

Economic History Society Annual Conference

Reading, 1st April 2006

**Adjustment under the Classical Gold Standard:
How costly did the external constraint come to
the European periphery?**

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Abstract

Conventional wisdom has that peripheral economies had to 'play by the rules of the game' under the Classical Gold Standard, while core countries could get away with frequent violations. Drawing on the experience of the two largest peripheral economies in pre-World War I Europe, ie Austria-Hungary and Italy, my paper challenges this view. Based on a vector error correction model and impulse response functions, it is shown that even the so-called periphery embarked on sterilisation policies and was not forced to use the discount rate tool in a way that would have put the domestic economy under too much strain. In the second part of the paper, I turn to a comparison of the two countries: what explains that Austria-Hungary retained more room for manoeuvre than Italy (another result of the VEC model)? Based on a reconstruction of the balance of payments and other economic indicators, I argue that Austria-Hungary was integrated into the global financial system in a more sustainable way; Italy's adherence to gold, by contrast, depended on several circumstances beyond her control, most importantly the steady influx of remittances.

1. Introduction

The discussions on the Classical Gold Standard are often phrased in terms of costs and benefits. While benefits might be seen in easier and cheaper access to foreign capital¹, it is less straightforward to define the 'costs' of adhering to gold. The gold standard as a system of (quasi) fixed exchange rates required the monetary authority to adopt measures so that the exchange rate would follow mint parity within the boundaries set by the gold points. In other words, continuous adjustment efforts were needed to maintain the gold link. In the case of a gold outflow, the necessary adjustment efforts would translate into raising the discount rate and/or reducing the monetary base. Partly intended, partly an undesired by-product, both measures would typically reduce domestic economic activity. Thus, the gold standard carried with it the inherent policy conflict between external stability – ie to keep the exchange rate close to mint parity – and domestic stability. Negative repercussions of the necessary adjustment process on domestic economic activity can therefore be viewed as 'costs' of the gold standard.

It is often argued that the adjustment process to balance of payments-disequilibria was very different in the case of the 'core' (UK, US, France, and Germany) as opposed to the 'periphery'.² Several studies have shown that core countries could get away with frequent and sizeable violations of the 'rules of the game'³; it is then argued that this was due to their real economic structure⁴ (theory of optimum currency area), self-stabilising speculation⁵, or central bank cooperation among the core countries⁶, to mention only some of the explanations discussed in the literature. By contrast, adjustment is believed to have been very hard in the case of the periphery: if peripheral economies wanted to adhere to gold, they could do so only at the price of entirely sacrificing the room for domestic stabilisation policies.⁷

We challenge this view, arguing that Austria-Hungary and Italy, the two largest peripheral economies in pre-WW I Europe, retained substantial room for manoeuvre despite their commitment to gold.⁸ This finding is based on a vector error correction model and impulse response functions; in chapter 3 we will explain the model and interpret the results. The impulse response functions not only show sizeable violations of the 'rules of the game', but

¹ Bordo, M. D. and H. Rockoff (1996). "The Gold Standard as a "Good Housekeeping Seal of Approval"." *Journal of Economic History* **56**: 389-428.

² Cf. the editors' introduction to Martín Acena, P. and J. Reis, Eds. (2000). *Monetary Standards in the Periphery: Paper, Silver, and Gold, 1854-1933*. London, New York. In the same vein cf. the editors' introduction (in particular p. 3) to Eichengreen, B. and M. Flandreau, Eds. (1997). *The Gold Standard in Theory and History*. London.

³ Jeanne, O. (1995). "Monetary Policy in England 1893-1914: A Structural VAR Analysis." *Explorations in Economic History* **32**: 302-26. McKinnon, R. I. (1993). "The Rules of the Game: International Money in Historical Perspective." *Journal of Economic Literature* **31**: 1-44. Giovannini, A. (1986). ""Rules of the Game" during the International Gold Standard: England and Germany." *Journal of International Money and Finance* **5**: 467-483.

⁴ Martín Acena, P. and J. Reis, Eds. (2000). *Monetary Standards in the Periphery: Paper, Silver, and Gold, 1854-1933*. London, New York.

⁵ Cf. introduction (in particular pp. 16-17) to Eichengreen, B. and M. Flandreau, Eds. (1997). *The Gold Standard in Theory and History*. London, New York.

⁶ Eichengreen, B. (1995). "Central bank cooperation and exchange rate commitments: the classical and interwar gold standards compared." *Financial History Review* **2**: 99-117. For a critical view cf. Flandreau, M. (1998). "Central Bank Cooperation in Historical Perspective: A Sceptical View." *Economic History Review* **50**(4).

⁷ de Cecco, M. (1996). Short-Term Capital Movements Under the Gold Standard. *Currency Convertibility: The Gold Standard and Beyond*. J. Braga de Macedo, B. Eichengreen and J. Reis. London, New York: 102-112.

⁸ For a theoretical understanding of monetary flexibility despite adherence to a system of fixed exchange rates cf. Svensson, L. E. O. (1994). "Why Exchange Rate Bands? Monetary Independence In Spite of Fixed Exchange Rates." *Journal of Monetary Economics* **33**(1): 157-199.

they also point to important differences between the two countries: Austria-Hungary retained more room for manoeuvre than Italy. Based on a reconstruction of the balance of payments (henceforth *bop*) of both countries and several other economic indicators, chapter 4 explains what accounts for the differences.

The main argument of this paper is built on the notion of ‘costs’ of the gold standard, which are identified as the negative repercussions of the adjustment process on domestic economic activity. This is certainly one way how *modern* economists would look back at the gold standard. As economic *historians*, however, we have to ask ourselves whether we are asking the “wrong question”: given that 19th century economists did not really articulate the conflict between external and domestic stability, it appears at first glance that we are imposing a modern concept of ‘costs’ alien to gold standard contemporaries. We will deal with this potential objection against our approach first (chapter 2).

2. Would our notion of ‘costs’ be alien to gold standard contemporaries?

It is mostly argued that the conflict between external stability (ie keeping the exchange rate close to mint parity) and internal stability (ie providing stimuli to the domestic economy whenever needed) was hardly discussed under the Classical Gold Standard, and came to the fore only in the interwar period.⁹ Indeed, Keynes’ main argument against the UK going back on gold after World War I was precisely that domestic stability would be sacrificed all too easily in the name of external stability. Ever since Keynes’ attack on the gold standard, the idea of a fixed exchange rate system restricting the room for domestic stabilisation policies has shaped monetary policy debate. But does it make sense to apply this yardstick to the pre-1914 gold standard?

We argue that contemporaries of the Classical Gold Standard were much more aware of the burden of adjustment than most economic historians nowadays are ready to admit. Essentially, we are saying that late 19th century central bankers and policy makers were equally aware of the conflict between external stability and internal stability as their early 21st century counterparts. The only difference is that late 19th century observers were living with the overriding paradigm in mind that only gold would make for a good currency; therefore, they would always decide in favour of external stability when it came to a conflict. Still, this does not mean that 19th century central bankers were unaware of the conflict, nor that they did not try to soften the conflict between the two goals wherever they could.

Such an understanding of the gold standard emerges clearly from the annual reports and the protocols of the general council of the Austro-Hungarian bank; while the gold link provided the strongly desired exchange rate stability, the adjustment all too often came as a heavy burden. For instance, in 1899 it took several months to bring the exchange rate under control again; as soon as this overriding objective was satisfied, the Austro-Hungarian bank reduced the discount rate as quickly as possible to provide stimulus to the flagging economy. In justifying this step, the Austro-Hungarian bank argued:

„... we should not forget that the bank’s duties do not only consist of defending mint parity. It is of no less importance to protect and promote all the other interests of our national economy which is beset with so many difficulties...”¹⁰

⁹ Hawtrey, R. G. (1962). A Century of Bank Rate. London, p. 1. Bordo, M. D. (1984). The Gold Standard: The traditional approach. A Retrospective on the Classical Gold Standard, 1821-1931. M. D. Bordo and A. J. Schwartz. Chicago, pp. 28, 68.

¹⁰ Austro-Hungarian Bank (1900), 22. Jahressitzung der Generalversammlung der Österreichisch-ungarischen Bank, p. XI. The report of the annual meeting including the appendices comes closest to what would be an annual report of a modern central bank.

Many other parts of the annual reports¹¹ boost our claim that central banks before World War I were equally aware of the trade-off as their post-war counterpart. In a way, the Austro-Hungarian bank was so acutely aware of the trade-off between external and internal stability that it was looking for ways to make this inherent conflict more bearable. The solution advocated by the bank was to accumulate large enough reserves in good times which could be returned to the market in bad times; in other words, foreign exchange intervention was developed so as to soften the conflict between external and internal stability. The existence of such a strategy emerges very clearly from the general council protocols during the American banking crisis in late 1907.¹²

We can therefore conclude as follows: 19th century central bankers did not perceive of ‘rules of the game’ as something they were happy to follow. While the paramount objective was to keep the exchange rate within the gold points, this was to be achieved with putting as little strain as possible on the domestic economy. In other words, the gold standard entailed rules that were followed if necessary, but happily violated whenever possible and convenient.

3. Estimating the adjustment process: sterilisation and discount rate policy

3.1 A vector error correction model as the most appropriate choice

We conceive of ‘costs’ as the undesired, but inevitable by-product of the adjustment process. According to the ‘rules of the game’, a central bank was supposed to react to an outflow of gold by (a) increasing the discount rate and (b) deliberately exacerbating the effect of a gold outflow on the monetary base. We will call these rules (a) the discount rate rule and (b) the non-sterilisation rule. While the former stresses the importance of short-term capital flows in the adjustment process, the latter is the adaptation of the Humean price-specie flow mechanism to the conditions of the 19th century gold bullion standard (as opposed to the 18th century gold coin standard David Hume had in mind).¹³

The two main channels of adjustment imply that we are essentially interested in the relationship between 3 time series: (a) gold reserves, (b) the discount rate, and (c) the monetary base. As regards the discount rate, it seems more plausible to operate with the discount rate differential to the European centres (London, Paris, Berlin) rather than the discount rate as such.

Two more factors determine the choice of our model: first, all variables need to be treated as endogenous, for all affect each other mutually; second, the three time series – including the discount rate differential (cf. 3.3) – are integrated of order 1, ie they become stationary after first differencing. Taking these limiting factors together, a vector error correction model seems most promising; such a VEC model would allow us to calculate impulse response functions, thereby precisely answering our question: how did the monetary authority react to a gold outflow? Similar to a natural science experiment in a laboratory, one specific cause – a sudden gold outflow – and its effects – on the discount rate (differential) and the monetary base – can be isolated and studied on their own. We therefore estimate the following equation:

¹¹ Ibid. (1898), 20. Jahressitzung, p. X; 21. Jahressitzung, pp. X-XI; 24. Jahressitzung (reprinted in *Compass* 37 (1904), p. 121); 31. Jahressitzung (reprinted in *Compass* 44 (1911), p. 130).

¹² Archive of the Austrian National Bank, Vienna: General council meetings ##528-535 (28th November 1907, 12th December 1907, 10th January 1908, 21st January 1908, 3rd February 1908, 5th March 1908, 9th April 1908, 7th May 1908).

¹³ The difference between the two forms is essentially what constitutes the monetary base. In the gold coin standard, gold coins in circulation form the great bulk of the monetary base. In the gold bullion standard, by contrast, most of the monetary base actually consists of notes issued by one or several note issuing banks. It is precisely this difference which created the responsibility of the note issuing banks for the external value of the currency under the 19th century gold bullion standard.

$$\Delta y_t = \pi y_{t-1} + \sum_{i=1}^{p-1} \pi_i \Delta y_{t-i} + u_t$$

where y_t is a (3x1) vector containing the three time series under investigation ($y_t' = (i_d = \text{bankrate differential, gold, monetary base})$) and p represents the appropriate lag length.

3.2 The data

Data availability is better for Italy than for Austria-Hungary. This reflects the intense research efforts of the Bank of Italy which have resulted in several excellent data collections. In the case of Austria-Hungary archival work was needed to reconstruct the time series.

Austria-Hungary

Estimation was carried out for the years 1896 to 1913. The gold standard legislation of 1892 did not lead to specie convertibility, but mint parity was reached in 1896. This allows us to speak from Austria-Hungary shadowing the gold standard from 1896 to the outbreak of World War I.

a. Gold reserves

Weekly data of the gold reserves were published in the annual reports of the Austro-Hungarian bank¹⁴ Reserves consist of (1) gold bullion and gold coin, (2) silver coin, and (3) gold bills.¹⁵ The series published in the annual reports of the Austro-Hungarian bank was taken for the years 1896 to 1900.

The published series could not be taken for the years 1901 to 1913, as it seriously underestimates the gold reserves. Why is that? As the difference between published and “true” reserves tells us a great deal about the emergence of the gold exchange standard, we shall devote some space to it. Beginning in 1901, a difference emerged between reserves from an economic point of view and reserves according to the charter of the Austro-Hungarian bank. According to the charter of the Austro-Hungarian bank, reserves (“Metallschatz”) consisted only of (1) gold bullion and gold coin, (2) silver coin, and (3) gold bills up to an amount of 60 million crowns. This definition reflects the basic idea of the 19th century gold bullion standard, ie convertibility of bank notes into specie; the German 19th century word for reserves, “Metallschatz” (metallic treasure), captures the concept well.

This rationale also explains why the inclusion of gold bills was limited to the amount of 60 million crowns. From an economic point of view, however, gold and silver constitute only one part of the total reserves; what really matters is an asset’s ability to be used in the settlement of international transactions and as a means of foreign exchange intervention. In this respect, gold bills are actually of better use than gold, as most international transactions at the turn of the last century were settled with bills rather than specie. In addition to gold bills, deposits on foreign bank accounts played an increasingly important role. Thus, reserves actually consist of 5 rather than 3 components:

¹⁴Appendix 2 („Übersicht der Geschäftsbewegung“) of „Jahressitzung der Generalversammlung der Österreichisch-ungarischen Bank“, 1 (1879) – 36 (1914), Vienna. Annual meetings took place in February following the end of the financial year on 31st December of the previous year. The report of the annual meeting including the appendices comes closest to what would be a yearly report of a modern central bank.

¹⁵Ie bills of exchange drawn on places located in gold standard countries (“Goldwechsel auf auswärtige Plätze”).

(1) gold bullion and gold coin	}	“reserves” both from an economic and a legal point of view
(2) silver coin		
(3) gold bills up to an amount of 60 million crowns		
(4) gold bills in excess of 60 million crowns	}	“reserves” from an economic, but not a legal point of view
(5) deposits on foreign banks		

While data for (1) – (3) were published in the annual reports (cf. above), data for (4) and (5) needed to be collected from the archive of the Austro-Hungarian bank in Vienna.¹⁶ A comparison of all 5 time series shows that (4) and (5) were much more volatile than (1) – (3): this explains why the Austro-Hungarian bank was so reluctant to publish them (whereas (1) – (3) had to be published as a legal requirement), but it also implies that modern researchers should include them.

b. Monetary base

The monetary base is the primary stock of money in an economy.¹⁷ As opposed to bank-created deposit money, the monetary base is the part of the money supply under the (almost) exclusive control of the monetary authority. This explains the economists’ interest in the monetary base when trying to establish a central bank’s policy. The monetary base encompasses all liquid liabilities of the monetary authority. Under pre-1914 conditions, liquid liabilities were first and foremost the banknotes (ca. 90%), followed by commercial banks’ deposits at the central bank. Data were taken from the annual reports of the Austro-Hungarian bank.

c. Bankrate differential

Bank rates were taken for England and France from Hawtrey¹⁸, for Germany from Friedhofen¹⁹ and for Austria-Hungary from the *Compass*²⁰, the leading financial yearbook in the double monarchy. The bank rate differential was constructed as the difference between the discount rate of the Austro-Hungarian bank and the unweighted average of the discount rates set by the Bank of England, the Banque de France, and the Reichsbank.

Italy

Estimation was carried out for two sub-periods: 1883 – 1891 and 1903-1913. In the first period, Italy resumed specie convertibility only for a limited period of time, but the exchange rate continued to follow mint parity closely until the early 1890s. In the second period, Italy did not even intend to join the *de iure* gold standard, but merely shadowed gold as was the case with Austria-Hungary (cf. above).

¹⁶ Each hand-written annual account contains an appendix providing additional information. In our case, sheets 10 (“Durchschnitt der Devisenbestände”) and 11 (“Durchschnitt der auswärtigen Guthaben”) contain the data on (4) gold bills in excess of 60 million crowns and (5) deposits on foreign banks, respectively.

¹⁷ Capie, F. H. and A. Webber (1995). A Monetary History of the United Kingdom, 1870-1982. London, New York, p. 9.

¹⁸ Hawtrey, R. G. (1962). A Century of Bank Rate. London, appendices 1 and 4, pp. 281-296, 302.

¹⁹ Friedhofen, J. (1963). Die Diskontsatzpolitik der deutschen Reichsbank, PhD thesis Freie Universität Berlin, pp. 155-159.

²⁰ Compass. Finanzielles Jahrbuch für Österreich-Ungarn.

a. Gold reserves

Monthly data of the gold reserves have been collected by R. de Mattia in his 1967 data collection on the Italian banks of note issue.²¹ De Mattia has a very broad definition of reserves, and we felt the need not to include all of them into our study. In particular, de Mattia includes bonds of the Italian state or guaranteed by the Italian state among reserves. For the purpose of this study, it seemed more appropriate to include only holdings of gold (## 1, 4, 6), silver (## 2, 3, 5), and foreign exchange (#13).

b. Monetary base

Monthly data of the note issue can be found in the same statistical reference work.²² We could not find data for commercial banks' deposits at the banks of note issue. In the case of Austria-Hungary, we included them as they do technically constitute part of the monetary base. At the same time, they account for less than 10% of the monetary base in the case of Austria-Hungary. De Mattia's 1967 collection of data, carried out under the auspices of the Bank of Italy, is of high quality and remains the standard source. As he does not provide such data, he himself was most likely either unable to establish such numbers, or, alternatively, the numbers he found were of negligible size which is why he did not include them. Either way, our time series for the monetary base consists entirely of bank notes in circulation.

c. Bankrate differential

Monthly data of the Italian bankrate can also be found in de Mattia 1967.²³ We have entirely relied on the bankrate of the Bank of Italy as this bank was by far the biggest and most influential of the Italian banks of note issue.

3.3 Estimation procedure: nature of the time series and cointegration rank test

Space limitations do not allow to report the results of all econometric tests carried out, but this section is meant to give an overview of the preliminary steps taken. The estimates of the cointegrating relationship between the three time series and the VEC model itself will be reported in full in the next two sections.

All 9 time series under consideration are I(1) (three estimations for Austria-Hungary, Italy I (1883-1891) and Italy II (1903-1913) with three time series each). In the case of the gold reserves and monetary base, we also established the nature of the trend as this determines the exact set-up of the vector error correction model. In all 6 cases, the time series were subject to a stochastic trend rather than a deterministic trend. It may come as a surprise that the bank rate differential is I(1) rather than I(0), for interest rates are widely believed to be stationary. As a matter of fact, the English and the German bank rates show up as stationary.²⁴ By contrast, the Austro-Hungarian bank rate does not appear to be stationary, a result replicated in the case of Italy. This is not the place to go more into detail, but it is an interesting finding in itself that bank rates of peripheral countries seem to contain a unit root while the bank rates of core countries do not.

²¹ De Mattia, R. (1967). I bilanci degli istituti di emissione italiani dal 1845 al 1936, altre serie storiche di interesse monetario e fonti. Rome, table 19, pp. 619-753.

²² Ibid., table 5 (column 1 only), pp. 446-454.

²³ Ibid., table 20, pp. 812-815.

²⁴ The French bank rate does not show up as stationary, but this appears to be a statistical artefact. This result is likely due to the fact that the French bank rate hardly changed over time which raises the question whether an ADF-test delivers sensible results under such conditions.

The appropriate lag length of a VEC model is determined by the standard lag length criteria of a usual VAR (AIC, SBC, HQ).²⁵ They unanimously suggest the inclusion of two lags both in the case of Austria-Hungary and Italy. In the case of a VEC model, two lags translate into one extra differenced term on the right hand side of the test equation (cf. formula under 3.1).

The Johansen cointegration rank test aims at establishing the number of cointegrating relationships between the time series; establishing such number is an essential precondition for the estimation of a VEC model. The key question of a cointegration rank test is the structure of π (cf. formula under 3.1). The rank of the estimate of π is most likely to be n (in our case 3), but this need not necessarily reflect the rank of the true, but unobserved π . The crucial question of a cointegration rank test is to establish the probability for the true π to be of rank $r < n$. If $0 < r < n$, then it makes sense to rewrite π as the product of two matrices $\pi = \alpha \beta'$, where α and β are both $(n \times r)$ matrices. Such a decomposition of π is helpful as it allows to give the matrices α and β an interesting economic interpretation. Such an economic interpretation is straightforward especially if $r = 1$. In this case, β can be interpreted as the underlying long-run equilibrium, and α can be seen as the speed of adjustment parameters that determine how fast and via what variables the long-run equilibrium is reestablished in the case of short-run violations. Both in the case of Austria-Hungary and Italy, the rank test suggested the presence of 1 cointegrating relationship.

3.4 Estimation results I: the long-run relationship between gold reserves, bankrate differential and monetary base

In case $r = 1$, the $(n \times r)$ matrix of cointegrating parameters becomes an $(n \times 1)$ cointegrating vector. Such a vector is open to the economic interpretation as a long-run equilibrium. Normalizing the cointegrating coefficients renders the interpretation easier. The vector can be solved for any of its three components, depending on the specific problem you are interested in.

Solving for i_d , the bankrate differential, yields the following result:

Austria-Hungary (1896-1913)

$$i_d = -2.6958 \ln \text{gold} + 2.4883 \ln \text{mb}$$

Italy I (1883-1891)

$$i_d = -11.9960 \ln \text{gold} + 7.9188 \ln \text{mb}$$

Italy II (1903-1913)

$$i_d = -8.6598 \ln \text{gold} + 9.0875 \ln \text{mb}$$

How can these results be interpreted and, of equal importance, what do they tell us about the difference between Austria-Hungary and Italy? Right hand side variables are in log-form, while i_d is measured in percent. This implies that a one percent reduction of the gold holdings (measured in levels rather than in log form) “requires” approximately an 2.70 increase in basis points in order to restore equilibrium *in the long run*.²⁶ In the case of Italy,

²⁵ Enders, W. (2004). *Applied econometric time series*, p. 363.

²⁶ Why can we so easily jump from the levels to the logs? This is because the first Taylor polynomial of $f(x) = \ln(x)$ with development point 1 is $x - 1$, implying that $\ln x \approx x - 1$ is a good approximation for values of x

however, such a 1% reduction would require a much larger increase: during Italy's short-lived adherence to gold from 1883-1891 a 12 basis points increase would have been needed; during the second period of adherence to gold (1903-1913) a 8.66 basis points increase would have been sufficient, but this is still roughly 3 times as large as in the case of Austria-Hungary.

Thus, on this account, Austria-Hungary scores substantially better than Italy.

As indicated above, the cointegrating vector can equally be solved for other variables. Of particular interest in our case is the impact of a gold outflow on the monetary base while holding the bank rate differential constant.

Austria-Hungary (1896-1913)

$$\ln mb = 1.0834 \ln gold + 0.4019 i_d$$

Italy I (1883-1891)

$$\ln mb = 1.5149 \ln gold + 0.1263 i_d$$

Italy II (1903-1913)

$$\ln mb = 0.9529 \ln gold + 0.1100 i_d$$

A one percent decrease in gold holdings leads, in the long-run, to a 1.08% decrease of the monetary base in the case of Austria-Hungary and to a 0.95% decrease of the monetary base in the case of Italy II (1903-1913); by contrast, a 1.51% decrease of the monetary base would have been needed during Italy's early adherence to gold. Such interpretation assumes that the monetary base has to carry entirely the burden of adjustment. On this account, both countries display similar results for the early 20th century, but adjustment appears to have been more strenuous during Italy's 19th century adherence to gold.

3.5 Estimation results II: VEC model estimates and impulse response functions

Having established the appropriate lag-length ($p = 2$ in all 3 cases) and the number of cointegrating relationships ($r = 1$ in all 3 cases), we proceed to the estimation of the VEC model itself. Thus, in our case, the following equation needs to be estimated (cf. the general formula under 3.1):

$$\Delta y_t = \pi y_{t-1} + \pi_1 \Delta y_{t-1} + u_t$$

Given our trend assumptions (c.f. 3.2) πy_{t-1} will be decomposed as follows:

$$\pi y_{t-1} = \alpha (\beta' y_{t-1} + \rho_0) + \alpha_1$$

where β is the (3 x 1) cointegrating vector that has already been reported under 3.4 . The results are reported in table 1.

close to unity. Holding the monetary base constant in the case of Austria-Hungary leads to the following equation: $\Delta i_d = -2.6958 \Delta \ln gold = -2.6958 (\ln x_2 - \ln x_1) = -2.6958 \ln (x_2 / x_1)$. If we think if a reduction of gold holdings of 1%, x_2 / x_1 would equal 0.99. Thus $\Delta i_d = -2.6958 \ln (0.99) \approx -2.6958 (0.99-1) = -2.6958 (-0.01) = 2.6958$ basis points.

Table 1: Results of vector error correction model

	Austria-Hungary	Italy I	Italy II
α	(-0.2213, 0.0049, 0.0003) ['] [-5.8563] [1.9787] [0.1213]	(-0.0506, -0.0107, -0.0006) ['] [-2.1083] [-6.4801] [-0.8692]	(-0.1180, -0.0041, -0.0006) ['] [-3.7238] [-3.2237] [-0.5894]
ρ_0	-1.5218	-18.4067	4.9371
α_1	(0.0007, 0.0020, 0.0022) ['] [0.0498] [2.1435] [2.6777]	(0.0129, 0.0078, 0.0044) ['] [0.3431] [3.029] [3.8152]	(0.0620, 0.0036, 0.0030) ['] [2.2604] [3.3001] [3.4667]
π_1	$\begin{bmatrix} 0.3186 & -1.7999 & 0.7909 \\ [5.1408] & [-1.7842] & [0.6717] \\ -0.0095 & 0.3324 & 0.0933 \\ [-2.3361] & [5.0470] & [1.2141] \\ -0.0049 & 0.0503 & 0.2802 \\ [-1.4017] & [0.8788] & [4.1921] \end{bmatrix}$	$\begin{bmatrix} 0.0964 & -1.0530 & 0.8602 \\ [1.0062] & [-0.9614] & [0.2715] \\ 0.0119 & 0.3375 & -0.4508 \\ [1.8138] & [4.5020] & [-2.0785] \\ -0.0002 & 0.0031 & -0.2263 \\ [-0.0590] & [0.0925] & [-2.3186] \end{bmatrix}$	$\begin{bmatrix} 0.1666 & -5.1272 & -5.1679 \\ [1.9771] & [-2.6105] & [-1.8680] \\ 0.0024 & 0.4036 & 0.1094 \\ [0.7232] & [5.1754] & [0.9958] \\ 0.0036 & 0.0943 & 0.2657 \\ [1.3778] & [1.5312] & [3.0640] \end{bmatrix}$

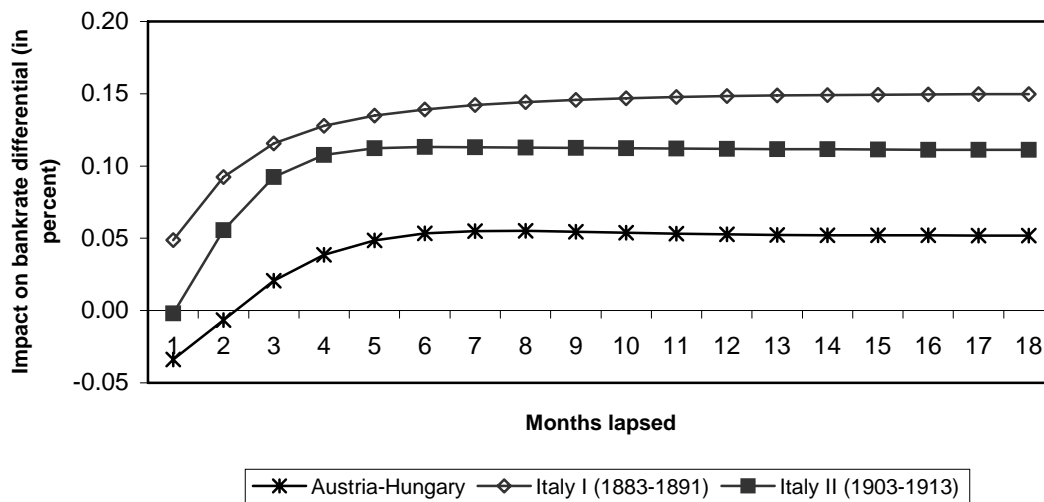
We have dutifully reported the VEC estimates, but the rich interactions between the variables in the case of vector regressions (as opposed to scalar regressions) inhibit us from attaching a straightforward interpretation to the given numbers. As is true for VAR model, the best way to interpret the results of a VEC model is to calculate the impulse response functions.²⁷ Impulse response functions trace out how the different variables react in periods 1, 2, 3, ...n to a specific shock to one of the variables in period 1. Similar to a natural science experiment in a laboratory, one specific cause and its effects can be isolated and studied on their own. This is precisely what we are interested in in our case: How do the monetary base and the bank rate differential respond in periods 1, 2, 3, ...n to a sudden gold outflow in period 1. An answer to this question would allow us to establish whether Austria-Hungary and Italy violated the rules of the game or not.

As for the discount rate rule, calculating the response of the bank rate differential in months 1, 2, 3, ...n to an initial shock to the gold reserves seems to be the most straightforward choice. Figure 1 shows such response to a minus one-standard deviation shock to the gold reserves in month 1.²⁸

²⁷ It has to be said that there is inevitably a large number of impulse response functions that can be calculated from one and the same VEC model. The calculation of impulse response functions differs only in how to determine the impact in the *first* period. For all subsequent periods (i_2, i_3, i_4, \dots) the calculation is identical; results obviously differ as they build on i_1 , the impact in the first period. Why does exactly the calculation of the impact in the first period differ? In order to say something about the first period, we need to know the patterns of *contemporaneous* causality between the variables (as opposed to intertemporal causality): for instance, what is the impact of a bank rate increase on gold flows *in the same month*? Essentially, we are forced to make some assumptions about the patterns of contemporaneous causality, as impulse response functions cannot be calculated without them. For a precise mathematical description of the problem cf. Enders, W. (2004). *Applied econometric time series*, pp. 272-310. Our own impulse response functions are based on the Cholesky decomposition; we chose the Cholesky ordering gold reserves $\rightarrow i_d \rightarrow$ monetary base, which we consider the most convincing one from an economic point of view. As some kind of 'robustness check', we tried out all other $3! - 1 = 5$ Cholesky orderings; this yielded results not very different from our preferred ordering.

²⁸ A *minus* one-standard deviation shock (as opposed to a *plus* one-standard deviation shock) was chosen as this is essentially what we are interested in: the central bank's reaction to a sudden outflow of gold rather than a sudden inflow of gold.

Figure 1: Impact of gold outflow on bankrate differential to European centres



As for the non-sterilisation rule, we would need a definition of what exactly we understand by sterilisation. Any outflow of gold would have an impact on the monetary base. An outflow of gold reflects a situation where demand for foreign currency exceeded supply on the foreign exchange market; excess demand is satisfied by the monetary authority, which, in turn, receives payment either in gold coin or bank notes, ie monetary base. Thus, if the central bank is entirely passiv, a one-unit gold outflow will lead to a one unit reduction of the monetary base.²⁹ The key to our question is the reserve ratio, ie the ratio of gold reserves over bank notes in circulation. The reserve ratio was a careful compromise between the risk of a bank run and the goal to have a monetary base as large as possible erected on a given amount of gold reserves. The former principle mitigated in favour of a high reserve ratio, the latter principle in favour of a low reserve ratio. In practice, most countries settled for a minimum reserve ratio between 30% and 40%. Hence, as the central bank was endowed with the task of maintaining the currency peg, it was well advised to maintain the reserve ratio regardless of any gold outflow or not. Eg, if the reserve ratio was 1/3, the one unit reduction of the gold reserves would need a three units reduction of the monetary base, if the reserve ratio were to remain constant. Nurkse, in his classical study on the interwar gold standard conducted under the auspices of the League of Nations, put this principle into very succinct words.

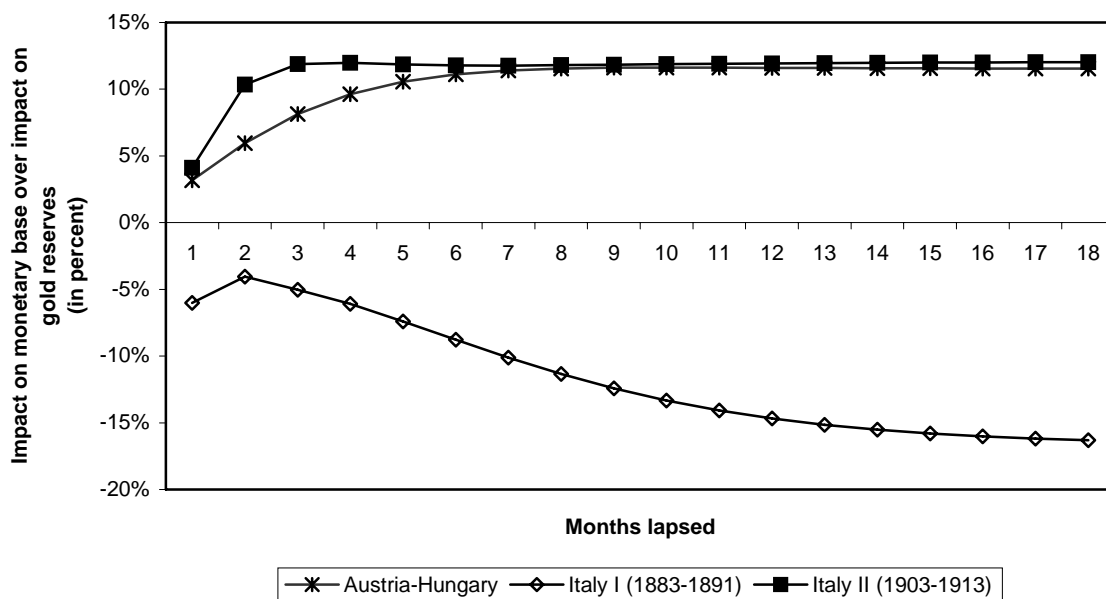
“... the traditional view of the operation of the gold bullion standard assigned to central banks more than the passive function of converting domestic into international currency and *vice versa*. Whenever gold flowed in, the central bank was expected to increase the national currency supply,

²⁹ Nurkse, R. (1944). *International currency experience. Lessons of the interwar period*, p. 66: „Under any form of gold standard, gold is used for the settlement of discrepancies in the balance of payments. Under the “gold specie standard,” where the domestic circulation as well as the international means of settlement consisted largely of gold, the relationship between the domestic money supply and the balance of payments was direct and immediate; in fact, the very distinction between national and international currency became important only with the growing use of bank notes and deposits in circulation. Under the “gold bullion standard,” where bank notes and deposits formed the great bulk of domestic money, the relationship was less obvious but still generally operative, since any purchase of gold by the central bank could normally be expected to increase a country’s note circulation and bank deposits while any outflow of gold usually decreased them.”

not only through the purchase of that gold, but also through the acquisition of additional domestic assets; and, similarly, when gold flowed out, the central bank was supposed to contract its domestic assets also. In this way the influence of gold movements on the domestic credit base was to be magnified, and magnified in accordance with the central bank's reserve ratio. With a ratio of 33%, for instance, any net increase or decrease in the gold reserve was thus supposed to create a threefold expansion of contraction in the total credit base."³⁰

By contrast, if a gold outflow of one unit translated into less than a one-unit reduction of the monetary base, we would refer to that as sterilisation or neutralisation: the monetary authority tries to insulate the domestic economy from external influences. This definition yields a straightforward solution to our question as to how we can operationalise the non-sterilisation rule with the help of impulse response functions: As an initial impulse to our system we choose a minus one-standard deviation shock to the gold reserves in month 1. Dividing the impact on the monetary base by the impact on the gold reserves for months 1, 2, 3, ...n tells us whether the central bank sterilized or not. If the fraction is 1, the central bank reacted passively. If the fraction is above 1, the effect on the monetary base was exacerbated, ie the central bank played by the rules of the game. If the fraction is below one, sterilization policies were adopted, ie the central bank violated the rules of the game. Figure 2 shows the results.

Figure 2: Relative impact of a gold outflow on the monetary base as an indicator of sterilisation



Interpretation of the results

Figure 2 shows that in all three cases a one-unit gold outflow was accompanied by substantially less than a one-unit reduction of the monetary base. This shows that massive sterilisation policies were followed, most notably in the case of Italy I (1883-1891). Both countries happily violated the non-sterilisation rule, thereby sheltering the domestic economy to a large extent from the vicissitudes of sudden gold outflows (and gold inflows).

Our findings for the discount rate rule are more in accordance with our expectations: a sudden gold outflow led the monetary authorities to increase the bankrate differential to the

³⁰ Ibid.

centre countries in order to attract short-term capital. Still, the impulse response functions suggest a very measured response of the monetary authorities: the short-run response is always lower than the long-run response. In the case of many impulse response functions, one will find the exact opposite: an immediate response of considerable size, while the long-run effect may be of negligible magnitude. Things look different in our case, suggesting that central banks in Austria-Hungary and Italy could built up their response slowly. This in itself suggests that adjustment came easier than the stereotype of a peripheral economy wants us to believe.

The impulse response functions we calculated also lend themselves to a comparison of Austria-Hungary and Italy. Especially figure 1 reveals a striking difference between the two countries: Faced with an average gold outflow, the Austro-Hungarian bank will only need to raise the discount rate (differential) by 5 basis points; by contrast, Italy has to raise the discount rate by more than double that amount, with Italy's earlier adherence to gold (1883-1891) coming out substantially worse than Italy's later adherence (1903-1913).

We conclude as follows: The impulse response functions demonstrate that both countries sterilised gold flows, thereby insulating the economy largely from sudden gold flows. As for the discount rate rule, we find evidence supportive of both countries raising the bankrate differential when needed, but both magnitude and pattern of the response (long-run impact stronger than short-run impact) suggest the monetary authorities felt free enough to adopt a very measured response. Taking both impulse response functions together, we conclude both countries followed the rules of the game if necessary, but violated them whenever convenient and possible. We interpret this finding as supportive of our claim that adherence to gold came at lower cost than is commonly argued for countries such as Austria-Hungary and Italy.

At the same time, we find that Austria-Hungary retained more room for manoeuvre than Italy. As for Italy, our findings suggest that she was in a better position in her second attempt to join gold than in her first. What explains the very different results of Italy and Austria-Hungary? This is what we turn to now.

4. Explaining the differences between Austria-Hungary and Italy

The impulse response functions of the previous chapter have shown that Austria-Hungary retained more room for manoeuvre under the Classical Gold Standard than Italy; faced with a similar gold shock, Austria-Hungary was required to increase the discount rate by less than half of what Italy needed to do. How do we account for these differences in "pulling power"?

Certainly a lot of factors are at play, and only a larger study including more countries could establish for certain what exactly explains the differences. Given that we are only focusing on two countries, we want to make some suggestions as to where the differences might come from. As a first step, we reconstructed the balance of payments. Next we looked at several economic indicators to see whether they help explain the differences in "pulling power".

Reconstructing the balance of payments of Austria-Hungary and Italy

Reconstructing a bop for the pre-World War I period is a notoriously difficult enterprise. With the exception of trade (due to customs and duties) and government debt, there was no need to produce good statistics modern researchers could rely on. In some respect, however, reconstructing the bop of a peripheral country is actually easier than for a centre country: Austria-Hungary, for instance, was so worried in the late 1880s about a structural bop-deficit that the Austrian Ministry of Finance produced high-quality statistics relating to the bop

before eventually joining the gold standard.³¹ Data availability is not as good in the case of Italy, but it is telling that the best source we have on the Italian bop before World War I is from no one else than the governor of the Bank of Italy himself!³²

Our reconstruction relies necessarily on a large number of sources, and many estimations needed to be carried out before obtaining a reliable estimate of the bop. We do not have the space to describe all necessary details, and we content ourselves with listing the most important sources.³³

How can we judge on the quality of a bop-reconstruction? In a system of fixed exchange rates, the reserve changes of the central bank should be identical to the sum of all other components of the bop. One way of establishing the quality of a bop-reconstruction is therefore to measure the average annual deviation between the reserve changes and all other components; in a second step, we compare the average annual deviation with the assets and the liabilities of the bop. The average annual deviation is 100.4 million crowns and 208.5 million lire for Austria-Hungary and Italy, respectively. This compares to an annual inflow / outflow of approx. 4,000 million crowns and 4,000 million lire, respectively. This implies that we have a margin of error of ca. 2.5% and 5%, respectively. The difference between Austria-Hungary and Italy is largely due to two factors: first, we have a much better understanding of the overseas proportion of government bonds for Austria-Hungary than for Italy; second, we have more benchmark estimates for non-government bonds and stocks held abroad in the case of Austria-Hungary. Still, we do consider the margin of error acceptable in both cases.

Figures 3 and 4 show both reconstructions, and tables 2 and 3 give the exact values of the individual components. In the case of Austria-Hungary the bop-reconstruction exhibits the same patterns as the reserve changes of the Austro-Hungarian bank. In the case of Italy, such a close movement is true for some periods, but it is notably absent for Italy's first period under gold, ie from 1883 to 1891. Initially, the bop seems to be much higher than the reserve changes, with things being reverted after 1893. As indicated above, the key problem is a precise reconstruction of the proportion of bonds being held abroad (which in turn influences our estimates for capital imports).³⁴

³¹ Austrian Ministry of Finance (1892), Statistische Tabellen zur Währungs-Frage, Vienna. Ibid. (1893), Tabellen zur Währungsstatistik, Vienna.

³² Stringher, Bonaldo. "Su la bilancia dei pagamenti fra l'italia e l'estero." Riforma Sociale 23 (1912): 49-83.

³³ The most important sources are (in addition to the ones mentioned in the previous two footnotes): Austria-Hungary: Bartsch, Franz. "Statistische Daten über die Zahlungsbilanz Österreich-Ungarns vor Ausbruch des Krieges." Mitteilungen des k.k. Finanzministeriums 22 (1917): 1-159. Fellner, Friedrich. Die Zahlungsbilanz Ungarns. Vienna, 1908 and Volkseinkommen. Budapest, 1915. Italy: Nitti, Francesco. Il Capitale Straniero in Italia. Bari, 1915. Commissariato dell'emigrazione. Relazione sui servizi dell'emigrazione per l'anno 1909-1910. Rome, 1910. Ministero delle Finanze. Direzione generale del demanio e delle. "Alcuni indici della entità e della orientazione del capitale italiano investito in titoli e valori esteri durante il periodo dall'esercizio 1909-910 a tutto il 1922-923." Bollettino di statistica e di legislazione comparata 22, no. IV (1924): 893-997 and I capitali delle società straniere operanti in Italia dal 1912-913 al 1924-925. Rome 1926. Among modern research the reconstruction of the Italian bop has particularly drawn on: Istituto centrale di statistica. "Indagine statistica sullo sviluppo del reddito nazionale dell'italia dal 1861 al 1956." Annali di statistica Serie VIII. Volume 9 (1957) and Sommario di statistiche storiche italiane. 1861-1955. Rome, 1958. Hertner, Peter. "Capitale Straniero, Banche Miste E Sviluppo Industriale in Italia (1883-1914)." in L'industrializzazione in Italia (1861-1900), edited by Giorgio Mori, 247-71. Bologna, 1981. Rey, Guido M., ed. Una stima del valore aggiunto per il 1911, Collana storica della Banca d'italia. Serie "Statistiche Storiche". 1992.

³⁴ The key problem is to what extent we can trust information on coupon payments made abroad. The *rendita italiana*, the single most important Italian bond, was paid in gold abroad but in paper at home. As soon as the exchange rate deviated considerably from mint parity, it made financial sense for Italians to send coupons abroad but transfer the obtained payments subsequently to Italy; thus, coupon payments made abroad do not necessarily end up in foreigners' hands. For a discussion to what extent we can rely on coupon payment data to establish the overseas proportion cf. Zamagni, Vera. "Il Debito Pubblico Italiano 1861-1946: Ricostruzione Della Serie Storica." Rivista di Storia Economica 14 (1998), p. 214, versus Spinelli, Franco. Per la storia monetaria dell'italia. Vol. 1. Turin, 1989, p. 303.

Figure 3: Austro-Hungarian balance of payments 1880-1913



Figure 4: Italian balance of payments 1868-1913

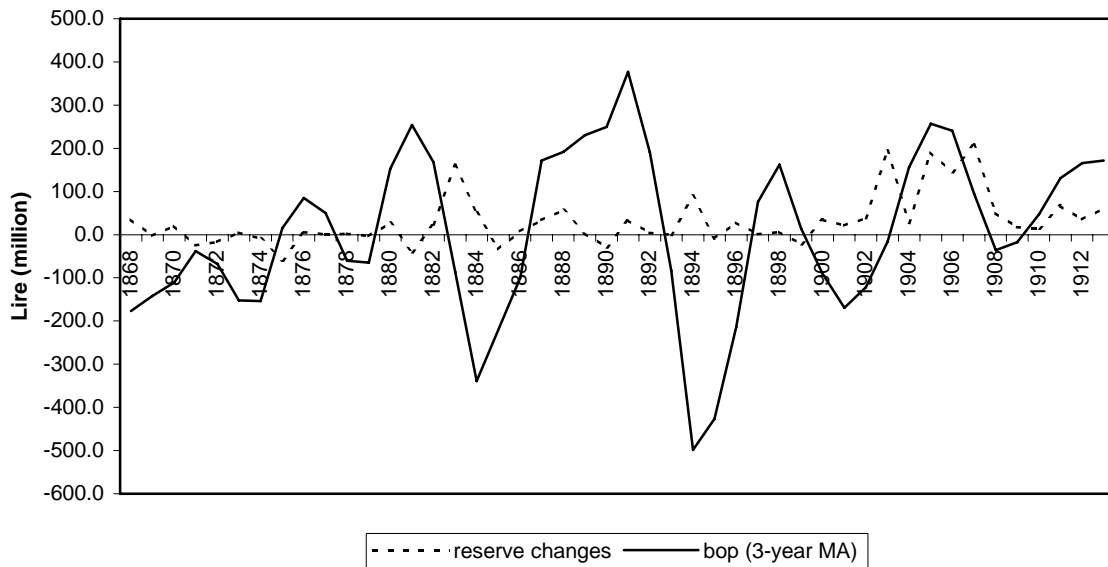


Table 2: Balance of payments Austria-Hungary 1880-1913

Year	Balance of trade	Capital imports minus capital exports	Interest payments abroad minus interest payments from abroad*	Remittances	Transport and Tourism	Total
1880	125.0	-63.8	-314.5	11.8	52.0	-189.5
1881	179.4	-43.4	-316.4	17.9	55.0	-107.6
1882	255.4	11.0	-323.1	21.2	55.0	19.5
1883	250.0	74.9	-337.1	23.6	58.0	69.4
1884	157.8	29.3	-334.6	30.5	58.0	-58.9
1885	228.4	-91.5	-331.0	30.3	61.0	-102.8
1886	318.8	-67.1	-325.5	32.2	61.0	19.4
1887	208.6	-109.0	-322.6	37.6	64.0	-121.4
1888	391.4	-25.9	-328.5	41.5	64.0	142.5
1889	354.0	-151.2	-320.2	38.6	67.0	-11.8
1890	321.4	-77.2	-316.3	48.3	67.0	43.2
1891	279.4	-127.1	-308.0	58.8	70.0	-27.0
1892	237.3	34.6	-307.9	67.4	70.0	101.4
1893	326.8	16.0	-306.8	32.1	73.0	141.1
1894	234.1	234.6	-315.6	22.3	73.0	248.4
1895	81.2	326.0	-335.0	25.6	76.0	173.8
1896	178.4	203.5	-348.5	35.6	78.0	147.0
1897	53.5	80.8	-351.7	30.4	84.0	-103.0
1898	4.8	19.6	-357.6	41.9	92.0	-199.3
1899	294.0	-29.8	-358.3	54.3	97.0	57.2
1900	312.7	183.3	-365.7	86.0	95.0	311.2
1901	286.8	67.3	-356.7	119.4	106.0	222.8
1902	229.1	-21.1	-330.2	159.4	108.2	145.3
1903	300.1	-72.3	-325.6	196.8	110.3	209.3
1904	71.0	43.1	-333.2	208.6	116.2	105.6
1905	177.6	-184.7	-325.2	262.5	118.5	48.7
1906	186.7	-196.8	-326.8	361.0	120.1	144.1
1907	70.9	-213.9	-326.3	433.5	124.6	88.8
1908	-77.5	-118.2	-323.4	518.8	129.1	128.9
1909	-346.1	-58.8	-325.1	392.8	150.9	-186.3
1910	-342.2	-114.0	-318.9	510.1	157.8	-107.3
1911	-692.6	76.5	-323.3	626.6	173.5	-139.3
1912	-743.2	-41.6	-330.3	626.2	167.3	-321.6
1913	-521.2	214.2	-336.6	602.1	159.1	117.6

*Dividend payments are also included.

Table 3: Balance of payments Italy 1868-1913

Year	Balance of trade	Capital imports minus capital exports	Interest payments abroad minus interest payments from abroad*	Remittances	Transport and Tourism	Total
1868	-109.0	53.3	-151.5	53.0	71.0	-83.2
1869	-144.0	-134.4	-148.5	58.0	99.0	-270.0
1870	-140.0	36.1	-128.5	60.0	99.0	-73.5
1871	114.0	-125.3	-130.7	52.0	101.0	10.9
1872	-21.0	-77.4	-116.0	62.0	100.0	-52.4
1873	-130.0	-103.4	-113.2	73.0	111.0	-162.6
1874	-318.0	-9.4	-107.4	84.0	109.0	-241.7
1875	-185.0	27.6	-110.6	95.0	115.0	-58.0
1876	-99.0	347.9	-138.8	108.0	127.0	345.1
1877	-208.0	85.2	-144.0	111.0	124.0	-31.7
1878	-41.0	-222.7	-141.2	115.0	126.0	-163.9
1879	-180.0	144.5	-106.4	26.8	130.0	15.0
1880	-83.0	6.3	-162.6	33.1	160.0	-46.2
1881	-75.0	496.2	-132.8	38.9	161.0	488.3
1882	-75.0	340.5	-159.0	54.3	159.0	319.8
1883	-100.0	-302.2	-146.1	78.5	165.0	-304.9
1884	-248.0	-233.4	-68.2	90.1	186.0	-273.6
1885	-509.0	-59.5	-146.4	102.2	173.0	-439.6
1886	-430.0	379.0	-168.6	112.1	161.0	53.6
1887	-603.0	535.1	-173.7	142.5	184.0	84.8
1888	-283.0	464.0	-216.9	214.0	198.0	376.0
1889	-440.0	338.0	-219.8	235.8	200.0	114.0
1890	-423.0	383.1	-217.0	254.7	202.0	199.8
1891	-250.0	427.1	-234.2	286.2	205.0	434.2
1892	-215.0	486.4	-245.1	249.7	221.0	497.0
1893	-227.0	-367.6	-256.1	267.5	224.0	-359.1
1894	-68.0	-577.2	-226.1	260.9	222.0	-388.4
1895	-149.0	-897.4	-172.5	255.0	216.0	-747.9
1896	-128.0	-327.0	-184.9	290.5	207.0	-142.3
1897	-100.0	28.8	-186.3	300.7	205.0	248.3
1898	-209.0	-0.5	-188.7	326.7	194.0	122.5
1899	-76.0	-129.8	-187.1	311.5	196.0	114.6
1900	-362.0	-138.4	-185.6	307.6	183.0	-195.4
1901	-344.0	-237.8	-178.8	356.9	212.0	-191.7
1902	-259.0	-338.6	-175.0	429.8	222.0	-120.9
1903	-330.0	-344.8	-157.2	519.9	259.0	-53.1
1904	-314.0	-287.8	-148.5	584.0	293.0	126.8
1905	-322.0	-107.1	-144.7	644.2	324.0	394.4
1906	-620.0	-119.6	-144.9	807.8	327.0	250.3
1907	-943.0	-124.6	-139.9	951.0	334.0	77.4
1908	-1195.0	-68.1	-136.0	921.2	436.0	-41.8
1909	-1257.0	6.1	-138.0	837.2	409.0	-142.7
1910	-1181.0	179.7	-143.8	825.5	451.0	131.4
1911	-1199.0	350.1	-169.9	757.7	414.0	152.9
1912	-1319.0	390.1	-169.7	842.5	364.0	107.8
1913	-1149.0	221.2	-205.9	977.8	392.0	236.1

*Dividend payments are also included.

Interpreting the results

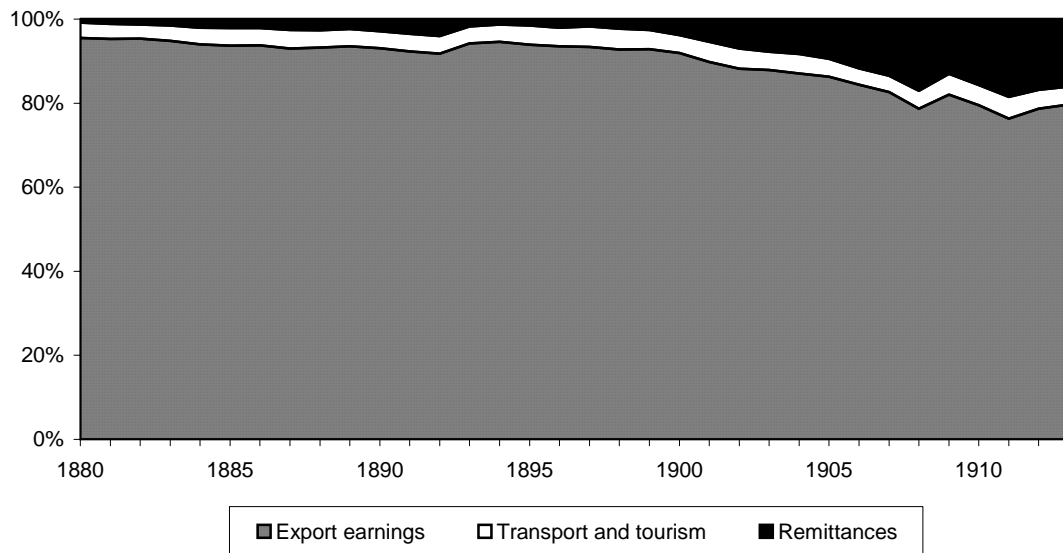
The bop reconstruction brings several issues to our attention: first, there is a fundamental difference between the Italian and the Austro-Hungarian balance of trade. The Italian balance of trade is negative throughout (except for 1871), while the Austrian-Hungarian balance of trade is mostly positive (except for 1908-1913).

Capital imports under the gold standard were not as impressive as one might believe: From 1896 to 1913, Austria-Hungary imported 431.2 million crowns in total, or 24.0 million crowns per year. Italy imported 409.3 million lire in total, or 37.2 per year.³⁵

The most important finding is probably the overarching importance of remittances to the bop. Especially in the case of Italy, the persistent trade deficit was essentially covered by remittances from Italian emigrants to the Americas. De Cecco, in his description of the Italian financial system from 1861 to 1914, labels the remittances with good reason a *deus ex machina*.³⁶ In the case of Italy another important asset to the bop were payments related to tourism.

The very obvious importance of remittances has led us to break down the assets of the bop into its individual components, ie export earnings, remittances, and transport and tourism. Figures 5 and 6 show a very different picture for Austria-Hungary and Italy: in both countries remittances and tourism related earnings increase over time, but the magnitude makes the difference: in the years immediately before World War I, both items account for ca. 40% in the case of Italy, but for less than 20% in the case of Austria-Hungary.

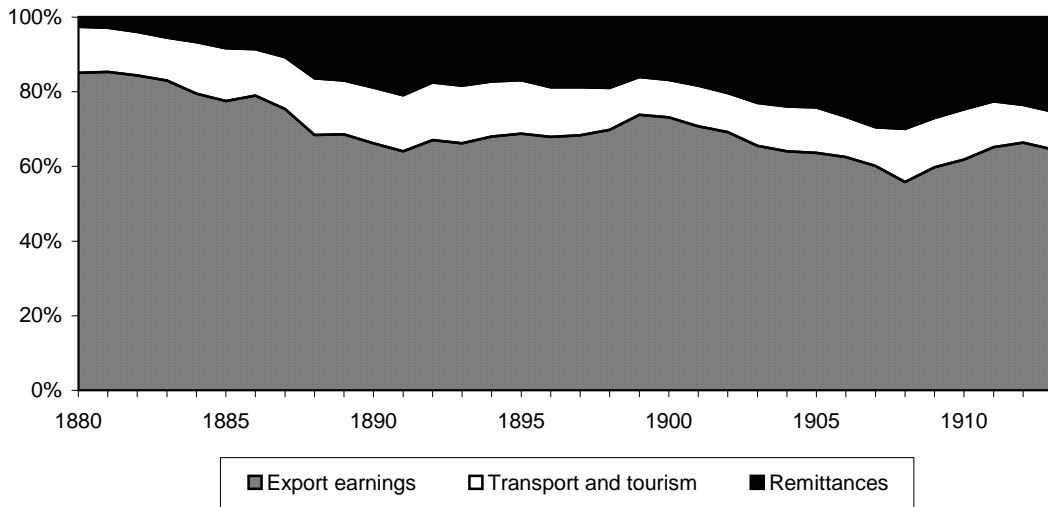
Figure 5: Assets of the Austro-Hungarian balance of payments, distribution in per cent



³⁵ According to mint parity, 100 Italian lire were worth 95.23 Austro-Hungarian crowns. Column 2 in tables 2 and 3 refer to capital imports minus capital exports. The numbers given here only refers to capital imports.

³⁶ Cf. the editor's introduction to de Cecco, Marcello, ed. *L'italia Ed Il Sistema Finanziario Internazionale, 1861-1914*. Rome. 1990.

Figure 6: Assets of the Italian balance of payments, distribution in per cent



One reading of the bop could therefore be: Austria-Hungary relied on earnings from exports, while Italy became increasingly reliant on remittances and tourism. As for the remittances, Italy relied on circumstances beyond her control: what would have happened to Italy's adherence to gold if mass emigration had stopped for one or another reason, eg an end to mass immigration into the US (as it came in the 1920s)? If a country becomes reliant on unrequited transfer to sustain the bop, this somehow implies membership to the gold standard club subject to "sunshine conditions". These conditions – rapid growth, capital mobility, no restrictions on migration, among others – were certainly present in the decade before World War I, which might explain why even Italy enjoyed quite some room for manoeuvre. Still, the higher ratio of export earnings to total assets in the case of Austria-Hungary somehow suggest that the double monarchy was the more mature member of the gold standard club.

Do we have other indicators to boost such a claim? There is an interesting pattern emerging between the two countries when comparing the government debt to GDP ratio on the one hand, and debt held abroad on the other. Italy had a much higher government debt to GDP ratio, reaching 128% when joining gold first in 1883. Austria-Hungary, by contrast, joined the gold standard at a debt ratio of "only" 80% in 1892. Things look different, however, when turning to the debt that actually circulated abroad: When joining the gold standard, Austria-Hungary had almost twice as much debt abroad (both government and private) than Italy (cf. table 4); this ratio did not change much until 1913. Not only the total amount, but also the "quality" of the debt points in the same direction: Italy could only circulate gold debt abroad (largely *rendita italiana*, cf. above), while Austria-Hungary's silver and paper bonds remained in circulation in Western Europe until World War I. In other words, Austria-Hungary enjoyed a much better access to the European capital market than Italy.

In this context, it might be worthwhile not only to consider the long-term debt, but also short-term capital a central bank can potentially attract by raising the discount rate; which brings us back to our initial question what explains the sizeable difference in "pulling power" between the two countries. Measured on this account, Austria-Hungary once again comes out better: The average bankrate differential to the European centres was 62 basis points in the case of Austria-Hungary, but 89 basis points in the case of Italy II (1903-1913). During Italy's 19th century adherence to gold, the average bankrate differential even reached 186 basis

points, demonstrating again that Italy's early 20th century experience under gold was happier than her late 19th century experience.

Table 4 : Macroeconomic indicators

	Austria-Hungary	Italy
Government debt over GDP		
1870	51.8%	98.6%
1883		128.4%
1892	79.9%	
1913	58.7%	71.5%
Amount and composition of foreign debt		
1883		4346 million lire (88.0% of which government debt)
1892	7611 million crowns (45.5% of which government debt)	
1913	8837 million crowns (50.5% of which government debt)	5706 million lire (55.5% of which government debt)
Average bankrate differential to London, Paris and Berlin		
	62 basis points (1896 – 1913)	186 basis points (1883 – 1891)
		89 basis points (1903 – 1913)

NB: According to mint parity, 100 Italian lire equalled 95.23 Austro-Hungarian crowns.

Sources: GDP Austria-Hungary: Schulze (2000); GDP Italy: Zamagni (1998); rest: cf. text.

5. Conclusions

Based on a vector error correction model and impulse response functions, this paper has shown that Austria-Hungary and Italy, the two largest peripheral economies in pre-World War I Europe, embarked on sterilisation policies and were not forced to use the discount rate tool in a way that would have put the domestic economy under too much strain. Both countries followed the ‘rules of the game’ if necessary, but violated them whenever possible and convenient. This suggests that adjustment was much less burdensome in the case of the periphery than is commonly argued.

At the same time, our estimates allow for a comparison of both countries: Austria-Hungary retained more room for manoeuvre than Italy under the Classical Gold Standard. As for Italy, we find that she performed better under her second adherence to gold (1903-1913) rather than her first (1883-1891).

We also gave an explanation as to why adjustment was easier for Austria-Hungary than for Italy. The Austro-Hungarian economy was integrated into the global economic system in a more sustainable way: she was able to circulate much more of her debt abroad and need not do so necessarily in gold; by contrast, Italy was overdebted, but unable to circulate much of her debt abroad; foreign investors would only accept gold bonds. A similar pattern emerges for short-term capital, with Austria-Hungary having much more “pulling power” than Italy. A reconstruction of the bop has shown that Austria-Hungary paid for her imports by her exports, while the Italian economy grew increasingly reliant on remittances, an asset largely beyond her control. Taking all the evidence together, Austria-Hungary’s adherence to gold appears more mature; Italy, by contrast, owes a great deal to the favorable circumstances of the decade before World War I.

6. Bibliography

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