where X_{it} is a vector of covariates summarizing the observed differences between countries, b is a vector of parameters to be estimated and $\theta(t)$ is a function describing the duration dependence in the hazard rate. The above hazard function takes a complementary log log form and can be interpreted as the discrete time model to the underlying continuous time proportional hazards model.

Given the historical context of the timing of countries leaving the gold exchange standard (compare Figure 1), we adopt a Weibull parametrization of the hazard rate in the following analysis.[6] For the discrete approximation of the Weibull parametrization a variable $\log(time)$ is generated which is a function of survival time t per country. A model with baseline hazard $\theta(t) = (q - 1)\ln(t)$ can be estimated by including $\log(time)$ as regressor. Following Jenkins (1995), we can then estimate the model by maximizing the following log-likelihood function:

$$\log L = \sum_{i=1}^{n} \sum_{t=\tau}^{\tau+s_t} y_{it} \log[h_{it}/(1 - h_{it})] + \sum_{i=1}^{n} \sum_{t=\tau}^{\tau+s_t} \log(1 - h_{it}), \tag{4}$$

where $y_{it} = 1$ if $t = \tau + s_t$ and $y_{it} = 0$ otherwise. Note that this log-likelihood function has the same form as the 'standard' log-likelihood function for the regression analysis of a binary variable.

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[6]The Weibull parametrization of the hazard rate for continuous time models is generally described in the following form. The hazard rate can be written as $h(t) = pt^{p-1}[\exp(x(t)'\beta)]$, where p and β are the parameters to be estimated. If $p > 1$ the hazard rate increases over time, for $p < 1$ the hazard rate decreases over time, and for $p = 1$ the hazard is constant (exponential hazard). The parameter p is comparable to $q - 1$ in the discrete approximation. Moreover, $x(t)$ is a vector of time-varying covariates and β is a vector of parameters describing the magnitude of the association between covariates and the hazard rate, t is the time at observation.

5   The Data

In all of the following analysis, we begin with a set of 24 sample countries as defined in Table 1. The overall time period of estimation comprises the years 1922-1938, but for the individual countries only the years between entering and exiting the gold standard regime are taken into account. This generates a total number of 162 years at risk for our sample. The average time a country remained on gold was 6.75 years. Two countries in the sample, Portugal and Yugoslavia, both adopted the gold standard for only one year. The U.S., the Netherlands, and Switzerland remained on gold the longest, with each 12 years.[7]

We test the various economic explanations of the gold standard's collapse, controlling for the level of GDP per capita, changes in gold, silver, and foreign asset reserves, trade relations, discount rate movements and inflation rates. All variables are explained in the Appendix. Moreover, Table 2 summarizes all economic and political explanatory variables and their hypothesized effects. GDP per capita, for example, captures a wealth effect that had already been observed by Meissner (2005) for the classical gold standard. Relatively wealthy countries were less exposed to domestic pressures and therefore found it easier to remain within the system. Also for the inter-war years, countries that were less affected by the Great Depression experienced smaller declines in GDP growth rates and thus less pressure to leave the regime. We would therefore expect higher per capita GDP growth to extend the time that a country would remain on gold. Including gold reserves tests the hypothesis that imbalanced reserves contributed to the regime's fragility. High reserves should increase the probability that a country could remain on the regime. Countries that accumulated gold were able to sustain the system, whereas those losing gold were not.

For this analysis, a trade network variable is included, measured as trade with countries on gold as percentage of total trade. Fixed exchange rate regimes promote trade flows by removing the exchange rate risk. The trade relations variable captures the idea that a country might have had a greater incentive to hold onto the regime to increase trade if the majority of the country's trading partners were also on the gold standard. One would therefore expect a higher percentage of trade with gold standard countries to increase the duration that

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[7]The U.S. is the only country within the sample that is on the gold standard before 1922. For the purpose of this analysis the U.S. is counted as being on gold for a total of 12 years, from 1922 to 1933.

a country would remain on gold.[8] For the inter-war years we also know that many countries engaged in competitive devaluations. Trade could therefore also be negatively related to gold adherence. By the early 1930s the importance of world trade for the international system had declined dramatically. Before opting for devaluation, many countries had tried to expand exports and limit imports to improve their foreign currency reserves. These import restrictions and prohibitive tariffs led to a world-wide decline in trade (Eichengreen 1992).

Including the average annual discount rate tests the question whether countries played by the 'rules of the game' and adjusted interest rates to maintain external balance. If countries played by the rules of the game, we would expect to see higher interest rates for the countries leaving the regime, meaning they exhausted the interest instrument in trying to defend the gold standard. Nurkse (1944) and Eichengreen, Watson and Grossman (1985) suggest that this apparently was not the case. The most famous example for this type of behavior is Great Britain, which left the gold standard in September of 1931 with a bank rate of 4.5%.[9] The inflation variable, measured as percentage deviation from average inflation tests the arguments made by Bernanke and James (1991) and Simmons (1996) that deflation destabilized the regime. Countries suffering from deflation might be induced to leave the regime.

Additional economic variables include a time varying dummy for banking crises, a dummy variable indicating whether a country had experienced a hyperinflation in the immediate post-war period, a dummy variable indicating whether a country had been a net creditor throughout the inter-war period, and the percentage of unemployed for some of the countries included. We would expect that a higher incidence of banking crises, as well as higher unemployment rates, increased the likelihood that a country would leave the regime. The example of Austria illustrates nicely how domestic banking crises could drain a country of its reserves and then force it to abandon the monetary regime (Schubert 1991). Likewise, higher unemployment increased the domestic pressures to place internal over external adjustment. Moreover, the variables banking crisis and unemployment, together with the GDP growth rate, control for the severity with which a country was hit by the Great Depression. Creditor

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[8]Including an openness measure computed as imports and exports divided by GDP in addition as well as instead of the trade network variable did not yield meaningfully different results.

[9]The Bank of England raised the discount rate from 4.5% to 6% on September 21, 1931, as it was leaving the gold standard.

status should decrease the probability that a country would leave the gold standard. The incidence of hyperinflation prior to the gold standard might induce countries to adhere to the regime in order to sustain credibility.

Table 3 shows the summary statistics for the complete data set. The period of estimation is the country year. For the economic variables, the summary statistics confirm the prevalence of deflation and the high variance in countries' reserve stocks. Moreover, the relatively high average unemployment of 12% stands out.

Institutional variables include a measure for central bank independence; a regime classification of democracies versus non-democracies; and a classification variable that accounts for the fact that at the time countries were grouped in currency blocs that might have influenced their decision making over gold standard adherence. Simmons (1994) suggests that the inter-war regime was upheld by independent central banks committed to the regime. In recent times, independent central banks are often associated with low inflation policies. This relationship cannot be confirmed for the inter-war years.[10] We also include a time varying democracy dummy to account for the fact that in democracies, domestic pressures to leave the gold standard in the face of an economic crisis should be higher than in authoritarian regimes. We can see that for the sample, about three quarters of all observations are classified as democracies. Currency blocs are included through a dummy variable indicating membership in the sterling bloc.

A second set of regressions focuses exclusively on the subset of democracies as opposed to the authoritarian regimes in the sample. In this subset, we include a time varying dummy indicating whether a country had a left of center government, the proportion of left of center parties in parliament, as well as a partisan veto player variable, indicating the number of parties in the governing coalition. It is important to distinguish between a left of center government and the proportion of left of center votes in parliament, to account for leftist pressures that were not reflected in the choice of government. In general, left of center governments and parties should be more receptive to the demands of the working class, and thus should be more likely to abandon the regime in a situation when domestic interests collide with the

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[10]Compare Rogoff (1985) and Cukierman (1992), who find that central bank independence can be related to lower inflation. A scatter plot of inflation versus central bank independence for the countries included in this analysis actually suggests no systemic relationship between central bank independence and inflation.

demands of maintaining the exchange rate regime. For our sample about half the observations show a left of center government and left of center representation in parliament is about 40%. We also account for the strength of the executive and the number of cabinet changes in a given year. Countries with coalition governments of multiple veto players should display increased political stability, reducing the probability of a regime change. Multiple veto players also capture the fragmentation of many of the young democracies, especially in east and central Europe during the inter-war years. These fragmented democracies usually had a more difficult time withstanding leftist pressures, which might have increased their probability of leaving the monetary regime. The effect of the partisan veto player variable on gold standard duration might therefore be ambiguous (compare Table 2).

6   Results from the Full Sample

Table 4 shows the regression results for six different specifications of the duration regression. For all specifications the coefficient $q - 1$ on $\log(time)$ in the baseline hazard function is statistically significant and takes values greater than one. This confirms the increasing hazard assumption.

Specification 1 is the baseline regression, where the decision to leave is purely a function of the log of per capita GDP, the percentage change in gold reserves, and a democracy dummy. This model captures the generic arguments. Higher GDP per capita as well as rising gold reserves decreased the probability of failure. A one percent increase in GDP would decrease by 1.97 percent the hazard of the country leaving the gold standard. Being classified as a democracy, in contrast, increased the probability that a country would abandon the regime by 1.2 percent. All three variables are statistically significant at 5% and 10%, respectively. The result that democratic regimes were more likely to leave the system confirms the arguments made by Eichengreen (1992), Simmons (1994) and Tortella (2003).

Specification 2 then extends the baseline model by including institutional determinants of the gold standard, such as adherence to the sterling bloc and a measure for central bank independence. Sterling bloc adherence is marginally significant, indicating that countries with close ties to Britain had a 0.95% increased hazard of leaving the gold standard. The central bank independence measure is unrelated to gold standard adherence. Specifications

3 to 6 include the economic variables for inflation, trade network, discount rate adjustments, experience of banking crises, hyperinflation, creditor status and unemployment. Higher inflation increased by 0.2 percent the hazard that a country would leave the gold standard, while increased trade with countries on the gold standard, prior experience of hyperinflation, and creditor status reduced the hazard by 0.05% , 1.71%, and 1.91%, respectively, and thereby and increased the probability of adherence to the regime. The inflation result contradicts the hypothesis by Bernanke and James (1991) that deflation contributed to the failure of the regime. But looking at inflation rates over time, we know that countries inflated as they left the regime. Since the analysis is based on annual data, it is possible that inflating after abandoning the regime is misinterpreted here as leading to the abandonment.[11] The trade network variable suggests that even though the importance of trade was declining during the inter-war years, trade was still a factor motivating countries to commit to the gold standard.

Creditor status and the experience of hyperinflation increased the time that a country would remain on the gold standard. The creditor variable supports the result on gold reserves and reflects that creditor countries had an interest in fully recapturing their loans. The hyperinflation result suggests that countries that had experienced hyperinflation in the immediate post-war period were holding onto the regime to import credibility. This result is even stronger if one considers that both of the democratic countries that had experienced hyperinflation in the immediate post-war period, Austria and Germany, were also among the first countries to adopt the inter-war gold standard in the early 1920s. Moreover, qualitative evidence suggests that countries that had experienced hyperinflation were more likely to adopt exchange controls when leaving the regime.

Variables that did not affect a country's decision whether to remain on gold or abandon the regime include discount rate adjustments, the experience of banking crises and unemployment. The effect of the banking crises might already be captured in the reserves variable and thus not register separately. The insignificance of the discount variable underscores that countries did not use the discount tool to fend off gold losses and remain within the regime. Regarding unemployment, it is relatively difficult to collect reliable data for the inter-war

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[11]This aggregation problem stemming from the use of annual data (the highest frequency available) is no problem for the other explanatory variables included in the regression, since none of them experiences a change as drastic as that of inflation once countries leave the regime.

years. Often figures are only available for unionized workers, which greatly underestimate the true unemployment numbers. It is therefore possible that the statistical insignificance on the unemployment indicator stems from data inaccuracies.

7 Democracy and the Inter-war Gold Standard

Table 5 repeats these regressions for the subset of democracies in the sample, and then extends these models with determinants of the political system to further illustrate the influence of the political regime over the choice of countries to remain on gold or leave the regime. Again, all models are overall significant and the coefficient $q - 1$ on log time is significant and greater than one. Specifications 1–6 confirm the findings of the full sample for the subset of democracies. Specification 7 includes measures for a left leaning government, the percentage of left in parliament as well as the partisan veto player variable. The only significant variable is the percentage of left in parliament, suggesting that countries with left leaning parliaments were more likely to leave the regime to adhere to their constituencies. A one percent increase in left leaning representation, reduced the probability a country would remain on gold by 0.05 percent. So leftist pressures did manifest themselves in more domestically oriented policies. The veto player variable, as well as the left orientation of government are not statistically significant. This might be driven by the fact that the theory on how these variables should behave is not clear. Often, left of center governments are more responsive to domestic demands, but they might also hold onto the regime to import credibility. Also, leftish pressures in parliament affected policy decisions, regardless of whether the government had a leftist orientation. Likewise in specification 8 the number of cabinet changes per year and the strength of the executive are insignificant and appear not to have influenced the probability of leaving the regime. In summary, while not all political measures are significant, there was still a sizable destabilizing effect from left of center representation in democracies.

8 Was Britain a Fair Weather Friend?

The dynamic nature of the model allows for the calibration of predicted survival rates for individual countries in the sample. Based on the coefficient estimates of Model 1 for the

full sample (baseline model), we generate predicted values and derive the predicted survival rates for four sample countries, Britain, the U.S., France, and Germany.[12] Figure 2 shows the survival rates for Britain and the U.S., and Figure 3 shows those for France and Germany. For all countries, the survival rates fall drastically over the time the country is on the gold standard, and all four countries leave the regime when the survival rates are lowest. What is noticeable, however, is that Britain leaves the regime at a high survival rate of about 60%, while the other three countries leave in years where survival probabilities have fallen to 20% for France and the U.S., or even 10% in the case of Germany. While it is difficult to derive an exact benchmark of when countries should leave the regime, we can assume that once survival rates fall below 50%, it is probably more advantageous for a country to abandon the gold standard. The differences between the four selected countries are therefore striking and suggest that Britain abandoned the gold standard at a time when the economic conditions did not necessarily warrant such a move. These results for Britain confirm the work by Hallwood, MacDonald and Marsh (1997) that realignment expectations contributed to the exchange market pressure on the pound in 1931, and that a disciplined management of the economic fundamentals alone is not sufficient to maintain the peg. In contrast, the U.S., Germany and France possibly held onto the gold standard too long.

A closer look at the politics of these four countries surrounding the decision to abandon the peg can help us explain their different responses. In Britain, the suspension of convertibility on September 19, 1931 came in the midst of a government crisis. On August 23rd, the minority labor government under the leadership of Ramsay MacDonald fell after it had been unable to adequately respond to the rising reserve losses. It was replaced by a National Government, again under MacDonald's leadership, before a general election in October 1931 brought a landslide victory for the conservatives (Eichengreen 1992).

In the U.S. on the other hand, the Hoover administration held onto the gold standard after Britain left in 1931, even though the predicted survival rates for the U.S. were lower than the British rates in 1931. Only after the government change in January 1933, the new administration under the leadership of F. D. Roosevelt contemplated devaluation. Though Roosevelt had been purposefully vague about his dollar policies during the campaign, he was responsive to the rising inflationist sentiment in congress, and convinced himself that raising prices

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[12]Survival probabilities generated from other model specifications show very similar results.

above 1929 levels would be necessary for ending the depression. He thus devalued the dollar on April 19th 1933, in the midst of the preparations for the World Economic Conference.[13]

Similarly, the French devaluation followed a government crisis and the rise of the Popular Front, which pursued inflationary policies under the leadership of Leon Blum. The survival probabilities for Germany clearly indicate that German economic problems started well before 1929. Germany is also the country with the most dramatic drop in survival probabilities before leaving the gold standard. This was due to the severe impact of the German banking crisis in 1931, during which reserve losses forced chancellor Brüning to impose exchange controls. Brüning's room for maneuver was furthermore compromised by his minority governing position.

In the historical narrative the relatively fast recovery of Britain after the crisis is often associated with the country cutting its ties to the gold standard early (Eichengreen 1992). In contrast The U.S. and France are seen as having held onto gold far too long. The survival probabilities generated in this study suggest that Britain did indeed leave the gold standard early, while the other key countries held onto the regime even after survival probabilities had fallen below 20%. In Britain, France, and the U.S. a political crisis or government change contributed to the decision to leave the regime. The German government found itself in a weak governing position. These events emphasize the importance of domestic politics for the instability of the inter-war regime.

9 Conclusion

Which factors contributed to the decline of the inter-war gold standard, how can the timing of countries leaving the regime be explained, and how much weight can be attributed to institutional and political effects?

The results of this study suggest that higher per capita GDP, higher gold and foreign asset reserves, trade links with countries on gold, creditor status, and the experience of hyperinflation increased a country's probability of adhering to the inter-war gold exchange standard. This confirms the importance of gold imbalances for the inter-war years and highlights a

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[13]For a careful and detailed discussion of the events surrounding the dollar devaluation, compare (Friedman and Schwartz 1963).

wealth effect that had already been observed for the classical gold standard. It moreover stresses the importance of the gold standard to import credibility. In contrast, a country's inflation rate and adherence to the sterling bloc reduced the probability that a country would remain on gold. Discount policy and central bank independence did not appear to matter for gold standard adherence, supporting the theory that countries did not adhere to the 'rules of the game' during the inter-war years.

On the political and institutional side, the explanatory power of democracy for the instability of the regime is relatively strong. The effects of left of center governments as well as the partisan veto player variable are not statistically significant but the overall measure of left-oriented representation in parliament is significant and positive, confirming that leftist pressures did contribute to countries' decisions to abandon the monetary regime.

Survival rates suggest that Britain could be characterized as a fair weather friend, leaving the gold standard even before predicted survival rates had fallen below 50%. The decision to abandon the regime was obviously forced by political turmoil. In contrast, the U.S., France, and to some extent Germany held onto the regime far too long until survival rates had fallen below 20%. In all countries a political change or crisis contributed to the decision to leave the gold exchange standard. The example of the inter-war years thus shows how political and economic effects need to be considered jointly when investigating a countries decision to maintain or abandon an exchange rate peg.

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Appendix

Countries Included in the Analysis: Argentina, Austria, Belgium, Brazil, Bulgaria, Canada, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Switzerland, United Kingdom, United States, Yugoslavia.

Dependent Variable:

Gold Standard: Dummy variable, taking the value of one for the year in which a country leaves the gold standard. Data are taken from Bernanke and James (1991) and Eichengreen (1992). For the present analysis, there is no distinction between a de jure or a de facto adherence to the gold standard. Officially abandoning the regime, realigning the exchange rate, as well as imposing exchange controls are all counted as leaving the regime. Compare with Table 1 for exact dates on the individual countries.

Independent Variables:

Banking Crises: Time varying dummy variable, taking the value of one for any year in which a country experienced a banking crisis. Data are taken from Bernanke and James (1991).

Cabinet Change: Number of cabinet changes in a given year per country. Data are taken from Banks (1971).

Central Bank Independence: Composed of an index for operational independence, ranging from 1 to 4, with 4 being the most independent. And an index for appointments, again ranging from 1 to 4, with 4 being the most independent. The values are taken from Simmons (1994) and extended by the author based on League of Nations (1932).

Creditor Status: Dummy variable indicating whether a country was a net creditor or debtor throughout the gold standard period. Compare Simmons (1994) and Eichengreen (1992).

Democracy: Time varying dummy variable, taking the value of one for any year where a country could be classified as democratic, and the value zero for non-democratic classifi-

cation. Classifications are taken from Simmons (1994) and Banks (1971). For this analysis, countries counted as democracies include Austria, Argentina, Belgium, Bulgaria, Canada, Czechoslovakia, Denmark, France, Germany, Greece, The Netherlands, Norway, Sweden, Switzerland, The United Kingdom, the United States. Non-democratic regimes are Hungary, Poland, Portugal, Italy, Romania and Brazil. Non of the countries included in the analysis changed regimes while being on the gold standard. For example in Germany, democracy ended in 1933 with the coming to power of Hitler's National Socialist party, but by then the country had long abandoned the gold standard.

Hyperinflation: A dummy variable taking the value of one for countries that experienced hyperinflation in the immediate post-war period. For this analysis only Austria, Poland, Germany and Hungary are counted as having experienced a severe hyperinflation in the immediate post-war period. Classifications made by the author based on Eichengreen (1992).

Inflation: Measured as the percentage deviation from average inflation of all countries included in the sample. Inflation rates are based on annual consumer price indices. Data are taken from Mitchell (1975).

Left of Center Government: Time varying dummy variable taking the value of one if a country had a left of center government in a given year. Again, data are taken from Cook and Paxton (2001) and McHale and Skowronski, eds (1983).

Left Representation in Parliament: Percentage of seats held by left of center parties in parliament. Data are taken from Cook and Paxton (2001) and McHale and Skowronski, eds (1983).

Partisan Veto Player: Number of parties in the governing coalition. Data are taken from Cook and Paxton (2001), Spuler (1977), and McHale and Skowronski, eds (1983). For instances where the governing coalition could not be identified, a minimum required coalition based on electoral results and seat distribution was computed.

Per Capita GDP: GDP data are taken from Mitchell (1975). Data are missing for Portugal.

Reserves: Percentage change of gold, silver and foreign currency reserves, held by the government and/or the central bank. Data are taken from League of Nations (1922-1938).

Sterling Bloc: The sterling bloc includes countries with close ties to Great Britain during the inter-war years, often holding the majority of their reserves in British pounds. The classification of countries is taken from Ritschl and Wolff (2004).

Strength of Executive: Variable measure the strength of the executive, classifying direct election by popular vote as 1, indirect election as 2, and nonelective executives as 3.

Trade Network: Trade with gold standard countries (imports plus exports) measured as percentage of total trade. Data are taken from Mitchell (1975).

Unemployment Rate: Collected from League of Nations (1922-1938).
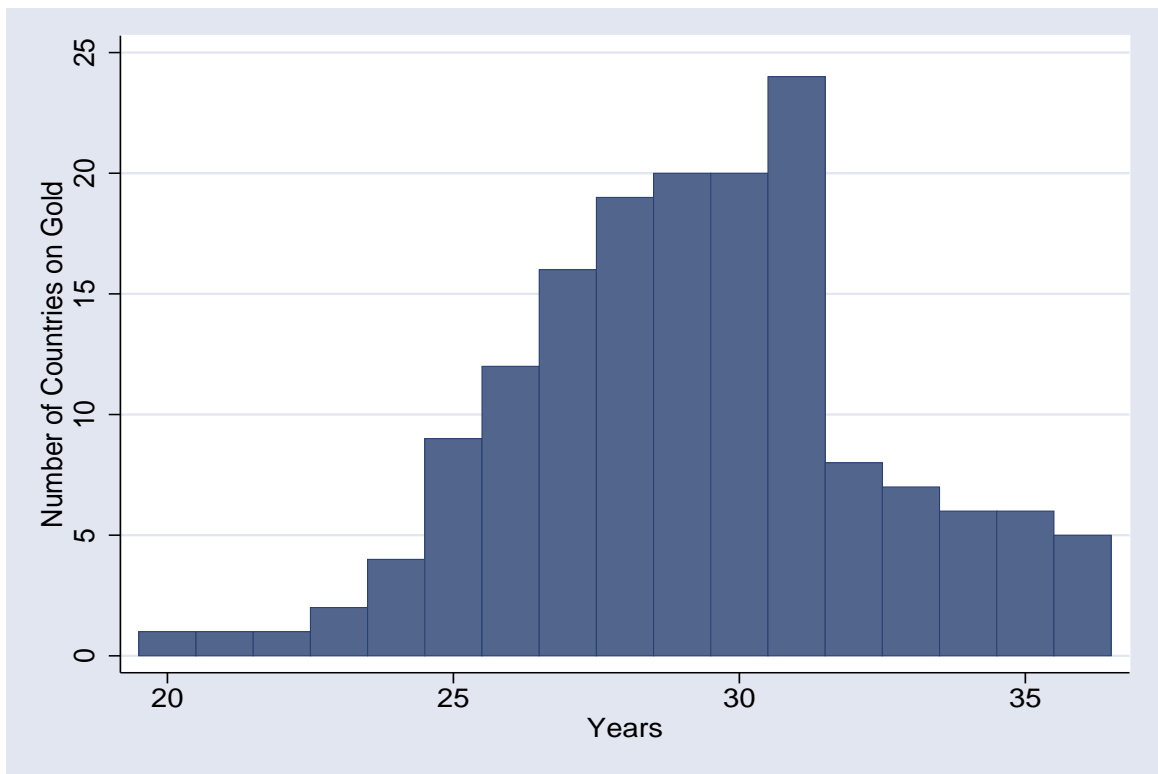
Figure 1: Number of Sample Countries on the Gold Exchange Standard

Table 1: Countries on the Gold Exchange Standard, 1919-1938

Country	Gold Standard Adopted	Gold Standard Suspended	Foreign Exchange Controls Imposed	Devaluation
Argentina	1927	1929		
Austria	1923	1931	10/1931	9/1931
Belgium	1925	1935		3/1935
Brazil	1927	1930		
Bulgaria	1927	1931		
Canada	7/1926	10/1931		9/1931
Czechoslovakia	4/1926	1931	9/1931	2/1934
Denmark	1/1927	9/1931	11/1931	9/1931
Finland	1926	10/1931		10/1931
France	8/1926	1936		10/1936
Germany	9/1924	1931	7/1931	
Greece	1928	1931	9/1931	4/1932
Hungary	4/1925	1931	7/1931	
Italy	12/1927	1936	5/1934	10/1936
Netherlands	4/1925	1936		10/1936
Norway	5/1928	1931	9/1931	9/1931
Poland	10/1927	1936	4/1936	10/1936
Portugal	1931	1931		
Romania	2/1929	1932	5/1932	
Sweden	4/1924	9/1931		9/1931
Switzerland	1925	1936		
United Kingdom	5/1925	9/1931		9/1931
U.S.	6/1919	2/1933	3/1933	4/1933
Yugoslavia	1931	1931		

Source: Bernanke and James (1991) and Eichengreen (1992).

Table 2: Summary of Hypothesized Effects

Economic Indicator	Sign	Political Indicator	Sign
GDP per capita	(-)	Democracy	(+)
Gold reserves	(-)	CB independence	(-)
Sterling Bloc	(+)	Left of center government	(+/-)
Inflation	(-/+)	Percentage left in parliament	(+/-)
Discount rate	(+)	Partisan veto players	(+/-)
Trade network	(+/-)	Executive Power	(-)
Creditor	(-)	Cabinet Change	(+)
Banking crisis	(+)		
Hyperinflation	(-)		
Unemployment	(+)		

(-) implies the variable is expected to reduce the hazard rate, thereby increasing the probability that a country remain on gold; (+) implies the variable is expected to increase the hazard rate, thereby reducing the probability that a country remain on gold; (+/-) implies the effect is indeterminate.

Table 3: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
regime exit	162	0.15	0.36	0	1
democracy	162	0.78	0.41	0	1
ln GDP	155	8.15	0.48	6.94	8.84
reserves	162	12.25	52.79	-89.75	362.68
sterling	162	0.19	0.39	0	1
central bank indep.	154	4.45	1.85	0	8
inflation	159	-2.06	6.78	-35.86	26.76
trade network	155	21.24	17.14	0	99.93
discount rate	152	5.38	2.22	2.00	11.57
banking crisis	159	0.14	0.35	0	1
creditor status	162	0.39	0.49	0	1
hyperinflation	159	0.21	0.41	0	1
unemployment	113	11.79	8.07	0.9	37.6
left government	162	0.46	0.50	0	1
percent left in parl.	162	36.79	25.80	0	81.1
partisan veto	162	1.78	1.52	1	6
cabinet change	161	0.69	0.80	0	5
executive	161	2.09	0.52	1	3

Table 4: Regression Results, dependent variable leaving the gold standard

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
log GDP	-1.97**	-2.33**	-2.58**	-2.83**	-2.06**	-5.54**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.02)
democracy	1.29*	1.25*	1.36*	1.35(*)	1.25(*)	4.63*
	(0.06)	(0.09)	(0.07)	(0.11)	(0.11)	(0.10)
reserves	-0.03**	-0.02*	-0.02**	-0.01	-0.02**	-0.1
	(0.01)	(0.08)	(0.01)	(0.27)	(0.02)	(0.38)
sterling group		0.95(*)	1.40**	1.94**	0.74	2.41**
		(0.11)	(0.04)	(0.01)	(0.33)	(0.02)
central bank independence		-0.002				
		(0.99)				
inflation			0.20**	0.24**	0.20**	0.20*
			(0.00)	(0.00)	(0.01)	(0.09)
network			-0.05*	-0.06**	-0.05*	-0.02
			(0.08)	(0.04)	(0.10)	(0.69)
discount rate				0.04		
				(0.86)		
banking crisis				0.78		
				(0.18)		
creditor status					-1.91**	
					(0.04)	
hyperinflation					-1.71**	
					(0.02)	
unemployment						0.04
						(0.39)
constant	9.93**	11.51**	14.39**	15.58*	10.00*	29.09*
	(0.03)	(0.03)	(0.01)	(0.10)	(0.10)	(0.07)
q-1	1.88**	2.53**	2.40**	2.75**	3.29**	5.12**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
number of obs.	155	148	150	140	150	108
log likelihood	-47.38	-43.25	-40.41	-36.79	-37.07	-21.57

** indicates significance at 5%, * indicates significance at 10%,

p-values in parentheses.

Table 5: Regression Results for Democracies, dependent variable leaving the gold standard

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
log GDP	-2.25**	-3.30**	-3.59**	-3.13**	-1.81	-5.30**	-4.35**	-4.44**
	(0.01)	(0.01)	(0.00)	(0.04)	(0.13)	(0.02)	(0.00)	(0.00)
reserves	-0.04**	-0.03**	-0.03**	-0.02	-0.03**	-0.01	-0.02*	-0.02*
	(0.01)	(0.05)	(0.03)	(0.16)	(0.05)	(0.42)	(0.08)	(0.06)
sterling		1.56**	1.95**	2.73**	0.84	2.23**	2.21**	2.39**
		(0.05)	(0.02)	(0.01)	(0.40)	(0.03)	(0.03)	(0.03)
central bank independence		-0.06						
		(0.78)						
inflation			0.25**	0.31**	0.26**	0.19*	0.31**	0.31**
			(0.00)	(0.00)	(0.01)	(0.09)	(0.00)	(0.01)
network			-0.05	-0.07*	-0.09*	-0.02	-0.07*	-0.08**
			(0.12)	(0.06)	(0.08)	(0.64)	(0.07)	(0.05)
discount rate				0.30				
				(0.28)				
banking crises				0.45				
				(0.55)				
creditor status					-3.81**			
					(0.01)			
hyperinflation					-2.59**			
					(0.04)			
unemployment						0.05		
						(0.30)		
left leaning government							-1.21	-1.48
							(0.24)	(0.17)
% of left in parliament							0.05*	0.05*
							(0.10)	(0.07)
partisan veto players							0.04	
							(0.86)	
executive								0.96
								(0.42)
cabinet change								-0.22
								(0.60)
constant	12.44**	17.17**	21.26**	14.03	7.13	32.96*	25.41**	24.34**
	(0.04)	(0.03)	(0.01)	(0.27)	(0.43)	(0.07)	(0.01)	(0.02)
q-1	2.43**	4.38**	3.86**	4.93**	5.11**	4.47**	4.13**	4.28**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
number of obs.	123	120	122	116	122	100	122	122
log likelihood	-31.54	-26.20	-25.84	-22.56	-22.08	-19.96	-24.17	-23.71

** indicates significance at 5%, * indicates significance at 10%,
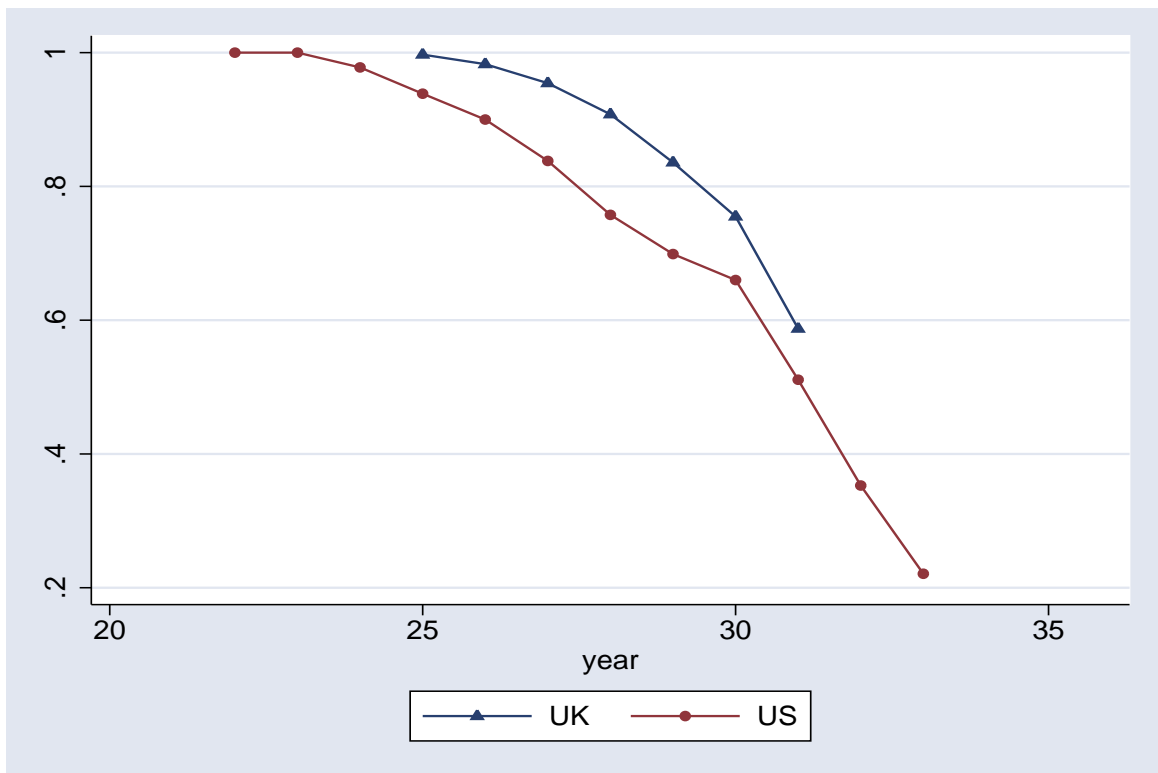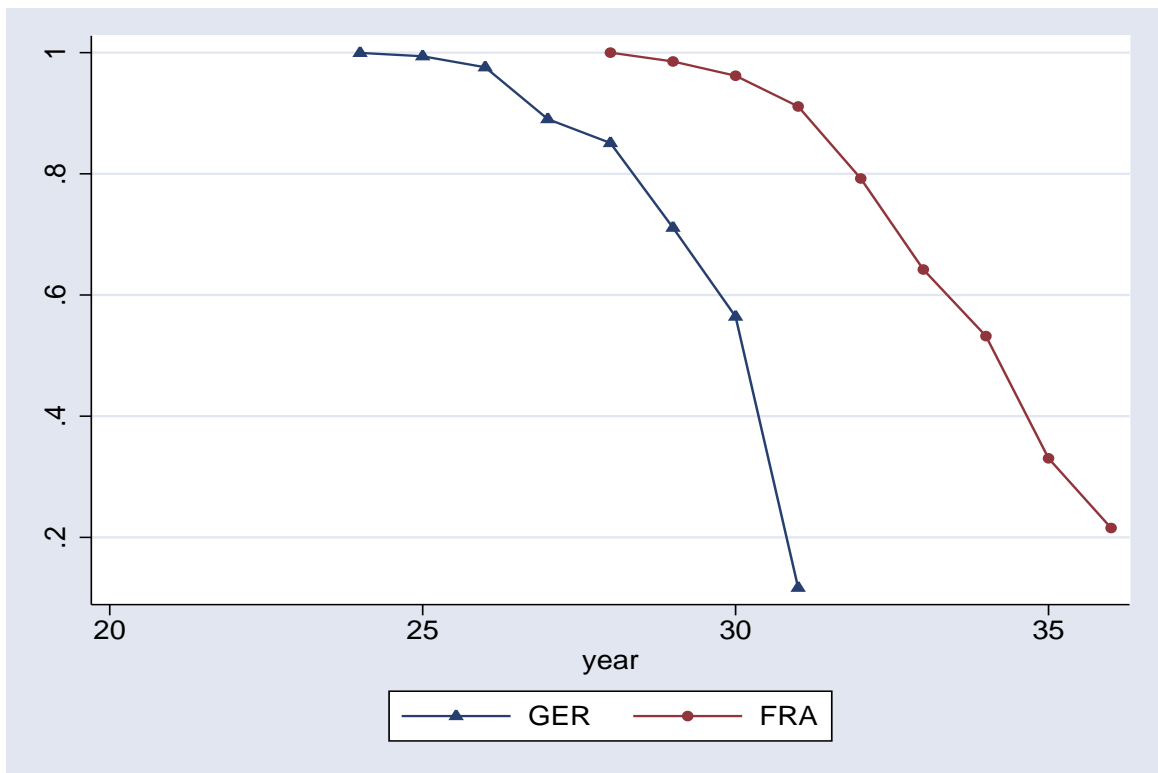
p-values in parentheses.

Figure 2: Survival Rates for the U.K. and U.S.

Figure 3: Survival Rates for Germany and France