

GONE WITH THE EURO: A REAPPRAISAL OF THE PESETA'S ADJUSTMENT MECHANISM (1870-1998)*

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ABSTRACT

The peseta was the Spanish currency for more than a century and, during this time, it played a remarkable role in adjusting the balance of payments. This paper presents a chronology of the moments when the adjustment was crucial, which, consistent with the macro-trilemma, coincided with periods of external openness. Moreover, this paper provides empirical support to the thesis that links the exceptionality of a floating peseta during the gold standard with fiscal profligacy.

Keywords: peseta, floating exchange rates, openness

JEL Code: F31, N10, C22

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RESUMEN

La peseta, durante el tiempo en que fue la moneda española, desempeñó un destacado papel en el ajuste de los desequilibrios externos. Este artículo establece una cronología de aquellos momentos en los que el ajuste fue más intenso y que, de acuerdo con el *trilema*, coinciden con momentos de apertura. Además, este artículo refuerza empíricamente la tesis que vincula la excepcionalidad de la flotación de la peseta durante el patrón oro con el problema de control fiscal.

Palabras clave: peseta, tipos de cambio flotantes, apertura

1. INTRODUCTION

The outbreak of the international financial crisis in 2008 led to a return of the term periphery, so common in economic history, to refer to the southern European countries. Due to secular problems with exchange rate instability, academics have long referred to these countries as the monetary periphery (Bordo and Rockoff 1996; Eichengreen and Flandreau 1996; Martin-Aceña *et al.* 2000). Interestingly, the recent crisis has made these countries reconsider the consequences of having renounced their currencies in favour of stability when joining the euro in 1998. In the case of Spain, which has undergone a painful process of internal devaluation, the impossibility of resorting to an external devaluation of the peseta to compensate for losses of competitiveness has been highlighted as the great difference between the latest and previous crises (Estrada *et al.* 2009).

The role of the peseta in compensating price differentials and easing the balance-of-payments adjustment has constituted a central topic in the Spanish economic narrative. The peseta became the national currency in 1870 at a parity of 100 pesetas/32.528 g gold, which, in theory, fixed its exchange rate at around 5 pesetas/dollar, 25 pesetas/pound and 100 pesetas/100 francs. However, it never formally belonged to the pre- or post-World War I (WWI) gold standards as the majority of European currencies did. In practice, the peseta's exchange rate floated between the heyday of the classical gold standard in 1880 and the collapse of the exchange gold standard in 1931. According to one of the most cited reports in the Spanish historiography, the official report on the convenience of Spain joining the gold club (*Comisión del Patrón Oro* 1929), the reason for this exceptionality was the monetary financing of deficits and the consequent departure of domestic from foreign prices. The floating of the peseta had helped to compensate price differentials and promote the balance-of-payments readjustment in 1890-1928. Consequently, the report condemned any intervention aimed at

maintaining the peseta's external value when domestic prices were increasing. The criticisms of contemporary academics of the government's attempts to counteract the peseta's depreciation in 1930-1931 (Olariaga 1977 [1933]; Sardá 1936; Vandellós 1936) should be read in the same terms of preserving competitiveness.

This was one of the many episodes in which the peseta is argued to have played an active role in adjusting the Spanish balance of payments. Others were the introduction of a multiple exchange rate system in 1948 and the approval of the Plan of Stabilization and Liberalization (PSL) in 1959, a crucial aspect of which was the decision to unify and devalue the peseta sufficiently to compensate for accumulated price differentials (Sardá 1970). Within the fixed adjustable system of Bretton Woods, the peseta was devalued, in 1967, again with the argument that it was necessary to compensate for losses of competitiveness and redress the consequent *weakness* of the Spanish balance of payments (Rojo 1975). The same reason was given to explain the chain of devaluations that followed the abandoning of the fixed exchange rate against the dollar in January 1974. Until the entry of Spain into the European Monetary System (EMS) in 1989, the peseta had a managed floating exchange rate, the most significant devaluations taking place in 1977 and 1982. Counterbalancing accumulated price differentials, that is, counterbalancing Spanish losses of competitiveness was yet again the reason given for the three devaluations of the peseta during the EMS crisis between the summers of 1992 and 1993 (Buisán and Gordo 1997). In sum, during the period of more than a century in which the peseta was the Spanish currency, it seems to have moved in accordance with the purchasing power parity (PPP) hypothesis.

This hypothesis states that the nominal exchange rate between the currencies of two countries is in equilibrium when it equalises the ratio between their respective aggregate price levels. Therefore, if the real exchange rate is defined as the nominal exchange rate adjusted by relative aggregate price levels, the long-run compliance of the PPP requires that the real exchange rate series revert to a mean (equilibrium), which is the first issue that this paper addresses. Our approach, however, differs from previous exercises that have tested the hypothesis for the peseta in the very long run such as Taylor (2002) and Gadea *et al.* (2008). Rather than providing evidence of quick reversion, which explains the use of black exchange rates by these authors, we are interested in offering a chronology of the peseta's more or less active role in adjusting the balance of payments. Thus, when analysing the mean-reverting properties of the peseta/dollar, the peseta/pound and the peseta/franc real exchange rates, instead of considering black market rates, we always use the rates actually in force for the bulk of Spanish international transactions. As a consequence, we find that the three series are best modelled as fractionally integrated processes, that is, they are mean-reverting processes which, on average, show long-lasting

deviations from parity. More interestingly, the recursive estimation of these deviations indicates that their length varied noticeably from 1870 to 1998; this variation meaning that the intensity of the peseta's adjusting role changed over time. The first contribution of this paper is to put these differences across periods into perspective and, above all, to relate them with the also very different macro-trilemma scenarios that the peseta experienced in its history.

By trilemma, we refer to the impossibility of simultaneously combining international economic integration, fixed exchange rates and an autonomous monetary policy. In a framework of fluent international trade, if a country credibly fixes its exchange rate (to gold or any other reference currency), any attempt at implementing an autonomous (more relaxed) monetary policy (one that raises relative prices) will be counteracted by (the worsening of) the trade balance and its (constraining) effect on the country's monetary base. However, if the exchange rate is not fixed, an autonomous (more relaxed) monetary policy will be counteracted by (the worsening of) the trade balance and its (depreciating) effect on the currency¹.

Accordingly, for a country like Spain, with secular problems of price differentials, the balance-of-payments equilibrium could be restored by depreciating the peseta, if the integration was to be maintained or, alternatively, by reinforcing the restrictiveness of trade barriers, if the exchange rate was to be fixed. So, in line with the trilemma, less active exchange rate adjustments (longer deviations from parity) are expected to correspond to the periods of higher trade barriers between 1870 and 1998. Our results are consistent with these expectations in that the persistence of deviations are not significant until the increase of trade costs in the 1930s and in that these deviations rose strongly in the 1940s when, first because of WWII and later because of the isolation of Franco's regime, Spanish international integration fell to a minimum. Equally consistent is the reduction in deviations found for the pound and the franc following Spain's 1970 agreement with the European Economic Community (EEC) and its entry into this union in 1986. We formalise this trade-off between integration and the speed of exchange rates reverting to equilibrium through a non-parametric approach and find a systematic negative relationship between the Spanish openness ratio and persistence. In this way, we provide evidence of the constraints imposed by the trilemma, whose message, although *theoretically compelling*, continues to be *empirically controversial* (Obstfeld *et al.* 2004).

¹ This formulation of the trilemma in terms of commodity arbitrage is complementary to the macro-trilemma that Obstfeld and Taylor (1998) refer to as the impossibility of simultaneously combining capital mobility, fixed exchange rates and an autonomous monetary policy. When a country has credibly pegged its currency value to the currency of some reference country, any attempt to separate domestic from foreign interest rates is prevented by capital movements induced by the interest rate parity rule. In this paper's trilemma formulation, any separation of domestic from foreign prices is prevented by commodity arbitrage.

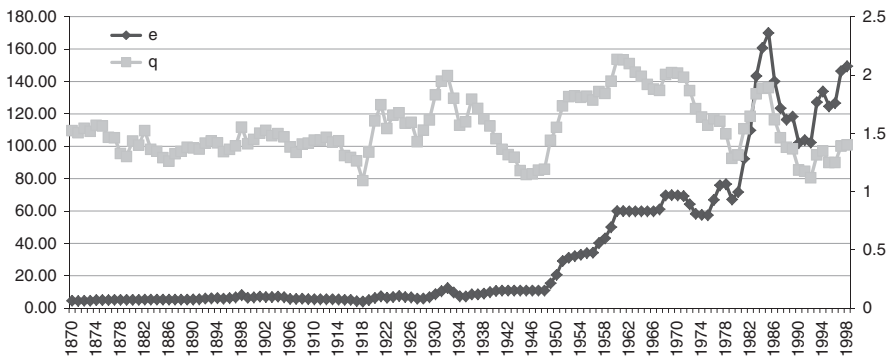
The economic policy constraints of the trilemma had already been theoretically well established in the 1929 report, according to which, Spain had solved it through domestic monetary sovereignty. Empirically, its conclusion that fixed exchange rates had been sacrificed to monetary independence was based on the high correlation values between relative (Spanish over British) prices and the peseta/pound exchange rate. Although the report recognised that «correlation was not causality», it held that the peseta's exchange rate had tended to move following the Spanish relative price variations from 1890 to 1928. Relative prices caused the peseta's exchange rate, even if, starting in the 1920s, the report also stated that the peseta had also caused Spanish prices. As far as we know, despite the controversies among contemporaries, causality has not been statistically addressed to date. We take advantage of new statistical tools and more refined data and, as a second contribution, this paper confirms that prices statistically caused the exchange rate in 1890-1928. This finding, in turn, allows us to close the debate on the supposedly protectionist strategy behind the decision to keep the peseta outside the gold standard. For a long time, some authors have rejected this idea and claimed that the floating was, instead, the result of Spanish fiscal profligacy. Deficits meant money creation (Sabaté *et al.* 2006), money creation provoked price differentials and, more importantly, price differentials led to a floating regime. This paper, by providing evidence that relative prices influenced exchange rates, completes this thesis.

The rest of the paper is organised as follows. In section 2, we comment on the data sources and model the peseta's real exchange rates 1870-1998. We also recursively estimate their deviations from parity and relate them with the Spanish narrative. In section 3, we focus on the trilemma policy constraints and formalise the link between changes in deviations and changes in Spanish trade openness in the very long run. Moreover, we revisit the contents of the 1929 report. Section 4 concludes.

2. THE DATA AND MODELLING OF THE PESETA REAL EXCHANGE RATE

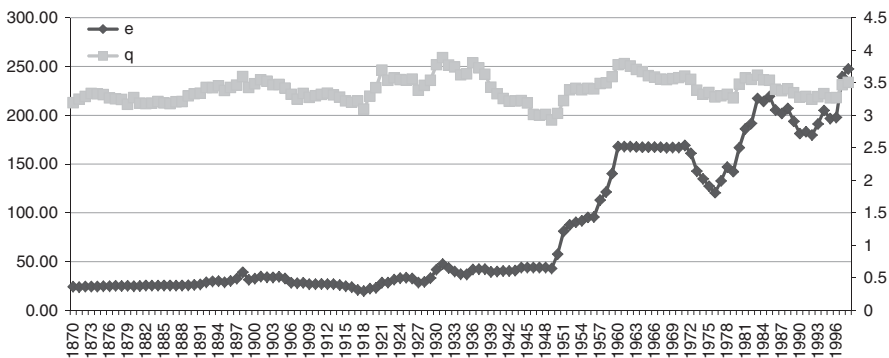
Our analysis of the persistence of deviations from parity is applied to the peseta/dollar, the peseta/pound and the peseta/franc exchange rate series covering the years 1870-1998. Thus, we are considering the period that runs from the generalisation of the gold standard as the international financial system in the last quarter of the 19th century to the birth of the European Monetary Union (EMU) when the peseta lost its domestic exchange rate identity. For most of this period, the peseta was free from international monetary agreements. It never formally joined the gold standard, it was a late Bretton Woods entrant and, within the EMS, it was weakly tied to the pound and the franc with a band of fluctuation of ± 6 per cent, for the former, only from October 1990 to September 1992. Figures 1-3 show the dynamics of the

FIGURE 1
PESETA/DOLLAR NOMINAL (E) AND REAL (Q) EXCHANGE RATE



Source: See text.

FIGURE 2
PESETA/POUND NOMINAL (E) AND REAL (Q) EXCHANGE RATE



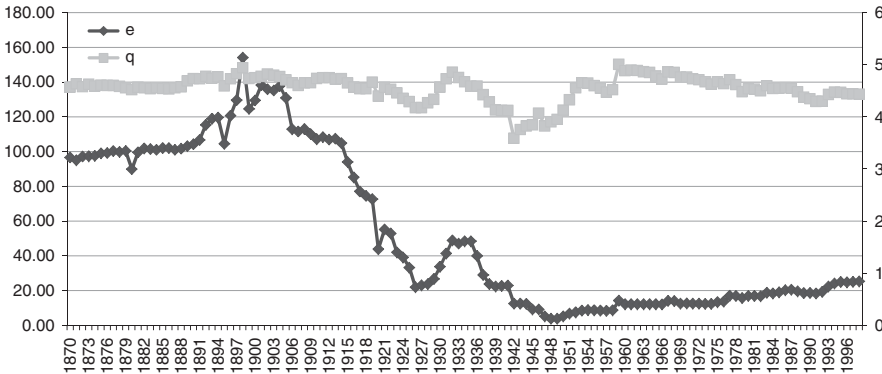
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peseta after the setting of the historical rates of 5 pesetas/dollar, 25 pesetas/pound and 100 pesetas/100 francs in 1870.

The nominal exchange rates come from Martín-Aceña and Pons (2005) for the period 1870-1935 and from Eguidazu (1978) for the years 1936-1939². After 1959, the data can be found in the Statistical Bulletin (*Boletín Estadístico*) of the Bank of Spain. For the autarkic years, 1940-1959,

² Eguidazu (1978) provides the rates applied to exports at 31 December by the Committee of Foreign Currency (*Comité de Moneda Extranjera*) in the Nationalist zone.

FIGURE 3
PESETA/FRANC NOMINAL (E) AND REAL (Q) EXCHANGE RATE



Source: See text.

we use the peseta/dollar exchange rate provided by Serrano and Asensio (1997) and the peseta/pound and the peseta/franc exchange rates are derived from Serrano and Asensio (1997) peseta/dollar and the pound and franc rates provided by the Official State Bulletin (*Boletín Oficial del Estado*). The exceptionality of the exchange rate regime in these years, given the purpose of this paper, warrants more detailed comments.

From 1940 to 1948, the exchange rate was fixed at 11.22 and 10.95 pesetas/dollar for imports and exports, respectively. In 1948, a system of multiple exchange rates was introduced, with all the new rates higher than the initial 11.22 and 10.95 pesetas/dollar that continued to be applied only to some goods³. In practice, this system served to bypass the Franco regime's aversion to an open devaluation of the peseta⁴. Later, importers in 1950 and exporters in 1951 were allowed to negotiate part of the foreign currency obtained from exports and needed for imports on the Madrid stock market⁵. This panoply of rates was formally unified at 42 pesetas/dollar

³ The multiple exchange rate system established nine import exchange rates for different groups of products, the rates ranging from the basic import rate of 11.22 to 27.38 pesetas/dollar between December 1948 and October 1949, when all these new rates were devalued by 30 per cent. As regards exports, in December 1948, fifteen exchange rates were set for different groups of products, the rates ranging from 10.95 to 21.90 pesetas/dollar, all of which were also devalued in October 1949, but by percentages that ran from 17 to 42 per cent.

⁴ According to Viñas *et al.* (1979, p. 268), the multilateral exchange rate system was the disguised answer of the regime to the pressures for devaluation from Spanish exporters.

⁵ In October 1950, the nine groups of imports were reduced to seven and, for these seven groups, different rates and different percentages of currency to negotiate on the stock market were set. Rates ranged from a minimum of 16.43 pesetas/dollar to a maximum of 25 pesetas/dollar, the percentages being 0, 40, 60 or 100 per cent, depending on the group. A year later, in October 1951,

in 1957, but the unification was merely apparent, since a system of surcharges and bonuses started working shortly afterwards⁶. The unification of rates did not become effective until July 1959, when the exchange rate was fixed at 60 pesetas/dollar.

Serrano and Asensio (1997) offer an average exchange rate by weighting the different rates in force from 1948 through their corresponding share of total Spanish trade. From 1950 onwards, the average also considers, apart from the multiple rates, the percentage of each operation negotiated freely on the Madrid stock market. The rates thus estimated reflect the pesetas effectively paid (received) by demanders for (suppliers of) foreign currency, which, as this paper is interested in calibrating the role of the exchange rate in counteracting the strain that Spanish price differentials put on the balance of payments, are the values to work with. For this reason, we use the values provided by Serrano and Asensio (1997), instead of those used in Taylor (2002) and Gadea *et al.* (2008) who do not consider the rates effectively applied to the bulk of the Spanish international trade in 1940-1959⁷.

As regards prices, a long-run series for the Spanish GDP deflator is provided by Prados de la Escosura (2003). We use this deflator and the U.S., British and French deflators from Mitchell (2003a, 2003b) to construct the respective indexes of relative prices (Spanish over the U.S., U.K. and French prices) until 1970⁸. From 1970 onwards, all the deflators come from the OECD. The series of the peseta/dollar, peseta/pound and peseta/franc real exchange rates, also shown in Figures 1-3, have been obtained by correcting

(footnote continued)

the 15 groups of exports were reduced to five categories. The rate was fixed at 21.90 pesetas/dollar for all the groups and the percentage of foreign currency allowed to be auctioned ranged from 10 to 90 per cent, depending on the group.

⁶ Under this system, a surcharge was added to the rate of 42 pesetas/dollar paid by the importers, this extra amount being added to the 42 pesetas/dollar received by the exporters. In practice, this led to up to 16 rates that ranged from 42 to 53 pesetas.

⁷ This is an important difference from Taylor (2002), who tests the purchasing power parity (PPP) hypothesis for the peseta/dollar exchange rate in 1880-1996. This author constructs his series interpolating values on the Spanish real exchange against the dollar between 1935 and 1947. However, when interpolating, he uses a nominal rate of 30 pesetas/dollar in 1947, very close to the 33.9 pesetas/dollar rate in the Tangier black market and very far from the rate effectively applied to the Spanish national transactions, set at 11 pesetas/dollar. The gap persists until 1949, when the nominal exchange rate of 39.4 pesetas of Taylor (2002) practically coincides with the 40.3 pesetas/dollar in Tangiers and the rate at work for importers and exporters was 15.4 pesetas/dollar according to Serrano and Asensio (1997). From then on, Taylor (2002) uses the rates of the dollar on the Madrid stock market until 1957 and again the Tangier rates in 1958-1959. In short, his peseta/dollar nominal exchange rate evolves much closer to the black market rate than to the rate really applied to the bulk of Spanish national transactions, that is, the value estimated by Serrano and Asensio (1997) as a combination of multiple exchange rates and the percentage of each operation (imports and exports) negotiated freely on the Madrid stock market.

⁸ Data to calculate the French deflator are not available for 1914-1919 and 1939-1948. We fill these gaps by applying the French consumer price index growth rates, available in Mitchell (2003a).

the nominal exchange rate by relative prices, so that an increase denotes real depreciation and a decrease real appreciation.

Our modelling of these real exchange rate series is based on the PPP hypothesis. This hypothesis postulates that the nominal exchange rate of a currency equals the ratio between domestic and foreign price levels ($E_t = P_t/P_t^*$). In its logarithmic form, the PPP hypothesis may be written:

$$e_t = p_t - p_t^* \quad [1]$$

e denoting nominal exchange rate (pesetas per dollar, pound or franc), p the domestic (Spanish) prices and p^* the foreign prices. So, with the real exchange rate expressed as:

$$q_t = e_t - p_t + p_t^* \quad [2]$$

The accomplishment of the PPP hypothesis requires evidence that the q_t series reverts to a mean. To this end, we take an auto-regressive fractionally integrated moving average (ARFIMA) approach for modelling the real exchange rate behaviour and measuring the persistence of deviations from the mean. From a theoretical point of view, this is the optimal approach since the price indexes used for the exchange rate series are the result of aggregating individual auto-regressive or auto-regressive moving average processes⁹.

The ARFIMA models extend the I(1) vs. I(0) dichotomy and permit stationary and non-persistent alternatives if the real exchange rate is an I(d) process with $d \in [0, 1/2]$ or non-stationary but non-persistent alternatives if $d \in [1/2, 1]$. In any case, a shock does not persist indefinitely but disappears, giving the series its mean-reverting behaviour. Thus, an ARFIMA model (p, d, q) can be defined as follows:

$$\phi(L)(1-L)^d(y_t - \mu) = \theta(L)\varepsilon_t \quad [3]$$

where $\phi(L) = 1 - \sum_{j=1}^p \phi_j L^j$ and $\theta(L) = 1 + \sum_{j=1}^q \theta_j L^j$ are the polynomials of lags of order p and q , respectively, whose roots lie outside the unit circle and ε_t is iid ($0, \sigma^2$).

To estimate ARFIMA models and the persistence or long-memory parameter d , we use the Gaussian of Robinson (1995) (GSP) estimates of the semiparametric type in the frequency domain and also the exact maximum likelihood (EML) method in the full parametric approach developed by Sowell (1992) (EML). By using the non-parametric GSP method, with $\tau = 0.5, 0.6$ or 0.7 , and their equivalent truncation lags, the long-memory or persistence parameter d lies between 0.7 and 0.9 . The results are more unstable using the EML method. In this case, by selecting the best model ARFIMA ($1, d, 0$) according to the Akaike information criterion (AIC), the d parameter

⁹ See Gadea and Mayoral (2015) for a discussion of this issue.

decreases to 0.50 for the dollar, 0.27 for the pound and 0.86 for the franc. However, this discrepancy is not surprising since, in the ARFIMA model, short-memory components are included in the auto-regressive coefficient. Moreover, the model without auto-regressive terms tends to increase d , since it captures the short-run behavior of the series. To sum up, the three real exchange rates are shown to be fractionally integrated processes which, even if not stationary, can be characterised as mean-reverting¹⁰. Moreover, we have confirmed the robustness of the fractional option by testing the $I(d)$ hypothesis against the integer alternative $I(0)/I(1)$, the presence of structural breaks and the possibility of a non-linear adjustment¹¹.

The next step is to derive the impulse response function from expression [3] and obtain a measure of persistence, that is, the length of time for deviations from the mean to be corrected by one half. We select the best ARFIMA model with the AIC criterion and find that the half-lives are of 12.5, 7.8 and 8.5 years for the dollar, the pound and the franc in 1870-1998, respectively¹². More interestingly, by applying the same procedure recursively, we find that the length of deviations varied noticeably over time. We start with an initial sample of 40 observations, enlarged yearly until the full period is covered, to estimate the best corresponding ARFIMA models $(0,d,0)$, $(1,0,0)$ or $(1,d,0)$, at each point in time and calculate the corresponding half-lives¹³. Figures 4 and 5 depict the evolution of half-lives for the peseta/dollar and the peseta/pound real exchange rates, both showing significant gains in persistence in the 1930s.

This is a finding that fits in perfectly with the Spanish narrative in that it illustrates the successive failures to stop the depreciation of the peseta against both currencies through intervention on the exchange markets¹⁴. Intervention started in July of 1928, was suspended in January 1929, resumed in June and was suspended again in October of the same year when funds ran

¹⁰ Results are available upon request.

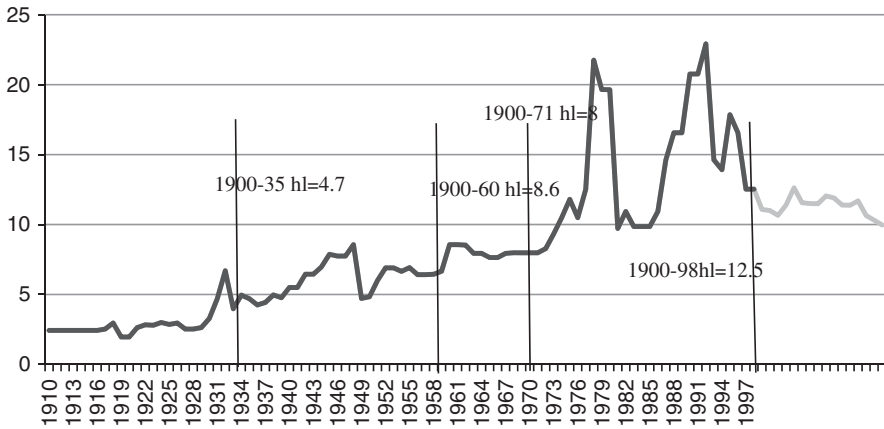
¹¹ First, we apply the extension of the Dickey-Fuller test developed by Dolado *et al.* (2002) for the null of $d = 1$ against the alternative $d < 1$. Second, we test for the null of $d = 0$ against the alternative of $d > 0$ using the test proposed by Lobato and Robinson (1998). Third, we test the null of linearity in a FI-STAR model by applying the tests proposed by Dijk *et al.* (2002) and Smallwood (2005). Finally, we try to discard the possibility that there are breaks which lead to the detection of spurious memory using the tapered periodogram technique proposed by Sibbertsen (2003, 2004). Results are available upon request.

¹² If, in line with Taylor (2002), we interpolate the peseta/dollar exchange rate in 1939 with the Tangier black market value in 1947 and continue using the black market values until 1959, the half-life deviation plunges to 5.8 years, which is the value that this author obtains for the period 1880-1996.

¹³ The decision to change the ARFIMA models in the recursive estimation is justified by the sensitivity of the d parameter to large short-memory components. We use the Sowell-EML method to avoid the inconsistent estimates of other two-step methods.

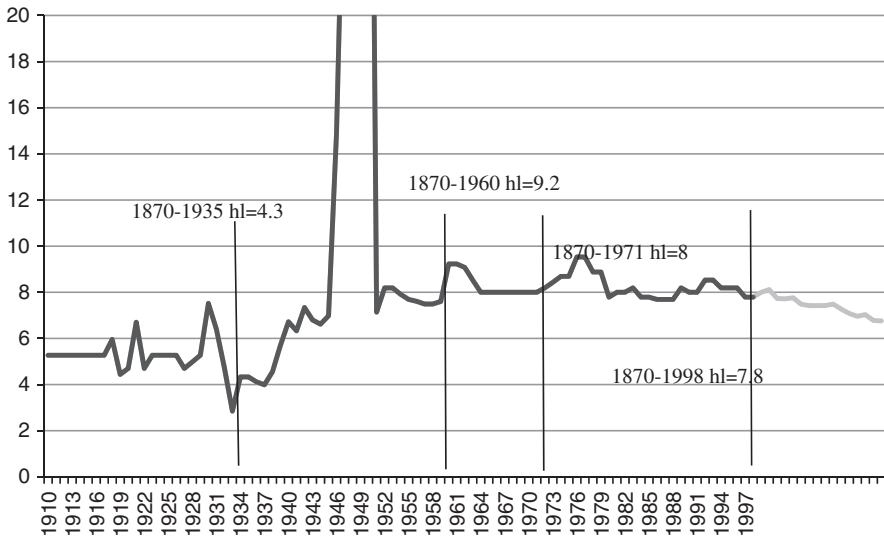
¹⁴ They are all detailed in the exhaustive study of Martín-Aceña (1984) of Spanish monetary policy in 1914-1935. See also the study of Martínez-Ruiz and Nogués-Marco (2014) for the relations between the choice of the monetary policies, exchange rate regimes and financial crises in Spain 1880-1975.

FIGURE 4
 RECURSIVE COMPUTING OF HL FROM AN AUTO-REGRESSIVE FRACTIONALLY
 INTEGRATED MOVING AVERAGE MODEL (PESETA/DOLLAR)



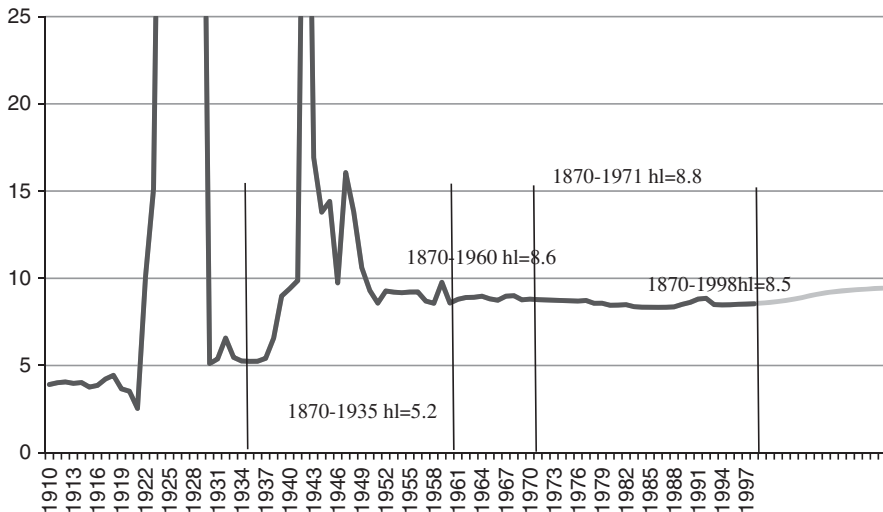
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FIGURE 5
 RECURSIVE COMPUTING OF HL FROM AN AUTO-REGRESSIVE FRACTIONALLY
 INTEGRATED MOVING AVERAGE MODEL (PESETA/POUND)



Source: See text.

FIGURE 6
 RECURSIVE COMPUTING OF HL FROM AN AUTO-REGRESSIVE FRACTIONALLY
 INTEGRATED MOVING AVERAGE MODEL (PESETA/FRANC)



Source: See text.

out without having been sufficient to stop depreciation. After the fall of Primo de Rivera's dictatorship (September 1923 to January 1930), interventions continued with the national government constituted in January 1930 and, later, with the arrival of the republic in April 1931¹⁵. However, these attempts did not succeed and the result was a sustained real depreciation of the Spanish currency. This is the deviation mirrored in the gains in persistence that the recursive estimation locates for the peseta/pound exchange rate in 1929-1930 and for the peseta/dollar exchange rate in 1930-1932.

In France, the extraordinary post-war reconstruction costs and their monetary financing created a situation of high inflation that lasted until the country underwent *de facto* stabilisation in 1926. Until then, the appreciation of the peseta against the franc went way beyond the French price differentials and, as a result, Figure 6 shows spectacular gains in persistence, this time in terms of real appreciation. In any case, be they gains of persistence in terms of depreciation or appreciation, one cannot resist linking the length

¹⁵ In July 1930, an agency to control the peseta rate was established which began to operate with the reserves of the Bank of Spain and a loan from the Bank for International Settlements. Funds to prepare a legal stabilisation were later enlarged by loans from the Morgan Bank and the *Banque de Paris et des Pays Bas*. The arrival of the republic in April 1931 did not result in any change of monetary policy. Interventions continued, but with the funds now coming from the Bank of France. For a detailed analysis see Martín-Aceña (1984, 1987).

of the deviations with the rise of trade barriers worldwide, especially from 1929 onwards. Spain's disconnection from the international economy was soon going to be augmented by the effect of the Spanish civil war (1936-1939) and the overlapping disintegrating effect of WWII (1939-1945). Thus, the gains in persistence of the dollar and the pound during the 1940s shown in Figures 4 and 5, the first decade of Franco's autarky, are not unexpected. Here again, our results support the Spanish narrative.

For some authors, the natural protection provided by WWII fitted in perfectly with the strong self-sufficient vocation of Franco's political regime, which was clearly reflected in the early creation of a public entrepreneurial holding in 1941 and the prohibition of foreign investment. Consistent with this strategy, a strict system of import quotas and licenses came into force during the 1940s until the poor economic performance of Spain led to the goal of autarky being redefined in terms of import substitution in the 1950s¹⁶. For others, the willingness of Franco's regime to reintegrate the country into the world economy was already present in the Spanish attempts to join the international monetary system in the mid-1940s and only the isolation with which the authoritarian regime was punished after WWII, by constraining the availability of foreign currency, explains the use of quantitative restrictions and exchange controls to preserve the balance-of-payments equilibrium (Cavalieri 2014)¹⁷.

The fact is that Spain first tried to overcome the balance-of-payments crisis in 1947 through international loans, and it was the failure to obtain these loans which led the Spanish Institute of Foreign Currency (*Instituto Español de Moneda Extranjera* (IEME)) to ask for an 80 per cent devaluation of the peseta to compensate for losses of competitiveness and encourage an external adjustment. These demands for devaluation, however, were only partially attended to by resorting to a multiple exchange rate system. This solution was aimed at contenting the supporters of boosting internal industrialisation by keeping appreciated (cheaper) currency rates on the imports of raw materials, while prompting the adjustment of the balance of payments by applying depreciated (more expensive) rates on other imports (Viñas *et al.* 1979). The possibility of a partial negotiation of foreign currency on the Madrid stock exchange, introduced in 1950, has to be understood in the same terms. This measure, equivalent to assigning a regime of floating exchange rate to a percentage of commercial transactions, was meant to

¹⁶ Moreover, in the 1940s, the possibility of importing some goods was restricted to the state while, for public enterprises, it was prohibited to import goods if domestic production, even if at higher prices, was available (Viñas *et al.* 1979).

¹⁷ According to Cavalieri (2014), the Spanish government closely followed the American-British talks on the future international monetary regime as early as 1943. This author offers a detailed description of the early failed attempts of Spain to join Bretton Woods and, based on these failures, argues that the autarkic rhetoric of Franco's regime until the late 1950s was more outwardly imposed than inwardly defended.

smooth the Spanish balance-of-payments adjustment and has to be seen as a natural complement to the decision to advance towards international integration.

Economic historians have long claimed that the 1950s ushered in significant changes in economic policy, among them, some relaxation of the import barriers (Donges 1976; Ros-Hombravella *et al.* 1978; González 1979; García-Delgado 1987; Carreras and Tafunell 2003)¹⁸. Our recursive computing of half-lives, by showing how persistence strengthens sharply until 1948 and weakens afterwards, complements the view of those who claim the non-homogeneity of Franco's autarky. The weakening of persistence in the 1950s fits in especially with the gradual reduction of macro-distortions that Prados de la Escosura *et al.* (2012) assign to this decade when studying the impact of Franco's economic policies on growth¹⁹.

In the case of the franc, the weakening of persistence in the late-1940s, so clear for the dollar and the pound, is veiled by the spectacular impact of WWII. By 1942, the franc had lost most of its value²⁰. However, after the stabilisation and monetary reform of 1948, the trajectory of the peseta/franc half-life deviations followed the downward paths of the dollar and pound. This shared path continued after the PSL of 1959, which, as we have already said, included a program of openness supported by the International Monetary Fund (IMF)²¹. The tariffs passed in the new bill of 1960 were gradually reduced and the percentage of trade not affected by quotas increased dramatically during the 1960s until the impact of the first oil crisis put a stop to the process. Also in 1959, the peseta entered the adjustable fixed exchange rate system of Bretton Woods with an equivalence in gold of 0.01488112 g, which fixed the parity at 60 pesetas/dollar. Consistent with this integration process, Figures 4 and 5 show how the recursive computing of half-life deviations registered a mild reduction, in which the devaluation of the peseta/dollar exchange rate in November 1967 played a decisive role. To relieve its external disequilibrium, the United Kingdom asked the IMF for an

¹⁸ In fact, Carreras and Tafunell (2003), in their *Historia Económica de la España contemporánea*, reserve the term autarky for the 1940s and, in a separate chapter, call the 1950s the years of import substitution.

¹⁹ These authors refuse to consider the first two decades of Franco's dictatorship as a *monolithic autarkic era* and estimate that, had intervention not been moderated in the 1950s, the Spanish annual rate of GDP growth would have been 2 per cent lower.

²⁰ In the words of Mildward (1986), after the German invasion, there was no demand for the French franc, which became a currency with no external value.

²¹ Although some relief measures were taken in the 1950s, import flows remained highly constrained. A license from the *Dirección General de Comercio* was necessary for each import operation and it was only valid for the country specified within the 6 months following its expedition. The license was required to obtain the necessary foreign currency from the IEME. Miguel (1952), Ros-Hombravella *et al.* (1978) and Viñas *et al.* (1979) detail the administrative procedures. In 1958, the dominance of quantitative restrictions on trade continued, only 9 per cent of imports being liberalised. A report on Spanish trade policy during Franco's regime can be found in Viñas *et al.* (1979). See also Donges (1976) and González (1979).

intense devaluation of the pound on the 17 November, and Spain, the day after, decided to follow. The reason argued was that, in a framework of increasing openness, the country's balance of payments was deteriorating²². In this way, with the acquiescence of the IMF, Spanish external competitiveness was restored without having to resort to internal deflation, and the fact that the devaluation was accompanied by stabilising measures (reduction of public spending and increases in taxes and interest rates) assured the equilibrium of the Spanish balance of payments for several years (Rojo 1975; González 1979; Muns 1986).

The result of devaluation plus stabilisation, in terms of persistence, was a sub-period of calm eventually interrupted by the misalignment ignited by the suspension of the dollar's gold convertibility in August 1971. The Spanish decision to maintain the gold equivalence that was set up in 1959, while the dollar devalued its gold parity in December 1971 and February 1973, explains the gains in persistence shown in Figure 4. The fact that France and the United Kingdom floated the franc and the pound in December 1971 and June 1972, respectively, while Spain delayed this decision until January 1974, when the worsening of the external imbalance forced her to adopt a managed floating system, explains the gains in persistence shown in Figures 5 and 6. Only the mean-reverting corrections introduced by the consecutive devaluations of the peseta/dollar exchange rate in 1976, 1977 and 1982 drove half-life deviations back to Bretton Woods levels²³. This finding is in tune with the idea that the 1973 levels of Spanish external competitiveness were not restored until 1982 (Dehesa 1983; Buisán and Gordo 1997).

As Figure 4 clearly depicts, new and sharp gains in persistence governed the peseta/dollar exchange rate in the second half of the 1980s. On the contrary, Figures 5 and 6 show a reduction in persistence when the period 1971-1998 is added. Because of its agreement with the EEC in 1970 and its entry in 1986, Spain underwent an important process of commercial liberalisation. So, the reduction in persistence in the cases of the pound and the franc might be explained by the United Kingdom and France having taken more advantage of Spanish integration into Europe, which might have made goods arbitrage more effective and the peseta/pound and the peseta/franc real exchange rates adjustment faster²⁴.

²² For a detailed study of the demands and arguments used before the IMF to modify the parity and the exchange rate system of the peseta between 1959 and 1982, see Muns (1986).

²³ In February 1976, the Spanish government decided to stop sustaining the rate at around 60 pesetas/dollar and established a new rate at around 66 pesetas/dollar. In March, a report of the IMF supported this devaluation as a legitimate tool to correct the losses of competitiveness accumulated by the Spanish economy since the collapse of Bretton Woods. The need to boost competitiveness was again the argument used before the IMF for the fixing of a new devalued rate of intervention in July 1977, at around 87 pesetas/dollar and, yet again, in December 1982, when the rate was raised to around 117 pesetas/dollar.

²⁴ Lower trade barriers are among the reasons given, in some papers working with panel data, to explain why the PPP hypothesis works much better for the post-Bretton Woods period if, instead

This is the issue we explore formally in the following section, which is devoted to the trilemma constraint, as it worked in the peseta's epoch. The entry of Spain into the EMU in 1998 put an end to resorting to the peseta as an adjusting mechanism, meaning that against trading partners within the eurozone, any balance-of-payments imbalance should be fully corrected through internal devaluation. For a time, however, the intra-euro financial integration let the periphery continue without bearing the new rule in mind. In fact, in a study for the eurozone prior to the outbreak of the financial crisis in 2008, Chen *et al.* (2013) presented the disappearance of the traditional exchange rate adjusting mechanism as the reason for the exceptional current account imbalances built up by peripheral euro countries. In Spain, price divergence against other countries of the zone could no longer be compensated by external devaluation and, on top of this, the euro appreciation caused by the optimism of investors outside Europe on the prospects of the euro core countries amplified its loss of competitiveness. If this did not become a problem, it was because of the easy financing that Spain obtained from the core thanks to intra-euro financial integration. The need for adjustment did not come until the crisis turned inflows of capital into outflows and the recovery of competitiveness started to force relative prices down in 2010. In this process of recovering competitiveness, Spain was helped by the depreciation of the euro against the dollar and the pound. This was not feasible with France. As the possibility of an external devaluation had gone with the euro, it meant that all the adjustment fell on internal deflation, and the fact that relative prices had not yet returned to pre-euro levels by 2014 can explain why Figure 6 shows a rise in persistence (from 8.5 to 9.4 years) against France, in contrast to the decrease shown in Figures 4 and 5 for the United States and the United Kingdom.

3. PESETA AND *TRILEMMA*

As we said in the introductory section, we refer to the macroeconomic trilemma in terms of commodity arbitrage and this, in a country like Spain, with a long record of price differentials, means that, to correct balance-of-payments imbalances, the choice, until 1998, was between depreciating the peseta and/or reducing the country's international integration level. We first explore the accomplishment of this trade-off in the very long run. Second, we look more deeply into this issue by revisiting the contents of the report on the convenience of Spain joining the gold standard in 1929.

(footnote continued)

of the dollar, other currencies (generally the Deutsche Mark) are used as the numeraire. See, for example, Jorion and Sweeney (1996) and Papell and Theodoridis (2001).

3.1. In the Very Long Run

When, in the wake of the EEC constitution, Haberler (1964) stated that the world was *in the age of integration*, he advocated the need of putting this movement into historical perspective. As a previous *wave* of world integration, he cited the free trade movement that started in the United Kingdom in the mid-19th century and spread to continental Europe through a network of commercial treaties articulated around the one signed by Cobden and Chevalier in 1860. This liberal commercial policy movement had its first reversal in the German tariff bill passed in 1878, a protectionist backlash that succeeded in continental Europe as a reaction to the grain invasion from Russia and America. This grain invasion was propelled by the plunge in maritime and land transport costs due to technological advances (steamships and railways), and the rise of tariffs only partially offset the continuing reduction of transport costs, which explains why world trade grew until 1913.

According to Haberler (1964), the first serious disintegration of the international economy occurred, for obvious reasons, during WWI. By 1929, world trade was back above the 1913 level, but the Great Depression drove a generalised return of high trade barriers (quotas, import prohibitions and/or exchange rate controls) that, this time, with no decreasing transport costs counteracting them, led to disintegration. Disintegration levels reached maximums following the outbreak of WWII and this author dated the start of a new *wave* of international integration in 1948. By the mid-1950s, many countries had made great advances in removing import quotas and the constitution of the EEC and the announcement of the so-called Kennedy round of tariff reductions under the General Agreement on Tariffs and Trade (GATT) allowed this author to anticipate further movements towards integration.

Haberler's integration chronology, including his expectations of further advances, has been confirmed in the study carried out by Findlay and O'Rourke (2003) and, more recently, quantified by Jacks *et al.* (2008, 2010, 2011). Covering the period 1870-2000, these authors compute a synthetic measure of trade costs (including transport costs, customs and other barriers) as the difference between the observed figures of pairs of countries' trade and the figures derived from a gravitational model. According to their estimates, trade costs fell by 30 per cent in 1870-1913, from which they infer that the European protectionist backlash only partially offset the steady decline in freight rates. By applying the same procedure, they also provide evidence that, from 1921 to 1939, the average trade costs increased by 13 per cent. This increase was the result of combining the softening of commercial policies until 1929 and its surge from then until 1933. Finally, Jacks *et al.* (2011) estimate that trade costs declined by 16 per cent from 1950 to 2000, which can be explained more by the removal of commercial policy barriers

FIGURE 7
SPANISH RATIO OF OPENNESS (EXPORTS PLUS IMPORTS OVER GDP)



Sources: Trade data come from Tena (2005), who considers the revision of official export and import figures between 1870 and 1959 carried out by Prados de la Escosura (1986), Tena (1992) and Martínez-Ruiz (2000), and the official values of the Spanish Trade Statistics from 1960 onwards. The GDP source is Prados de la Escosura (2003).

than by transport innovations. This starring role of customs fits in with their finding that the most dramatic reduction in trade costs estimates was for intra-European trade following the constitution of the EEC.

In general terms, this chronology of integration and disintegration waves matches the trajectory of the Spanish ratio of openness (exports plus imports over the Spanish GDP) as presented in Figure 7. There is a first movement in tune with the wave of international integration until 1913. WWI leaves its negative mark as does the introduction of quantitative restrictions and exchange controls in 1931. The outbreak of the Spanish civil war in 1936, overlapping the disintegration effects of WWII, lowered the openness ratio to a minimum in the mid-1940s. By 1959, the level of Spanish openness was still below the pre-1929 crisis ratio. From then on, the PSL of 1959, the tariffs cuts promoted in the GATT rounds and, above all, the 1970 agreement with and 1986 entrance into the EEC, fostered Spanish international integration.

The question is whether this ratio of openness, consistent with our trilemma formulation, is negatively (positively) linked to the half-life deviation of real exchange rates from (with the speed of reversion to) equilibrium. For this purpose, we have constructed an index of the peseta effective real exchange rate against the dollar, pound and franc, with each bilateral nominal exchange rate and index of relative prices being weighted according

to the importance of each country in Spanish foreign trade²⁵. We then recursively estimate the half-life deviations of the peseta effective real exchange rate and formally analyse its relationship with the time-varying ratio of openness from 1900 to 1998.

This relation is estimated under minimal assumptions that rely on non-parametric methods. A non-parametric approach is very appropriate in this case because it works well under mild conditions of the variables (the half-life variable comes from estimation and may contain measurement errors) and very flexible functional forms. We focus on assessing the role of openness in explaining real exchange rate persistence patterns. To that end, we first compute the average openness over each possible level of the half-life, $E(\text{HL}|\text{OP} = c)$. Notice that the conditional mean can be calculated for every value of HL. To compute the conditional expectation, we use the Nadaraya-Watson estimator (local constant) with a Gaussian kernel²⁶. Thus, if HL is independent from OP, then, $E(\text{HL}|\text{OP}) = E(\text{HL})$. Finally, we can proxy the role of openness in explaining regional synchronisation through the difference between the conditional and the unconditional expectations:

$$\text{HL}(c) = E(\text{HL}|\text{OP} = c) - E(\text{HL}) \quad [4]$$

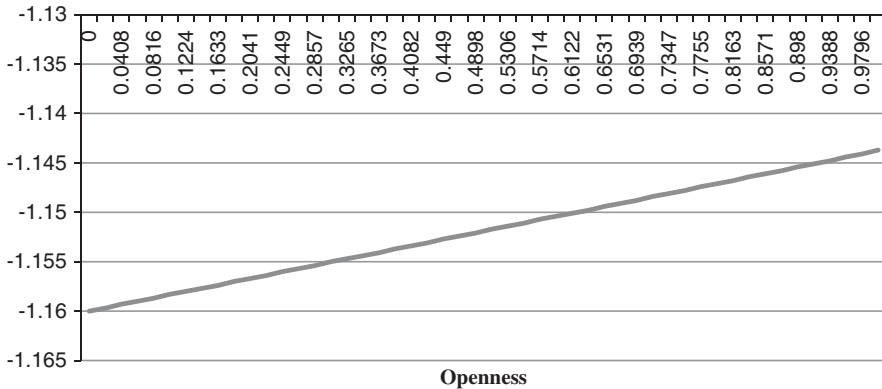
where the unconditional expectation is calculated as the simple cross-sectional average. When $\text{HL}(c)$ is close to 0, this implies that the explanatory power of openness is negligible. Conversely, the larger $\text{HL}(c)$ is, the more informative openness is to explain persistence patterns. In this exercise, we work with annual data and, therefore, we have 129 years which, after recursively computing the half-lives with a 30-year window, gives us 100 observations. Figure 8 plots $\text{HL}(c)$ showing a linear negative relationship between openness and the persistence of real exchange rates, the latter measured through half-lives. This means that the conditional expectation of half-lives decreases with the degree of openness. Thus, this paper contributes to the still scant empirical evidence of this trade-off in the literature²⁷.

²⁵ We calculate the effective nominal exchange rate index as a geometric average of the three bilateral nominal exchange rates, each one weighted by the relative weight of each country (imports plus exports) in the Spanish foreign trade. The average weight is revised every decade. We calculate the relative price index by dividing the Spanish deflator by the weighted average of the U.S., British and French deflators. The weighting of foreign prices is the same as in the effective nominal exchange rate. Data on the foreign trade per country come from the *Spanish Trade Statistics* (from the *Spanish Statistical Yearbook* since 1990).

²⁶ The selection of the optimal bandwidth is based on cross-validation using the Quartic kernel for each year. The intensity of the effect depends on the value of the bandwidth; the smaller the bandwidth, the higher the effect. We work with a bandwidth of 0.10.

²⁷ Few papers have found a significant link between the width of the thresholds in non-linear models of real exchange rates, that is, the width of deviations from parity and a number of trade friction variables such as distance, tariffs and exchange rate controls (Obstfeld and Taylor 1997; Imbs *et al.* 2003). Our finding is more in tune with that of Pavlidis *et al.* (2011), who shows that increases in an estimated index of total trade costs, that is, increases in a comprehensive measure of trade frictions such as openness, lead to increases in the width of thresholds for the dollar/pound real exchange rate series in 1830-2000.

FIGURE 8
EFFECT OF OPENNESS ON PERSISTENCE (CONDITIONAL
EXPECTATION - UNCONDITIONAL EXPECTATION)



Source: See text.

Our result also agrees with Eichengreen and Irwin (2010) who established that the different degrees of trade protectionism to which nations resorted in the early 1930s depended on whether they had left the gold standard or not²⁸. Britain, and the countries that followed Britain out of the standard, were able to loosen their monetary policies without worrying about their balance-of-payment adjustment. Freed from gold requirements, the floating exchange rate was in charge of accommodating the resulting price differentials. On the contrary, countries that, like France, remained on the standard had to resort to protectionism to keep their balance-of-payment adjusted. In accordance with the trilemma constraint, more openness is paired with accommodating exchange rates and less deviation persistence.

3.2. In Times of the Gold Standard

The exceptionality of not formally belonging to the gold standard was never clearer than when in 1928 only Spain and Turkey, among the European countries, remained out of it. The Spanish exceptionality, however, can by no means be put down to indifference since the possibility of joining the standard was by then at the centre of the political arena. The Spanish government, embodied by Calvo Sotelo, the Minister of Finance, backed the convenience of joining the standard and, to that end, of

²⁸ Eichengreen and Irwin (2010) find a robust relationship from exchange rates (ratio of gold par 1935/1928) to protection (tariff rate 1935/1928).

intervening on the exchange rate market to counteract the capital outflows and stabilise the external value of the peseta. On the other hand, in 1928, a former Minister of Finance, Cambó, led a campaign of criticism against the government's intervention in favour of the peseta on the basis that this prevented the exchange rate from moving in accordance with relative prices, which damaged domestic competitiveness²⁹.

In Cambó's opinion, the appreciation of the peseta in 1926 and 1927 had resulted from the confluence of some extraordinary events (the end of the Spanish war in Morocco and the official statement declaring the intention of joining the gold standard at the parity fixed in 1868) which encouraged speculative capital inflows, thus disconnecting the peseta exchange rate from relative prices. When the holders of pesetas realised that «there was no economic reason for the appreciation», capital outflows began depreciating the Spanish currency (Cambó 1929, p. 28). A declared supporter of Cassel's PPP hypothesis, Cambó argued that, without intervention, the peseta would continue to depreciate until domestic competitiveness had been restored. Intervention, however, was preventing the completion of this adjustment and, in Cambó's (1929) words, created «economic disturbances» (Cambó 1929, p. 44). The only way to stabilise the peseta's external value and avoid «disturbances» was to link the domestic to foreign prices, which, in turn, required ceasing the monetary financing of Spanish deficits.

The Minister of Finance counteracted arguing that the PPP hypothesis was not of application to the Spanish economy (Cambó 1929, pp. 81-88). The official view was that the exchange rate could remain disconnected from relative prices in Spain and, consequently, it made no sense to postpone the stabilisation of the peseta until the deficits had disappeared. The Minister advocated formally joining the gold standard and announced the immediate constitution of a committee to inform on the terms on which the stabilisation of the peseta should be based. However, the official report of the committee, under the presidency of Flores de Lemus, ended up endorsing Cambó's position³⁰.

The report claimed, based on the high correlation values found between the yearly peseta/pound exchange rate and the relative (Spanish over British) prices in 1890-1928, that there was an «undeniable and tight relation» between the two variables, although it accepted that this relation was not «simple and clear» in terms of «causality». The fact that the low correlation value (0.63) found when the estimation was carried out at a monthly frequency for the period 1921-1928 reached a high value (0.90) when moving

²⁹ The campaign was carried out through a series of press articles, from 28 November to 9 December, gathered together by Cambó (1929) with the official responses.

³⁰ This is a not entirely unexpected result considering that Flores de Lemus had been a university teacher of Tallada, also a member of the committee, and Tallada, in turn, had been a teacher of Vandellós, both of them regular advisors of Cambó on economic issues. See Bausili (1974).

the exchange rate forward was taken as proof that, at least in those years, there was a bidirectional link. For the report's committee, shocks to the balance of payments due to the agrarian bias of Spanish exports influenced the peseta/pound exchange rate in the short run. The gains in correlation when moving the exchange rate 7 months forward, time enough for these changes in rates to be transmitted to prices, were indicative of this influence. In any case, for the report, the correlation indicated the *undeniable* existence of an equilibrium between the peseta and relative prices and, for this reason, recommended not fixing the peseta exchange rate until the control of Spanish deficits allowed a sustainable parallelism between Spanish and foreign prices. The constraints of the trilemma were strongly present in this argumentation. In a scenario of still fluent trade flows, the report warned that the fixing of exchange rates implied linking domestic to foreign prices and that any divergence, in a country like Spain, with downward rigid salaries and prices, would end up translating into cuts in production and employment.

In the academic field, the 1929 report was technically qualified over the causality issue by Bernácer (1929a, 1929b) and Fernández-baños (1930). The first author, using Flores de Lemus's (1976 [1929]) own words, insisted on the idea that «correlation was not causality» and refused to accept the increase in correlation when the exchange rate was moved forward as proof of influence of exchange rates on prices in 1921-1928³¹. In the short run, the only prices on which the exchange rates had influence were those of import and export commodities and, given the small range of export and import commodities compared to total domestic consumption, it was not feasible, in his opinion, «that the Spanish index could be notably modified» (Bernácer 1929a, p. 202). Rather than the exchange rate's influence on prices, what this increase in the correlation could be denoting is the market validation of inflationist expectations³². The same query about causality was present in Fernández-baños (1930) who, like Bernácer (1929a, 1929b), thought that the gains in correlation when moving the exchange rate several months forward, instead of reflecting its economic influence on prices, could be merely reflecting the quicker response of the peseta to events (e.g. budget deficits) that affected both exchange rates (through expectations of the monetary

³¹ The first part of the 1929 report is highly coincident with the contents of Flores de Lemus (1976 [1929]).

³² Bernácer (1924, 1928) had already underlined the role that expectations on economic fundamentals might have played in influencing exchange rates. The example he proposed started with a worsening of Spanish deficits. If speculators forecast the need of the monetary financing of deficits, the subsequent Spanish price differentials and, eventually, the future depreciation of the peseta, they would demand foreign currency, thus provoking an immediate depreciation. «If the speculator is right when forecasting the future exchange rate variations based on the Spanish economic reality, his action will just anticipate these variations» (Bernácer 1928, p. 361). For this reason, and not because of the influence of the exchange rate on prices, the correlation between the exchange rates and prices might increase by moving the first variable forward.

financing of these deficits) and prices (through the monetary expansion following the financing of deficits). Despite these qualifications, both authors endorsed the report's conclusion that there was an equilibrium relationship between exchange rate and relative prices and that, consequently, the government's building up of deficits and their monetary financing was incongruent with the fixing of the exchange rate.

In practice, however, the report did not influence policy makers. The government of Primo de Rivera's dictatorship resumed intervention in June (1929). It had to be suspended in October of that year when funds ran out without stopping depreciation, although interventions continued with the national government constituted in January 1930 and, later, with the arrival of the republic in April 1931. With few exceptions, politicians ignored the warnings of the futility of trying to stabilise the peseta without eliminating deficits³³. More importantly, they ignored the warnings of the dangers of stabilising the Spanish exchange rate, just when deflation was spreading worldwide from the United States through the functioning of the gold standard. In a framework of downward rigid salaries, as the 1929 report warned, this meant rising unemployment³⁴.

These announced dangers soon became real. After fixing the exchange rate against the gold franc in 1933, the balance-of-payments adjustment, in the words of Vandellós (1936), was «pursued through domestic prices, although they only responded initially and, later, with the Spanish traditional inflationist policy, the situation worsened» (Vandellós 1936, p.9). Eventually, to preserve external equilibrium, quantitative restrictions on imports and delays in making external payments had generalised. International integration was sacrificed, a result not at all unexpected, according to this author, after the compelling terms in which the report had diagnosed the incongruence of implementing price divergent policies while keeping the exchange rate fixed.

But, how compelling do the report's conclusions remain when observed through the lenses of improved Spanish data and current econometric techniques? Because of the dominance of import commodities until 1913, the literature has convincingly argued that the report did not work with a reliable representation of the evolution of domestic prices. This shortcoming can now be overcome because Prados de la Escosura (2003) estimated deflators for Spain in 1850-1948. Moreover, state-of-the-art econometrics allows us to improve estimates of the link between relative prices and exchange rates and, above all, to establish statistical causal relationships between these two variables.

³³ Martín-Aceña (1987, p. 130) cites the exception of Carner, who «decided to leave the exchange rate to find equilibrium».

³⁴ Eichengreen (1995) provides an extensive description of the role of the gold standard, as a system of fixed exchange rates, in spreading deflation worldwide.

TABLE 1
 HALF-LIVES (HL) OF THE PESETA/POUND REAL
 EXCHANGE RATES FOR SELECTED PERIODS

	HL
1890-1928	2.41
1882-1928	2.87
1882-1913	3.39

Notes: We use the exact maximum likelihood method proposed by Sowell (1992). This method, parametric and in the time domain, estimates the full auto-regressive fractionally integrated moving average (ARFIMA) model. We select the best ARFIMA model by using the Schwartz information criterion from a general ARFIMA (p,d,q) model with $p = q = 0,1$.

Table 1 presents the results of testing the PPP hypothesis on a yearly basis. We find that the peseta/pound real exchange rate is mean reverting when we examine the period 1890-1928 and when we extend the temporal coverage back to 1882, the year in which the peseta's gold convertibility was definitively suspended. We also find that the hypothesis holds for the period 1882-1913. Accordingly, we always find short half-life deviations from equilibrium³⁵. Thus, modern econometric techniques with revised price indexes reinforce the report's idea that, in the long run, there was a parallelism between the movements of relative prices and exchange rates. To go a little further, we have applied a VAR (vector auto-regressive) model to study whether one of the series is exogenous to the other. Having selected the order of the VAR in accordance with the Schwartz information criterion and the AIC, Table 2 shows evidence of Granger causality from relative prices to the exchange rate in 1882-1913 and evidence in both directions when the coverage is expanded to include the 1920s. The statistical evidence that relative prices drove the peseta/pound exchange rates, in turn, allows us to take up the controversy on the protectionist effects of a floating exchange rate in times of the gold standard.

Using calculations of the peseta real exchange rate in 1891-1904, Sabaté (1993) denied that a floating peseta meant additional protection for the Spanish economy, as claimed by, among others, Maluquer de Motes (1985), Prados de la Escosura (1988) and Fraile (1991). Sabaté's (1993) results, however, used the Spanish price index provided by the 1929 report, which, as we have said, was dominated by import commodities. This shortcoming could not be overcome until Prados de la Escosura (1995, 2003) estimated a Spanish deflator starting in 1850. With this index, Serrano *et al.* (1998) and

³⁵ They are significantly shorter than the one found until 1998, which, as shown in section 1, was over 7 years in 1870-1998.

TABLE 2
CAUSALITY BETWEEN PESETA/POUND NOMINAL
EXCHANGE RATES (E) AND RELATIVE PRICES (P/P^*)
FOR SELECTED PERIODS

	$p/p^* > e$	$e > p/p^*$
1890-1928	0.090	0.000
1882-1928	0.048	0.002
1882-1913	0.051	0.256

Notes: This table displays the P -values of the Granger causality Wald test. Once cointegration between nominal exchange rate and relative price has been accepted, a vector auto-regressive (VAR) system is estimated to check the direction of causality. The number of lags in the VAR system has been selected in accordance with the Schwartz information criterion.

Sabaté *et al.* (2003) provided evidence of accomplishment of the PPP hypothesis for the peseta/pound exchange rate in 1882-1931. Based on this evidence, they insisted that the floating of the peseta only compensated for price differentials, in other words, that, on average, the peseta did not add protection to that originating from customs. However, by identifying deviations from parity linked to balance-of-payments shocks, Gadea and Sabaté (2004) reconciled this absence of a long-run protectionist effect of the peseta with the approach of those who claimed that the float of the Spanish currency had short-run effects, adding protection in the late 1890s or diminishing it in the first decade of the 20th century, as sustained in Prados de la Escosura and Tena (1994) and Sánchez-Alonso (1995). Sabaté *et al.* (2011), through a gravitational approach, also backed the idea that, although with short-run effects, the exchange rate had not played a deterrent role in the long run. This made it difficult to envision the floating of the peseta as a protectionist strategy. The floating of the peseta was more the result, they maintained, of Spanish fiscal profligacy. Deficits meant money creation, money creation provoked price differentials and price differentials were behind the float³⁶. However, to accept this thesis, as Maluquer de Motes (2013) has recently underlined when remembering the controversy on the protectionist effects of the floating of the peseta, some evidence that relative prices caused exchange rates was lacking. This is the evidence provided in this paper, whether we consider the classical gold standard (1882-1913) or the classical and exchange gold standards (1882-1928).

³⁶ The channels through which fiscal policy dominated monetary policy in Spain before the Civil War are summarised in Sabaté *et al.* (2006, 2015). Both articles support the hypothesis of fiscal dominance.

Table 2 also shows that exchange rates caused relative prices if the post-WWI years are included in the yearly analysis, a possibility that we examine on a monthly basis for the period 1921-1928. We recall that, for these years, the report gave a correlation between prices and exchange rate of 0.63. However, using the same data as the report, we find that the regression coefficient of the peseta/pound exchange rate on relative prices is much lower, 0.16, very close to the also low coefficient of correlation, 0.18, found by Rojo (1960)³⁷. He explained this gap arguing that the correlation had not been estimated between exchange rate and relative prices, but between exchange rate, Spanish prices and British prices³⁸. In any case, the low correlation between exchange rate and relative prices in 1921-1928 did not invalidate the report's defense of an *undeniable* connection between the two variables. In Rojo's opinion, the underlying problem is that the temporal coverage was too short for the accomplishment of PPP hypothesis to emerge, as Martín-Aceña (1983) would also remark later. In fact, we find no cointegration (no long run) relationship between exchange rate and relative prices in 1921-1928. As shown in Table 3, we also fail to find cointegration when we extend the period until 1935³⁹. Interestingly, the analysis of the properties of the monthly peseta/pound real exchange rate series in 1921-1935 locates a structural change in terms of appreciation in August 1931, just before the British currency exited gold.

So, our exercise not only illustrates the problems of finding PPP evidence in short-run horizons. It also supports the Spanish narrative when it strongly agrees that the decision to keep the peseta following the gold block currencies after the pound's exit meant an appreciation shock against the exiting currencies⁴⁰. Finally, if the dummy August 1931 is included in the analysis to correct this shock, we find that both series, the exchange rate and relative prices are cointegrated with a coefficient not significantly different from unity. Moreover, when considering the period 1921-1931, Table 3 shows evidence of causality from exchange rates to prices. This result is in line with that of Frenkel (1978) for the dollar/franc and the pound/franc exchange

³⁷ The report was retrieved at different exchange rate system crossroads. For example, it was retrieved by Viñuales (1944) in relation to the Bretton Woods talks; the report was commented by Rojo (1960), when reprinted in a special issue of the review of the Ministry of Trade (*Información Comercial Española*) focussed on justifying the rate at which the convertibility of the peseta was restored. The report was again retrieved by Martín-Aceña (1983) when the collapse of the Bretton Woods system made academics look back to the previous experience of floating exchange rates.

³⁸ According to Rojo (1960, notes 8 and 9), the high multiple correlation in the report reflects the parallelism between the three variables; a parallelism that disappears when the flatter trajectory of relative prices is related to that of the peseta exchange rate.

³⁹ We have extended the coverage using the same sources as the report. Exchange rates come from the Madrid stock exchange rate, in Martínez Méndez (1990). Spanish prices come from Dirección General de Estadística (1942). As Flores de Lemus (1976 [1929]) did, we have worked with 11-month moving averages. British prices come from *The Statist*, in Capie and Collins (1983).

⁴⁰ See Olariaga (1933) and Vandellós (1936). Sardá (1936, p. 93) described the decision to link the peseta to the gold block as *dogmatic*.

TABLE 3
COINTEGRATION AND CAUSALITY BETWEEN NOMINAL EXCHANGE RATES (E)
AND RELATIVE PRICES (P/P^*)

	Trace test	Maximum eigenvalue test
Cointegration without structural breaks		
No cointegration vector	0.5135	0.5087
One cointegration vector	0.5866	0.5866
Cointegration with structural break in 1931.08		
No cointegration vector	0.0138	0.0428
One cointegration vector	0.0887	0.0887
Granger causality tests		
$p/p^* > e$	0.0018	
$e > p/p^*$	0.1129	

Notes: This table displays the P -values of the Johansen (1991, 1995) cointegration tests and the Granger causality Wald test. Once cointegration between nominal exchange rate and relative prices has been accepted, a vector auto-regressive (VAR) system is estimated to check the direction of causality. The number of lags in the VAR system has been selected according to the Schwartz information criterion. The position of the structural break has been endogenously selected in accordance with the Quandt-Andrews unknown breakpoint test (Andrews 1993).

rates in the early floating 1920s. Interestingly, this author underlines how statistical causality from exchange rate to prices might be merely reflecting that the former reacts faster than prices to common factors as Bernácer (1929a, 1929b) and Fernández-baños (1930) had ventured, 50 years before, in their comments on the report. In any case, the statistical causality from exchange rates to prices in 1921-1931 and the reversing causality from prices to exchange rates that we find in 1921-1935 support the existence of a link between the two variables that, even in the short run, the report postulated.

4. CONCLUSIONS

This paper provides evidence of mean reversion in the peseta/dollar, the peseta/pound and the peseta/franc real exchange rate series in 1870-1998. More importantly, we find that, in accordance with the very different macro-trilemma scenarios that the peseta went through, the speed of the adjustment varied strongly over time. The narrative has repeatedly underlined that, in times of the peseta, Spain tended to solve this trilemma through domestic monetary sovereignty to finance deficits, which required a trade-off between raising trade barriers and/or accepting the external loss of the peseta's value. We find a systematic negative relationship between the Spanish ratio of

openness and the persistence of deviations from parity, which contributes to the still scant evidence of this trade-off in the literature.

The entry of Spain into the EMU put an end to the depreciation adjusting mechanism, leaving the level of production and the rate of unemployment in their place. The terms of this alternative had already been thoroughly discussed nearly a century ago when the country assessed the possibility of fixing the peseta's exchange rate against gold. For this reason, we have also revisited the 1929 report on the convenience of Spain joining the gold standard. With more refined data and modern techniques, we support its conclusion that the exchange rate and relative prices were indisputably linked in 1890-1928. Moreover, we provide evidence of statistical causality from prices to exchange rate, which allows us to complete our explanation of why the peseta remained outside the gold standard. From a controversial rejection of the protectionist effect of the peseta's depreciation at the end of the 19th century, we evolved towards a less rigid interpretation, according to which, in times of the gold standard, the peseta sometimes reinforced, while other times weakened the protection originating from customs. However, since these short-run effects counterbalanced each other, there were no extra protectionist effects in the long run. So, we denied that the floating of the peseta responded to a protectionist strategy, being instead the result of the need to finance deficits monetarily. As it has been shown that deficits led to money creation, this paper, by providing evidence of causality from prices to exchange rates, completes the thesis.

Finally, by extending the report's monthly analysis to 1935, we confirm its intuition that, even in the short run, exchange rate and relative prices were interconnected. This evidence, added to the solid link between the two variables found for the period 1890-1928, confirms the pertinence of the report's warnings against the futility and costs of assigning incongruent targets to exchange rates and prices. It stated that fixing exchange rates without a compromise of curbing price differentials would, sooner or later, force an exit from gold. This was because it did not contemplate closing the country to international trade and because it assumed that the losses of competitiveness would accumulate until the balance of payments forced an exit from gold and let the peseta compensate for them. It rejected the option of readjusting the balance of payments through cuts in production and employment that drove Spanish prices down. With the peseta *gone with the euro*, the long-feared internal devaluation has finally become the only mechanism through which Spain can restore the external equilibrium.

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