

Market leader:

The Austro-Hungarian Bank and the making of foreign exchange intervention, 1896-1913

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Final draft November 2008

JEL classification: E58; F31; N23

Keywords: Foreign exchange intervention, foreign exchange market structure, gold standard, central bank, Austria-Hungary.

Acknowledgements

The views expressed in this article are those of the author and do not commit the Oesterreichische Nationalbank. I would like to thank the participants in the Third Past, Present, Policy conference in Genoa and in particular the editors Barry Eichengreen and Marc Flandreau, as well as Claudio Borio, Isabel Schnabel, Nathan Sussman, Stefano Ugolini and an anonymous referee for crucial comments. For valuable suggestions on earlier versions I am grateful to Vincent Bignon, Larry Neal, Jaime Reis and Lucio Sarno. Walter Antonowicz and Bernhard Mussak facilitated access to the historical archives of the Austrian National Bank. The responsibility for errors and misinterpretations remains mine.

Abstract (135 words)

This paper challenges the conventional view that the gold standard was stabilized by quasi-automatic central bank intervention and/or private arbitrage whenever the spot exchange rate reached the ‘gold points’. New archival evidence on the central bank of Austria-Hungary between 1896 and 1913 documents the use of sophisticated instruments like foreign exchange forward and repo (sale-repurchase) contracts and a quest for market dominance both with respect to reserves held and the share in market turnover. The resulting change in the working of the foreign exchange market is shown to have supported the conduct of monetary policy, underlining the importance of market micro structure in the design and conduct of monetary policy. The picture that emerges is that of a much more ‘modern’ approach to exchange rate stabilization during the classical gold standard than is traditionally recognized.

1 Introduction

In a stylized textbook gold standard regime, reserves at the central bank serve to guarantee the convertibility of the notes issued by the central bank into gold coin on demand.¹ The convertibility of the banknotes in turn stabilizes the value of domestic money in terms of other gold currencies, as a rise or fall of the exchange rate beyond the gold points triggers equilibrating international shipments of gold. In this framework, central banks transact in gold (or foreign exchange in a gold-exchange standard regime) in principle on the initiative of the public only: The central bank is essentially a currency board passively exchanging gold against banknotes and vice versa.

Under the catchphrase of the rules of the game, the literature on the gold standard has extensively discussed another aspect of central bank policy, the setting of the discount rate.² Concerning transactions in reserve assets, on the other hand, very little is known beyond the fact that most central banks manipulated gold export and import prices and that some operated not only in gold but also foreign exchange.³ Size, nature, frequency and the rationale of reserve operations and foreign exchange transactions in particular remain a largely uncharted territory.

This article brings to bear new archival evidence on the foreign exchange interventions of the central bank of the Austro-Hungarian Empire, the *Oesterreichisch-Ungarische Bank* (OeUB). While the foreign exchange policy of the OeUB has early on attracted the interest of economists, we remain ignorant on key aspects of the Bank's policy. Contemporary authors like Ludwig von Mises mainly relied on official accounts coupled with anecdotal evidence from financial market participants. More

¹ In addition, in many countries the law prescribed a certain level of reserves as a function of notes in circulation. For an overview see e.g. Conant (1910).

² For an overview of the main arguments see the editors' introduction in Eichengreen and Flandreau (1997).

³ For a recent overview see Bordo et al. (2007). White (1933) and Morgenstern (1959) discuss gold devices. The Belgian, French and Suisse central banks, operating in legally bimetallic frameworks, at times redeemed their notes in silver (Bloomfield 1959, p. 54; Flandreau 1996; Contamin 2003). Many banks used foreign exchange as intervention instruments, e.g. Belgium (Conant 1910, p. 180) as well as Finland and many colonies (Bloomfield 1963, p. 23). The Banco de Portugal regularly relied on borrowed reserves (Reis 2007).

recent work has built on the econometric analysis of exchange and interest rate data. On the other hand, hardly anything is known about the OeUB operations themselves, in particular about the instruments used, the frequency and size of interventions, and the motives of the decision makers. This article proposes to fill the gap by presenting a broad set of quantitative and qualitative evidence on the operations of the OeUB and the market setting within which they took place.

The article proceeds as follows. Section 2 reviews the existing literature on the foreign exchange policy of the OeUB and gives an outline of the open questions. Section 3 portrays the foreign exchange operations of the OeUB based on new material from the archives of the Bank. In addition to spot sales and purchases, the section documents the use of forward contracts as well as of foreign exchange repurchase operations. Section 4 explores the evolution of the Vienna foreign exchange market. After 1901, the OeUB commanded by far the largest foreign exchange holdings in the monarchy and, more surprisingly, became the key market maker and a high frequency trader, in sum the market leader. Section 5 links the changes in market structure to the increase in foreign exchange market efficiency that occurred at the same time. Section 6 then looks at the practice of modern central banks to understand why the OeUB developed new instruments and why the Bank was so keen on dominating the market. The conclusion wraps up and sketches some avenues for future research.

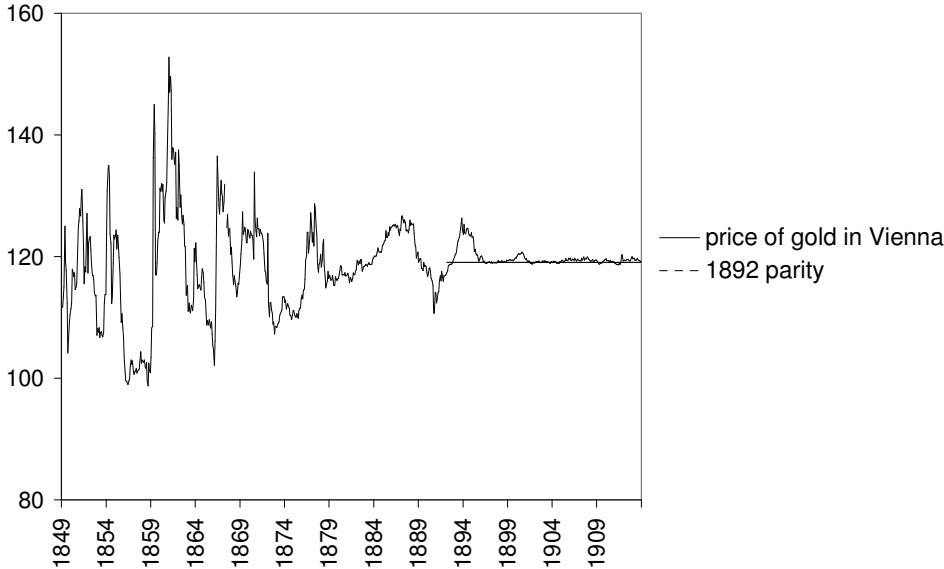
2 A successful exchange rate stabilization program and some open questions

After decades of floating and several aborted attempts at stabilization, a series of monetary reforms in the 1890s tied the Austro-Hungarian florin to gold. The legal adoption of a gold standard had no immediate effect on the exchange rate, however, as the convertibility of banknotes into specie remained suspended.⁴ The new regime proved nevertheless very successful in stabilizing the value of the Austro-Hungarian currency on the foreign exchange markets. After wide gyrations in the 1850s and 1860s and fluctuations in the order of $\pm 7\%$ up until the mid-1890s exchange rates became steady

⁴ For a general overview of Austrian monetary history in the second half of the nineteenth century see Kamitz (1949) and März and Sochor (1973). Spitzmüller (1900) and Fellner (1911) give exhaustive accounts of the changes in monetary legislation. Mises (1907; 1912) analyzes the political economy behind monetary reform and why ultimately specie payments were never established.

after 1896, when the OeUB started to intervene in the foreign exchange markets. After 1901 volatility declined even further, and exchange rates behaved similar to those between the core gold standard countries France, Germany or the UK. Figure 1 tracks the price of gold, representative for the trends in the value of the Austro-Hungarian currency vis-à-vis the main international currencies.

Figure 1: Price of gold in Vienna



Source: 100 = silver parity before 1848, converted into gold at the Latin ratio of 15,5:1. End of month values.

2.1 Early debates on rules vs. discretion

Almost from its inception, Austria-Hungary’s new exchange rate regime aroused the curiosity of economists. One aspect that intrigued contemporaries was the absence of gold convertibility. Georg Friedrich Knapp closes his presentation of the state theory of money (1905) with the Austro-Hungarian example of exchange rate stability without specie payments. In a drawn out debate, Ludwig von Mises confronted the Vienna economic journalist Walther Federn on the true nature of the Austro-hungarian exchange rate regime. Von Mises (1909a, 1909b, 1912) claimed that the absence of a legal obligation for the OeUB to redeem bank notes in gold on demand had no practical relevance for exchange rate dynamics and that the regime was just a gold standard in disguise: While in a stylized gold standard, exchange rate movements are limited by gold convertibility, in Austria-Hungary, Mises argued, foreign exchange intervention by the OeUB had been substituted for this mechanism. The result was the same, as the OeUB stood ‘always [ready to sell] foreign bills at such a price that it [was] cheaper to purchase and forward checks or bills than gold’, i.e. at a ‘price which would be lower than

the above gold point after the introduction of the gold currency' (Mises 1909b p. 204 and 203). In the end, Mises claimed, the foreign exchange policy of the OeUB was just a slightly more sophisticated version of gold convertibility.⁵

Federn (1910, 1911) on the other hand, argued that the OeUB was not intervening according to such a simple rule.⁶ Instead the bank exercised discretion by letting occasionally depreciate the exchange rate beyond the notional gold points as well as by discriminating between the demand for forward versus spot exchange. Seemingly technical, the debate on policy implementation drew its significance from the supposed implications for the autonomy of domestic monetary policy. According to Federn, the innovative instruments and the discretion afforded by the suspension of specie payments allowed the OeUB to discourage speculative capital flows and (partially) insulate the domestic money market from shocks in foreign money markets. With an exchange rate slightly below the gold export point, capital exports faced the risk of a return of the exchange rate back within the band. Speculative flows were consequently discouraged.⁷ Furthermore from time to time the Bank discriminated between the spot and forward exchange markets. In Federn's argument, short term capital exporters needed spot exchange while importers could do with forward exchange as well. Consequently, the OeUB let the spot exchange depreciate while keeping the price of forward exchange steady, thereby putting short-term investment abroad at a disadvantage without hurting the 'legitimate interests' of commerce.

Einzig (1937), witness to the hot capital flows of the interwar-years, refined Federn's argument in the modern terms of covered interest rate arbitrage. In his story, short term capital exporters covered their

⁵ In principle, the intervention thresholds could have been set arbitrarily (wider or narrower than those given by shipping costs), but Mises phrased his statement with reference to the gold points in order to highlight the equivalence between gold convertibility and the foreign exchange policy of the OeUB.

⁶ See also his articles in 'Der Oesterreichische Volkswirt', in particular 5 June, 17 July and 31 July 1909.

⁷ 'Die Bank hat in ganz richtiger Taktik, ähnlich wie aus Anlaß der Zinsfußarbitrage in den Jahren 1906 und 1907, die Devisenkurse mäßig über die Relation steigen lassen und zwar deshalb, weil, solange die Devisenkurse sich an der Relation hielten, die Finanzinstitute bei ihren spekulativen Devisenkäufen kein Risiko trugen; es musste erst eine Verlustmöglichkeit vorhanden sein, um von spekulativen Devisenkäufen abzuhalten.' (*Der Oesterreichische Volkswirt*, 5 June 1909, p. 3).

investments abroad by selling forward in order to lock in their gains. By driving a wedge between spot (the price at which foreign exchange could be acquired for investment today) and forward rates (the price at which funds could be repatriated), through the technique described by Federn, the Bank rendered covered interest rate arbitrage unattractive. In the words of Einzig: ‘The Austro-Hungarian Bank evidently went out of its way to cause [the forward] premium to widen, so as to make the cost of covering the exchange risk on interest arbitrage prohibitive’ (1937, p. 333).⁸ By inventing this creative tool, the OeUB pioneered modern, i.e. inter-war, foreign exchange policy, Einzig concluded.

2.2 *Modern views on monetary policy autonomy*

Leaving aside the question of *how* the exchange rate band was implemented – a central topic in the Federn-Mises debate – Flandreau and Komlos (2002, 2006) have revisited the question of monetary policy autonomy from the viewpoint of the behaviour of market prices, interest rates and exchange rates.⁹

Recent interpretations of the gold standard have insisted on the flexibility afforded by the possibility of exchange rate fluctuations within the gold points.¹⁰ As long as the exchange rate parity is perceived

⁸ The mechanism could also be employed in the reverse direction. On occasions, Federn argued, the Bank limited speculative short-term capital *inflows*, when domestic interest rates were attractively high compared to foreign rates (*Der Oesterreichische Volkswirt*, 17 July 1909, p.2).

⁹ They only note that they had not found evidence for forward interventions in the minutes of the board of directors (p. 1982).

¹⁰ For an early summary of what they term the ‘modern synthesis’ see Eichengreen and Flandreau (1997). The modern interpretation has borrowed heavily from target zone theory (Krugman 1991, Svensson 1994), but the recognition by economists that, depending on the width of the exchange rate band, short term interest rate can deviate substantially between centres, is much older, as Svensson recognizes, going back to Keynes and the practical experience of pre-1914 central bankers (for a brief discussion see Flandreau and Komlos 2006). Techniques from modern target zone theory have been applied among others by Hallwood et al. (1996) and Bordo and MacDonald (1997) to show that the exchange rate bands between the ‘core’ currencies were credible. Bordo and MacDonald (2005) document policy autonomy for England, France, and Germany between 1880 and 1914.

to be credible, speculation will be stabilizing as economic agents bid up (down) the exchange rate whenever it is weak (strong) in anticipation of an eventual return of the exchange rate towards parity.

While their argument is related to the literature on target zones, Flandreau and Komlos derive the properties of stabilizing speculation and monetary policy autonomy in the Austro-Hungarian case without that a well determined band had been in place historically. They conclude that instead of the band, the two important ingredients for policy autonomy were (1) the credibility of the parity, which they find established from 1896 onwards, and (2) the efficiency of the foreign exchange market, which guarantees that expected appreciation or depreciation is actually translated in a forward premium or discount.¹¹ While most studies of modern forward markets have found markets little or inefficient (MacDonald 1988) – forward rates predict future changes in the exchange rate very badly – Flandreau and Komlos (2006) find the market for German mark to be efficient from 1901 onwards: The forward premium became an unbiased predictor of changes in the exchange rate.

The resulting limited flexibility allowed significant discretion in setting the monetary stance over the short run, as Flandreau and Komlos (2006) show for the crisis of 1907, when the OeUB succeeded in keeping its discount rate relatively steady, despite large increases in the official rates in Berlin and London. In a final step they show that the interest rate differential (the policy variable of the OeUB) drove the expected rate of currency depreciation: the exchange rate band effectively isolated domestic monetary policy.

While the debate on monetary policy independence thereby appears settled, the literature leaves us with the puzzle of how credibility was established and maintained and why forward markets were efficient after 1901 while they had been inefficient before. Interestingly, forward exchange and the structure of the foreign exchange market feature prominently in both the earlier and the modern literature. Federn and Einzig argue that the OeUB could manipulate the market through forward market interventions. Flandreau and Komlos point to the sudden improvement in forward market

¹¹ For further credibility test of the Austro-Hungarian exchange rate regime using bond rates see also Jobst (2001).

efficiency. The presence of this common element in the two different arguments is intriguing and suggests that the working of the foreign exchange market and the seemingly technical aspects of exchange rate intervention might in fact be just the two sides of the foundation on which the stability and success of the Austro-Hungarian peg rested. Policy and market performance will be analysed in turn.

3 Innovation in policy instruments: forward contracts and foreign exchange repos

3.1 The Vienna foreign exchange market before 1898

Before looking in detail at the foreign exchange operations of the OeUB, it is useful to sketch briefly the set-up of the Vienna foreign exchange market. In the second half of the 19th century, the market was dominated by the large internationally connected banks of the monarchy – Creditanstalt, Länderbank, Anglo-Österreichische Bank and the like – and private banking houses like the Vienna branch of the Rothschild family (März and Sochor 1973). An important line of business was international securities arbitrage. Austrian and Hungarian shares and bonds were cross-listed on numerous exchanges in Western Europe and markets closely integrated (Baltzer 2006). Arbitrage, however, involved an element of exchange rate risk as the Austrian florin floated throughout the entire second half of the 19th century. The need for hedging was probably the most important driving factor behind the early emergence of forward markets in foreign exchange in Vienna, much earlier than in the leading financial centres London or Paris (Einzig 1961 p. 7-9; Flandreau and Komlos 2002). In many European markets, securities themselves were traded forward with transactions being settled mostly at the end of the month (in Vienna called *Ultimo*). To match settlement dates in security transactions, the Vienna forward market in foreign exchange became equally tied to *Ultimo*. In the bulletin of the Vienna stock exchange forward (or *Ultimo*) quotes for German mark can thus be found alongside spot (or *Cassa*) rates. Lotz (1889) gives a vivid description of the hedging involved in international arbitrage operations.

Until the mid-1890s, i.e. for almost the first eighty years of its existence, the OeUB had been completely absent from the Vienna foreign exchange market. While the Bank had invested in foreign bills as early as 1848, operations remained limited to adjustments within the portfolio of reserve

assets. Reserve management was firmly circumscribed by the legal rules on the metallic cover of the note issue. In its earlier years, foreign bills did not count towards the legal cover, after 1888 up to 30 million florins (60 million crowns).¹² On the other hand, under pressure to increase profitability, the Bank had an interest to invest at least part of its silver and gold holdings in foreign bills, e.g. sterling bills, which earned interest but could, if necessary, be easily converted back into gold (Mecenseffý 1897; [Anonymous] 1898). As a result, the Bank used part of those reserves, which it held in excess of the amount legally required, to buy foreign bills. These transactions did not involve domestic bank notes. When excess reserves were high, the Bank shipped silver or gold abroad to acquire bills. When excess reserve holdings fell low, some bills were cashed and the proceeds added to the metallic reserves in form of silver or gold.¹³ As a result, foreign exchange operations had no incidence on the availability of foreign bills in the Vienna market or on domestic money supply.

The situation changed only in the wake of the adoption of a new gold parity in 1892. Before, the Bank had declined any responsibility for the management of the exchange rate. Now, even though legal convertibility of banknotes into the new gold crowns remained suspended, the governments pressured the Bank to start supporting the exchange rate. Anxious of its newly acquired gold stock, the OeUB hesitated to lose gold in possibly futile interventions. Instead of selling, the Bank started to lend gold and some limited amounts of foreign bills to the market in 1893 (Mecenseffý 1896, p.50). Soon however, the Bank had to recognize that limited *lending* was not the appropriate tool to permanently affect the level of the exchange rate and decided in 1898 to start *selling* foreign exchange outright (BHA 1064/1898, Spitzmüller 1900). By extending significantly the range of businesses, the Bank was

¹² From 1863 onwards the Bank operated under a Bank of England style reserve requirement system, where it was allowed to issue a fixed amount of banknotes with any additional issues to be covered 100% in silver, later gold. The system was relaxed in 1888 along the lines of the statutes of the German Reichsbank. The strict limit on the fiduciary issue was replaced by a 5% tax on banknotes issues in excess of 200 million florin. See the statutes in the appendix to Mecenseffý (1896).

¹³ In addition, the Bank replaced foreign bills that fell due by new bills. To qualify for the legal cover bills were not allowed to mature in more than three months.

allowed to do, the new statutes from 1899 made this shift in policy official.¹⁴ Furthermore, foreign exchange operations were reorganized within the Bank and entrusted with a small unit directly subordinated to the secretary-general (see appendix to GR 427 and GR 449). The concentration of foreign exchange operations is in an interesting contrast to the otherwise high degree of decentralization in Bank operations and underlines the key role of foreign exchange interventions, which required speed and confidentiality to be effective.¹⁵ The organizational transformations mark the beginning of the Bank's active involvement in the Vienna foreign exchange market and of a foreign exchange *policy* properly speaking.

3.2 *Plain vanilla interventions*

The standard way to explore central bank operations in the foreign exchange market is to look at patterns in intervention behaviour. The modern empirical literature usually takes central bank interventions either directly from central bank published or unpublished records or uses changes in net foreign reserves as a proxy, both series either in total or broken down by currency (Sarno and Taylor 2001). Then as today, however, most central banks preferred to keep techniques and policy behind a veil of secrecy and empirical studies depend very much on data availability.

The same is true for the OeUB. The weekly published balance sheet does not give a full picture of the reserve position. Of course, those items serving as legal cover of the note issue, gold and foreign bills up to the limit of 60 million crown, had to be published. At the same time, information on foreign bills held in excess of the 60 million crown limit, foreign bills maturing in more than three months and

¹⁴ The 1899 statutes allowed explicitly the purchase and sale of bills and checks drawn on foreign places, of foreign bank notes, as well as of bills and checks in foreign currency drawn on Austro-Hungarian places; cashing of bills and payments for third parties abroad; the writing of checks and payment orders; and the holding of deposits at foreign banks necessary for these transactions. Many of the operations listed in the 1899 statutes had been utilized by the OeUB before, though at a much more modest scale.

¹⁵ Following the 1867 compromise between Austria and Hungary, the organization of the Bank was adapted over the years to reflect the dualistic structure of the monarchy. See Köver and Pogány (2002).

foreign deposits cannot be deduced from the published reports.¹⁶ Fortunately, these series can be completed using internal files of the Bank. Foreign reserves thus defined include gold, foreign bills and foreign currency denominated deposits the OeUB kept at commercial banks abroad.¹⁷ The result is a high-frequency series for changes in foreign reserves.¹⁸

Figure 2 plots weekly changes in foreign reserves between 1901 and 1914 both over time and against the level of the exchange rate, here mark as the most important exchange rate for Austria-Hungary. Two observations emerge. First, the level of reserves exhibits significant short-term fluctuations. Secondly, we note that contrary to the idea implicit in the standard textbook view, there is no significant increase in reserve gains or losses when the exchange rate gets closer or crosses the gold export and import points. Instead, there appears to be a broadly linear relationship between the exchange rate and changes in reserves. The OeUB tended to sell foreign exchange when the crown was trading below par and tended to buy when crown was appreciated relative to mark. However, there are large deviations around the linear relationship, the Bank acquiring reserve assets when the crown was weak and selling assets when the crown was strong.¹⁹ This is in line with the suggestions

¹⁶ In the weekly reports, these holding were lumped together with other balance sheet items in the entries “other assets” and “other liabilities.” Hertz’s (1903) study on the OeUB foreign exchange policy is based mainly on changes in “other assets”.

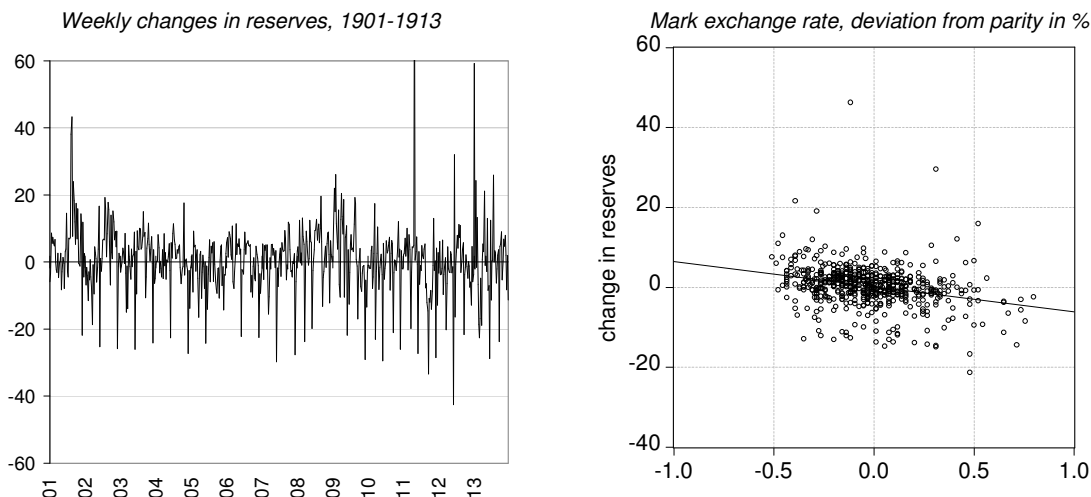
¹⁷ The reserve series excludes silver coins held by the Bank, which qualified as legal cover, but which were, given the low value of silver on the free market, effectively fiduciary money. The main determinant in fluctuations in silver holdings was seasonal changes in demand for circulation.

¹⁸ Even though often obliged by lack of alternative data to resort to changes in reserves as proxy for actual interventions, the modern literature raises several caveats against this measure (e.g. Dominguez and Frankel 1993). The main concern, simple changes in valuation that would show up as ‘intervention’, however, does not apply in the case of the OeUB. Foreign assets were priced in the balance sheet at parity, so that any increase in foreign assets can only stem from an increase in volume, which is the variable we are looking for. In addition, total reserves are used, so that portfolio shifts within foreign reserves, e.g. a swap sterling for mark, cancel out.

¹⁹ (Non-)linearity can also be tested econometrically, results are available from the author on request.

by both Federn and Flandreau and Komlos that the OeUB did not commit to intervene at well-specified exchange rate levels but exercised discretion in its defense of the exchange rate parity.

Figure 2: Weekly reserve changes in million K vs. exchange rate, 1901-1913



Source: Exchange rates from Kursblatt, reserves from author's calculation from appendix files to balance sheets.

3.3 More sophisticated instruments: transactions on the forward market

While informative, changes in reserves per construction capture spot sales and purchases and have only limited value to track forward transactions, the peculiar instrument that has so interested Federn and Einzig. The reason is technical and related to the way the balance sheet is drawn up. A forward sale or purchase does not entail any transfer of cash at the moment of contracting but only after settlement, e.g. at *Ultimo* of next month, depending on the stipulations of the deal. As long as the deal was not settled, reserve holdings appeared unchanged.²⁰ Furthermore, if the Bank decided to sell forward for the same settlement day the forward exchange it had just bought, the sale compensated the purchase and no trace of the two transactions ever showed up in the books.

Even today with access to the Bank's internal files, it is difficult to reconstruct the practice of forward interventions. A complicating factor is the highly concentrated organization of foreign exchange

²⁰ The ensuing risk of misrepresenting the true reserve position is not specific to the OeUB or 19th century banks, as the infamous forward sales by the Thai central bank preceding the devaluation of the bath in 1997 have well shown. The experience led to efforts by the IMF and the BIS to increase transparency in the reporting of foreign exchange reserves by central banks (BIS 1998; IMF 1999).

trading within the OeUB, sketched above. Information on reserve positions was kept within a small unit and wasn't fully passed on even to the board of directors (called the *Generalrath* or general council) that met on a monthly basis to set the discount rate and whose minutes are the main source on Bank policy during the period. While much more detailed than the published weekly reports, the balance sheets communicated to the Council included only current holdings but no future commitments. In a telling episode in June 1900 the secretary-general had to explain to the members of the Council why the reported foreign exchange holdings had increased although it was 'generally known' that the Bank had sold significant amounts in the market. He explained that the sales had been done forward and had not been settled yet (GR 423).

As a consequence of reporting practice, no continuous series on forward commitments can be reconstructed. However, data for some particular days have survived. All attest to the volume and variety of forward transactions undertaken by the OeUB. The most telling evidence is provided by two internal reports dated from the 31 December 1905 and the 30 December 1906.²¹ The printed forms, entitled '*Devisen-Engagement Stand*' (foreign exchange commitment), detail the amount of checks, banknotes, and foreign coins the Bank expected to receive or was committed to pay on specific days over the coming months. Commitments resulted from both forward and spot transactions. Spot transactions were settled the working day after conclusion of the contract and thus also figured among commitments.²² As the reports are from the last day of December, they allow us to compare the volume of spot transactions for one day in December with the total of the forward deals done for Ultimo December as well as outstanding forward transactions for later dates in January and February.

²¹ There is also occasional, though less detailed evidence in the reports of the secretary-general to the GR.

²² For the rules (*Usancen*) determining the time limits for different contracts at the Vienna stock exchange compare Wittelshöfer (1897) and §4 in the rules for trading on the Vienna stock exchange ('Bedingungen für den Handel in Effekten, Devisen und Valuten an der Wiener Börse') enacted by the K.k. Börsenkammer (reprinted in the *Taschenausgabe der österreichischen Gesetze*).

Table 1: Foreign exchange commitments end of year, 1000 K

<i>31 December 1905</i>		<i>spot</i>	<i>Ultimo December</i>	<i>Ultimo Jan. and later</i>
London	buy	-	817	1.585
	sell	-	877	3.062
Berlin	buy	-	2.753	15.096
	sell	562	2.413	-
Paris	buy	114	3.323	2.809
	sell	135	2.666	-

<i>30 December 1906</i>		<i>spot</i>	<i>Ultimo December</i>	<i>Ultimo Jan. and later</i>
London	buy	-	5.056	5.068
	sell	3	3.050	-
Berlin	buy	-	1.886	9.707
	sell	164	2.156	-
Paris	buy	324	-	238
	sell	571	1.395	-

Source: Author's calculations based on BHA 263/1906 and 344/1907.

From table 1 we can derive three observations: (1) The OeUB dealt in both forward and spot exchange. As far as any inferences can be drawn from two observations, it appears that volumes were sizeable in both spot and forward markets; (2) the Bank appears on both sides of the market with net sales/purchases being small relative to total volume, in particular for forward contracts, but also in the spot market. This shows that the Bank operated as a market maker; and (3) there are sizeable volumes in forward sterling and franc. This is interesting, as in the stock exchange bulletin only forward mark was quoted. Apparently, there was a complementary OTC market in sterling and franc.²³ Together these elements provide the first proof based on internal files of the OeUB for Federn's claim that forward transactions were important.

3.4 Linking the spot and forward markets: The invention of the foreign exchange repo

Outright purchases and sales of forward exchange were however not the only means of dealing in the forward market. A related tool was the already mentioned lending operations. To understand the significance of lending operations for the forward market, we have to look closer at the underlying contract. In fact, what the OeUB called '*Leihoperation*' was equivalent to a modern-day foreign

²³ Einzig (1961, p. 8) mentions sterling, but not franc. The existence of a relatively liquid market for forward franc – corroborated also by the large volumes in franc repurchase agreements, see section 3.4 below – is not surprising given the significant short-term capital flows between Vienna and Paris (Michel 1976 pp. 254-5, see also Flandreau and Gallice, 2005).

exchange swap or repurchase agreement (repo): Foreign exchange was sold spot under the condition of a future repurchase at a price fixed today.²⁴ Occasionally, the Bank also bought foreign exchange spot selling at the same time forward. These reverse repos were done at a much smaller scale, however, and outstanding volumes were zero most of the time.²⁵

The existence of foreign exchange repos is highly interesting in itself. The operation is much more complex than redeeming notes in gold or selling foreign bills in the market and attests to the sophistication of central banks in the late 19th century and of the OeUB in particular. The only other central bank, for which combined spot sales and forward repurchases of securities are documented is the Bank of England, which used these repos in government debt to steer market liquidity (Sayers 1976, p. 38).²⁶ The evidence provided here on the OeUB is however the first to document the use of repurchase agreements in *foreign exchange*.

How were repos employed? The appendices to the annual balance sheet give the annual volume of business as well as the amounts outstanding on December 31. Both behave very similar. Figure 3 tracks the end-of-year volumes from 1893 to 1913. Well visible is an early experimentation period during which business remained limited in size and until 1897 mainly in effective gold coin, i.e. the Bank sold 20 francs or 20 mark gold pieces and repurchased them forward. As already pointed out, the Bank had initiated lending in order to support the exchange rate without parting permanently with its

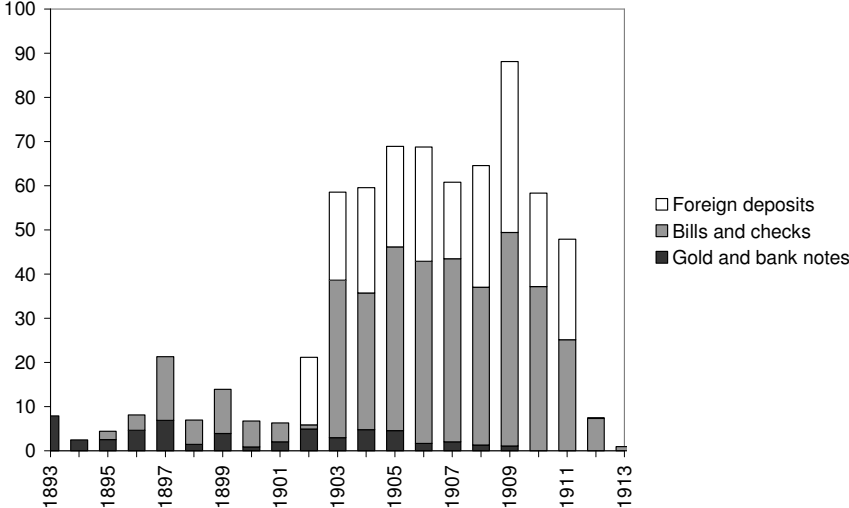
²⁴ „[Die] Verleihungen [sind] eigentlich nur Verkäufe gegen Banknoten per prompt unter der Bedingung der Rückkäufe auf Zeit.“ (BHA 1898/1064).

²⁵ Between 1901 and 1906 the maximum annual turnover was 2.5 million K in 1903, insignificant compared to close to half a billion K in lending.

²⁶ Many note issuing banks routinely lent against securities, like bonds or even shares. Here however, it was always the banks delivering cash against securities, not vice versa as in England or Austria-Hungary, where the central banks provided securities against cash. Note also that lending against securities was typically organized as standing facility, i.e. the operations could be done at a posted rate and at the initiative of the counterparties of the central bank. OeUB and BoE repos on the other hand were initiated by the central banks themselves. On the modern definition of standing facilities and open market operations see e.g. Bindseil (2004).

gold and foreign exchange reserves. In this respect lending proved ineffective and so the Bank started to sell foreign exchange and gold outright from 1898 onwards. However, instead of discontinuing the repo operations as repeatedly announced in public, the Bank actually increased the amount of funds employed in lending substantially.²⁷ At the same time within operations, the importance of effective gold declined, while bills, checks, and transfers became dominant.²⁸

Figure 3: Repurchase agreements outstanding end of year, million K



Source: BHA, appendices to the balance sheets.

Clearly, repos must have come to serve a new purpose. Very likely, part of the increase in repos was related to the transfer of the foreign exchange holdings of the governments to the Bank, which will be discussed in section 4 below. Repurchase operations were one of several possibilities for the OeUB to earn interest on the government deposits while keeping the investment short-term and liquid. Repurchase contracts however had an additional interest both for the OeUB and the commercial banks.

²⁷ See e.g. annual report pro 1900, where the OeUB states that lending, ‘a provisional means of international settlement by nature,’ should be reduced to an absolut minimum: ‘Wir waren bestrebt, die Verkehrsbedürfnisse vornehmlich durch prompten Verkauf von Checks und Gold u befriedigen und das Leihgeschäft, dieses dem Wesen nach provisorische Mittel zur internationalen Zahlungsausgleichung, auf den nothwendigsten Umfang zu beschränken.’

²⁸ Breakdown along currencies exist for selected years and show that most business was done in mark and franc as well as some sterling. See BHA 50/1899, 106/1900, 154/1901, 177/1902, 183/1903, 279/1904, 320/1905, 283/1906, 344/1907.

By combining a spot with a forward transaction, repos were in fact the perfect tool for the OeUB to influence the forward premium, just as suggested by Federn and Einzig, as an increase in outstanding repos would drive down spot prices relative to forward rates. From the viewpoint of the commercial banks on the other hand, repos provided a well-suited instrument for international arbitrage operations. Banks lending abroad needed spot foreign exchange but also typically sought to hedge the eventual repatriation of funds by selling forward. The repos offered by the OeUB combined both operations in one. Therefore it was the central bank that provided the most convenient, and probably most cost-efficient, instrument for commercial banks undertaking interest arbitrage, as was recognized by the OeUB itself (BHA 1064/1898).²⁹ Surprising at first sight, the practice will appear much more natural, when the Bank's role as market maker will be discussed in the next section.

After years of stable and high lending, volumes fell sharply in 1912. At the end of 1913, almost no repo contracts were outstanding. Several factors might have contributed to the decrease in repo volumes. The first were legal constraints in the form of cover requirements, which became binding after 1910. According to the Bank's statutes, notes in circulation had to be backed fully in gold, with a maximum of 60 million crowns of the metallic reserves held in foreign bills. Unbacked notes in excess of 400 million crowns, after 1910 600 million crowns, paid a tax to discourage excess issue. As long as the unbacked note issue fell short of 400 million, excess gold reserves could be invested in foreign exchange. The scope for repo operations thus depended crucially on the availability of excess reserves. While high in the early years of the 1900s, excess reserves declined when the increase in circulation forced the bank to call in gold. Excess reserves became almost permanently negative from summer 1910 onwards forcing the Bank into increased tax payments on account of unbacked issues. While not impossible, holding a large foreign bill portfolio became increasingly costly.

²⁹ Unfortunately, no intra-year breakdowns of lending volumes and conditions are available for the critical year 1907. Furthermore a monthly or weekly series of government foreign exchange deposits would be needed, which is also inexistent. The lack of volume data coupled with the complex nature of repurchase contracts, there is no information on fees, maturity, collateral, etc., render a quantitative assessment of repo operations practically impossible.

Aggravating factors that may have further hampered the Bank's ability to undertake repo operations include international political tensions during the years preceding 1914. These confronted the OeUB with a double shock of high cash demand and government deficits, increasing the need for gold and reducing the foreign exchange deposits of the governments at the Bank. To summarize, at the very moment when the Bank would have needed more resources, the funds it could actually employ in foreign exchange lending and outright transactions declined. Its position as market leader was weakened and this precisely became manifest when the exchange rate of the crown declined in 1911.³⁰

4 The OeUB as market leader

The previous section has documented the important transformation in the way the OeUB operated on the foreign exchange markets. From occasionally exchanging foreign bills against precious metals before the 1890s, the Bank turn by turn extended the range of financial instruments and currencies it was dealing in. By late 1901, the Bank transacted regularly in forward markets and had introduced foreign exchange repos as a new instrument. Around the same time, the Vienna foreign exchange market itself underwent a dramatic structural transformation, as the OeUB sought and actually acquired a leading position. Contemporaries like Federn repeatedly emphasised the importance of market dominance for the capacity of the Bank to influence exchange rates.³¹

From the inception of foreign exchange sales in 1898, the OeUB insisted that its position in the market had to be strengthened. Its principal concern was the significant mark and franc holdings of the governments.³² Deposited with commercial banks, they were large enough to neutralize any

³⁰ Federn blamed policy mistakes (see articles in *Der Oesterreichische Volkswirt*, 23 and 30 September, 7 October 1911), but the situation didn't improve in the following months, which gives support to a more structural story.

³¹ 'Die Finanzwelt weiß, dass die Bank vor den Devisenkursen Wache hält, sie kennt ihren großen Vorrat an Gold und Devisen und weiß, dass die Bank mehr davon abgeben kann, als alle Finanzinstitute zusammen spekulativ aufkaufen vermöchten; sie sind die schwächeren.' *Der Oesterreichische Volkswirt* 5 June 1909.

³² Besides, the governments also held accounts denominated in sterling, Swiss francs and Russian ruble (Bradel 1900, p. 9). Both governments needed gold and foreign means of payment primarily to service their gold

intervention by the Bank, the OeUB argued. (Spitzmüller 1900, BHA 283/1906). At the end of 1897, the Austrian government kept foreign currency deposits worth about 25 million K at six Vienna banks, of which 10 million K at the Creditanstalt alone.³³ On 1 October 1901 all these accounts and transactions were transferred to the OeUB, which reduced significantly the amount of foreign deposits available to the commercial banks.³⁴ Further measures to concentrate gold and foreign exchange holdings at the Bank included the introduction of gold coupons (*Zollgoldanweisungen*) to be used in custom payments.³⁵ The private market for gold coin was consequently squeezed. In March 1910 the Bank entered the retail exchange business on a large scale when it extended the service of purchasing and selling foreign gold coins and banknotes from its headquarters to all of its well over hundred branch offices.

While contemporary observers generally agreed on the OeUB's 'mastery of the market', they offer no or limited quantitative evidence.³⁶ As earlier studies on pre-1914 foreign exchange holdings and short-term capital flows have already noted, it is tremendously difficult to obtain data on the private sector. The current and capital accounts were open and relevant transactions had not to be reported to a government statistical office. In the published balance sheets of the commercial banks relevant items

denominated debts, as well as for international payments of state-run enterprises like the postal services, railroads, shipping companies, and the tobacco monopoly. The main sources of gold were custom duties and surplus revenue from international railroad transport. ÖStA 311/F.M./1900; 2353/gemeinsames Ministerium/1900.

³³ The numbers for 1898 are very similar (Bradel 1900, p. 34, 37). The data on government gold accounts were collected when the transfer of these accounts to the Austro-Hungarian Bank was planned in the late 1890s. While total gold and foreign exchange balance might have been higher than usual at this moment due to the recent international bond issues, the type of business was probably similar to the 1880s.

³⁴ The governments had used the Bank's services already before, but on a case-by-case basis only.

³⁵ First admitted the 15 December 1900, RGBl. 198/1900.

³⁶ See e.g. Zuckerkandl (1909, p.441). Mises (1909a, p.139-42) struggled at least to assemble some data on the business of the OeUB, which the Bank held secret. He presents no information on private banks, however.

were typically pooled, so that domestic and foreign bills of exchange showed up under a common heading.³⁷ No series on private holdings of foreign exchange can thus be constructed.

The remainder of the section presents the best indicators we can find on the activity of commercial banks in the Vienna foreign exchange market. The indicators can be grouped under two headings, reflecting two ways we can think about market dominance, often mixed up in contemporary discussions of the topic.

First, the level of foreign exchange holdings. Foreign exchange reserves are the logical measure for a central bank's room for manoeuvre in the face of capital outflows or a speculative attack. To put the reserves of the OeUB, for which reliable data are available, into perspective, a number of indicators will be derived to get an idea on the order of magnitude of foreign assets held by the private sector. The second set of indicators concerns the share of the central bank in market turnover, a more subtle concept. Contemporary observers often noted that the OeUB appeared on either the buyer or the seller side in many deals done on the foreign exchange market (Mises 1909a, p. 142). In principle, the *turnover* of the Bank in its role as market maker is independent from the *stock* of foreign exchange held. The advantage of frequent interaction with the foreign exchange market however is less evident than of large reserves. Potentially, in its role as market maker, the Bank can smooth exchange rate fluctuations, and in this case having a larger buffer stock would certainly help. Another advantage of being a market maker could be access to information. By taking part in a large number of transactions, the Bank can observe activity, the relative predominance of buyer- or seller-initiated orders, the identity of buyers and sellers and finally whether underlying transactions relate to trade or capital flows.³⁸ The information thus assembled was certainly of high value when assessing the economic situation and formulating policy. The two dimensions, holdings and turnover, are analyzed in turn.

³⁷ The classical studies on pre-1914 short term capital flows by Bloomfield (1963) and Lindert (1969) have thus decided to neglect private foreign exchange and concentrate on holdings by public institutions like central banks and treasuries. Flandreau and Gallice (2005) have recently reconstructed the accounts for one French bank, Paribas. They also explain in detail the difficulties associated with such an exercise.

³⁸ On the information content of the order flow see e.g. Lyons (2001).

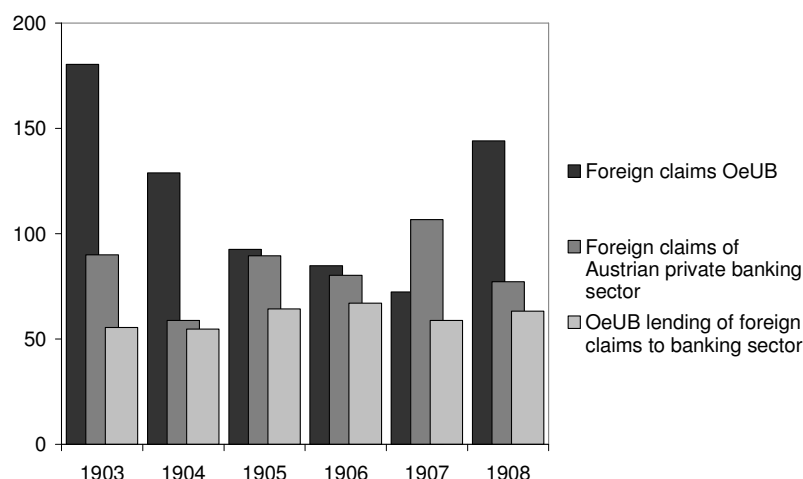
4.1 Concentrating foreign exchange at the central bank

In a fortunate exception to the rule that international financial transactions in the 19th century are a statistical no man's land, the Austrian statistical office collected some numbers on the foreign bill holdings of commercial banks for the years 1903 to 1908.³⁹ The numbers include all banks in the Austrian half of the Empire, however only bills and not foreign deposits. The series was discontinued in 1909. As can be seen in figure 4, holdings fluctuated between 50 and 100 million crowns. Figure 4 gives also two measures for the relative size of the OeUB. As for the commercial banks, the OeUB series includes only foreign bills, not deposits. With the exception of 1907, the foreign portfolio of the OeUB exceeded the combined holdings of all Austrian banks throughout the years, sometimes by a large margin. The second measure for the relative size of the OeUB is the amounts of outstanding lending operations (repos). If we make the reasonable assumption that it was only or mainly banks that borrowed foreign exchange at the OeUB, a surprising dependence of the banks on OeUB resources becomes visible. Throughout the period, the total amount of foreign bills held by the commercial banks barely exceeded the amounts they borrowed at the OeUB.⁴⁰ It is evident that by reducing or increasing the level of outstanding repos the Bank could heavily influence the amount of foreign assets available for the commercial banking sector and thereby influence market conditions at least over the short-run.

³⁹ These must have been collected using special questionnaires, as foreign exchange holdings cannot be derived from published balance sheets. The regular publication of banking statistics by the Austrian statistical office gives breakdowns of the bill portfolio into domestic and foreign bills for selected banks only.

⁴⁰ Note that repos include bills but also other instruments like deposits and checks.

Figure 4: Foreign bills held by the OeUB and the Austrian banking sector, lending operations of the OeUB, all end of year in million K



Source: Statistisches Handbuch, for repos see figure 3.

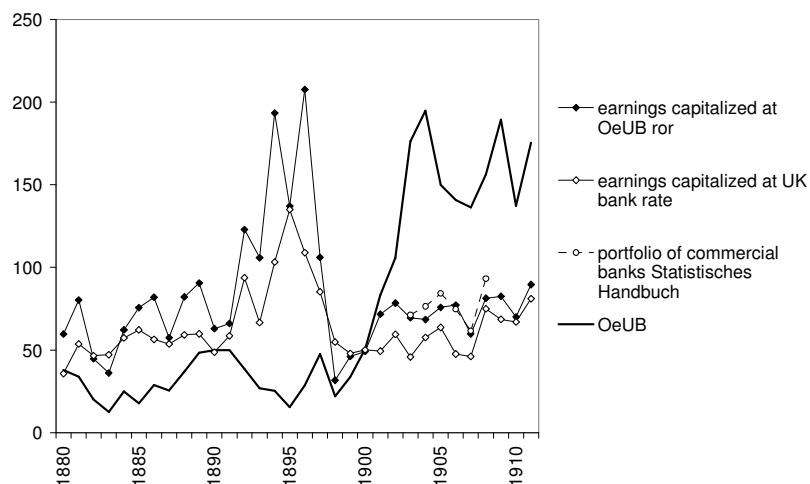
To get a longer-term perspective and to appreciate the shift that occurred in 1901, we have to use alternative proxy series. A possible indicator is earnings on foreign exchange, which is available for a sufficiently large sample of banks over a longer time span. Using an appropriate interest rate, earnings can be used to derive the average foreign exchange portfolio held during the year. Figure 5 shows the results using two different interest rates. The first capitalizes earnings using the (known) rate of return on the foreign portfolio of the Austro-Hungarian Bank, the second the average annual UK bank rate.⁴¹ It is not clear whether earning numbers include only interest earned or also trading profits. By ignoring trading profits, the estimated holdings give an upper bound of the portfolio size. Both estimates show a significant increase in the early 1890s and a sharp decline after exchange rates stabilized in 1895.⁴² If we put the numbers against the average foreign bills portfolio of the OeUB a dramatic shift in relative size becomes again evident. Before 1901, the OeUB was one among several holders of foreign bills and deposits. The OeUB overtook the commercial banks in 1901 and soon became about twice as

⁴¹ The OeUB invested very conservatively and the implicit interest rate on its portfolio is correspondingly low. Commercial banks probably earned higher returns on more risky portfolios. The UK Bank Rate was typically above the market rates for first class bills.

⁴² Note that the size of foreign portfolios calculated using earnings and assumed interest rates conforms acceptably well with the numbers from the Statistische Handbuch available for the years 1903-1908, see above.

large as the main banks taken together. The gap only started to close somewhat towards the end of the period.⁴³

Figure 5: Estimated portfolio of a sample of commercial banks, average portfolio OeUB, in million K



Note: Includes the Bankverein, Creditanstalt, Länderbank, and the Hungarian General Credit Bank. Sources: Compass, OeUB balance sheets, Statistisches Handbuch.

4.2 The market leader as market maker

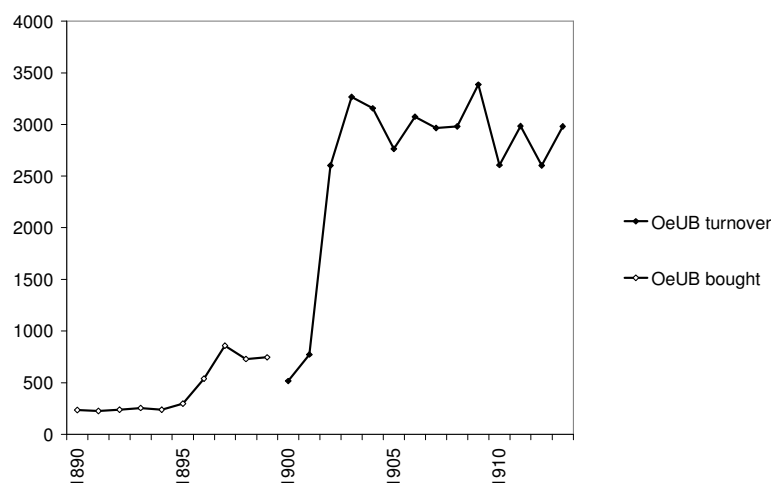
Getting numbers on the volume of foreign exchange transactions is even more hazardous than on assets. Between 1890 and 1898, the OeUB published figures on the total sum of foreign exchange acquired during the calendar year. From 1902 onwards, a series for turnover (‘Umsatz in Devisen und Valuten’) is available.⁴⁴ Similarly named series were also published for several private banks, although the series don’t necessarily overlap in definition.

Before comparing the commercial banks with the OeUB, the new policy of the OeUB becomes already clear by looking at OeUB turnover alone. A visible increase in 1896 was followed by an explosion in transactions again after 1901. The transfer of the government accounts – equivalent to an annual turnover of about 250 to 300 million crowns – played a role but can account for only about 10% of the increase in market activity of the OeUB. Clearly, the OeUB actively strived to increase its involvement in the foreign exchange market.

⁴³ Note the difference in the OeUB series to figure 4. Figure 4 refers to end-of-year holdings, figure 5 to average holdings during the entire year.

⁴⁴ Before 1900 ‘Summe der durch Kauf erworbenen Valuten, Devisen und anderen Forderungen auf das Ausland’.

Figure 6: Turnover in foreign exchange, million K



Source: Annual reports. For definitions see text.

One way to put turnover at the OeUB into perspective is by looking at the overall volume of transactions with foreign countries derived from the current account. Table 2 gives an overview of the payments Austro-Hungarian residents made and received throughout three benchmark years.⁴⁵

Table 2: Austro-Hungarian current account in million K

	1893		1903		1913	
	<i>debit</i>	<i>credit</i>	<i>debit</i>	<i>credit</i>	<i>debit</i>	<i>credit</i>
Trade	1390	1720	2050	2300	3540	3100
Interest and redemption ⁴⁶	380	30	400	30	350	40
Transport (net)	-	30	-	40	-	70
Migration ⁴⁷	30	30	70	170	80	520
Tourism	?	40	?	70	?	90
<i>Total</i>	<i>1800</i>	<i>1850</i>	<i>2520</i>	<i>2610</i>	<i>3970</i>	<i>3820</i>
foreign exchange turnover OeUB	250		3270		2980	

Sources: K.k. Finanz-Ministerium (1903-1906), Bartsch (1916).

As can be seen in table 2, by 1903 foreign exchange transactions at the Bank exceeded the sum of all payments on current account. Of course, short term capital movements are not included in these numbers, but the size of the OeUB appears impressive in any case. The share of the Bank declined in the following decade, as turnover fluctuated around three billion crown while foreign trade rose by

⁴⁵ Some sources of earnings and spending, like foreign direct investment, are unknown. However, these sums are likely to have been small relative to those included in the table.

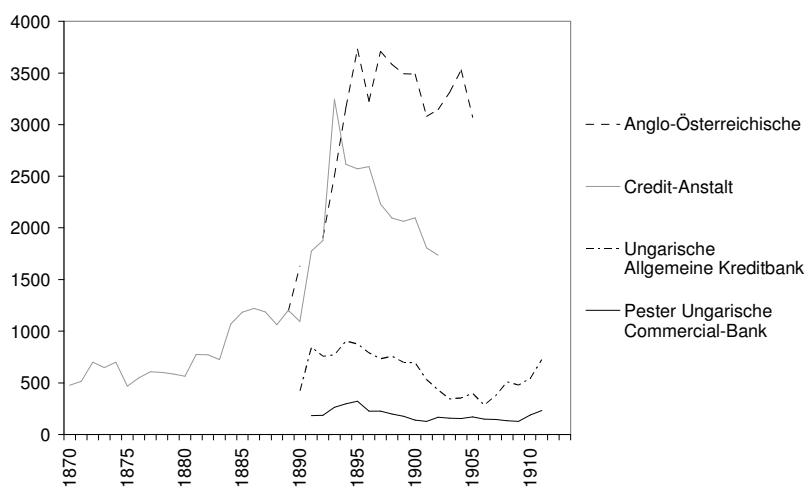
⁴⁶ Interest figures for 1903 refer to 1901.

⁴⁷ 1893 and 1903 without savings from returning overseas migrants, 1893 without continental migration. Italian migrants assumed to send back 10 Mill. K as in 1910.

75% and remittances from migrants became an important item on the credit side. Nevertheless, the Bank remained an important player up to 1914.

What about the commercial banks? Figure 7 shows turnover for a number of Viennese and Budapest banks that have published data for selected years. As has been noted, it has to be kept in mind that there is no common definition of turnover, so that the comparison of the *levels* of the series should not be taken too far. Looking at *trends*, we see a steady increase in turnover until the early 1890s, broadly in line with the increase in foreign trade, an explosion in activity around the stabilization and the passage of the gold standard laws in 1892, followed by a period of stagnation or decline. Only at the end of the period, after 1910, turnover volumes seem to have increased again. The weak performance of the banks after 1895 is all the more significant as one of the underlying drivers of foreign exchange transactions, trade, continued to increase. At the same time, the OeUB entered the scene, taking market share from the commercial banks.

Figure 7: Turnover in foreign exchange, selected Austro-Hungarian banks, million K



Source: Compass, März (1968).

To sum up, on both dimensions of market dominance, the OeUB scored high from 1901 onwards. Foreign exchange assets of the commercial banks pale in comparison to the reserves of the OeUB. At the same time, the OeUB lent the banks significant amounts of foreign assets that could be extended or withdrawn in order to influence market prices. In addition, the OeUB became the central market maker and counterpart in a large share of deals in the Vienna foreign exchange market.

5 Did it matter? The rise and fall in market efficiency

Sections 3 and 4 have provided critical empirical evidence documenting the introduction of new instruments by the Bank and its drive to dominate the Vienna foreign exchange market. Having answered the question of the ‘how’ leads directly to two related questions, first, ‘did it matter’, and secondly, ‘why’, i.e. what were the reasons that motivated the OeUB to opt for such a complex strategy and sophisticated operational procedures.

Flandreau and Komlos (2006) document an intriguingly high level of foreign exchange market efficiency for the last thirteen years of the monarchy. The evidence is based on testing Fama’s (1984) condition for market efficiency for different time periods from the first appearance of forward quotes in the Vienna financial press in 1876 until 1914. They run the following simple test of the predictive power of forward market rates:

$$s_{t+1} - s_t = \alpha + \beta(f_t - s_t) + v_{t+1}, \quad (1)$$

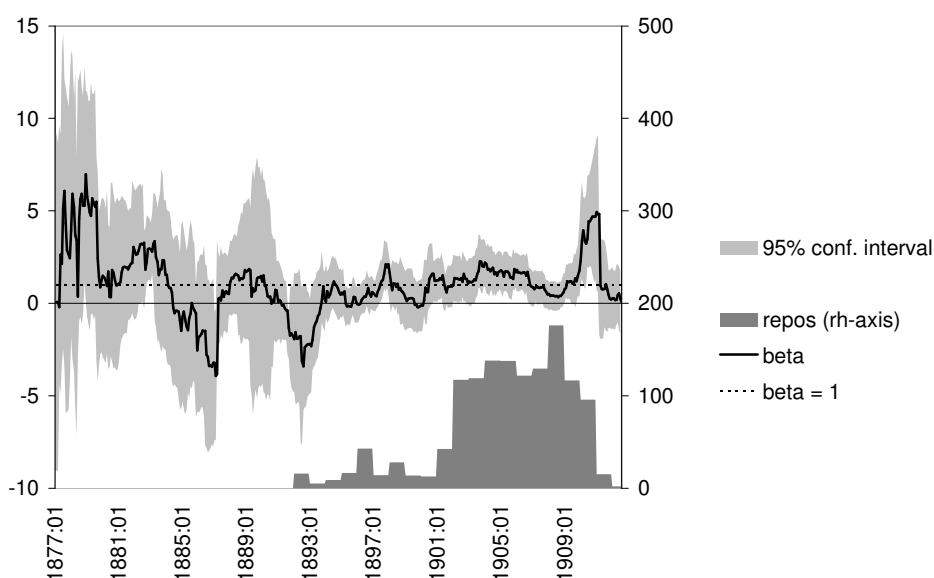
where s_t is the log spot rate at month t , f_t the log forward rate quoted at month t for delivery at $t+1$ and v_t is a random shock. Efficiency in the forward market implies that there is no systematic bias in the prediction of future exchange rate changes: $\beta = 1$ and $\alpha = 0$, if investors are risk neutral. The authors then estimate equation (1) for several sub-periods – motivated by political and institutional changes. Studies on contemporary forward markets typically find markets to be inefficient. Forward rates predict future exchange rates badly and in some cases even point systematically in the wrong direction (see e.g. de Grauwe 1996, p. 156-8, Flood and Rose 1996). As nowadays, Flandreau and Komlos don’t find market efficiency for most of the sub-periods. During the last period, August 1901 to July 1914, however, markets appear clearly efficient, the hypothesis of $\beta = 1$ and $\alpha = 0$ can not be rejected.

To better trace the change in the predictive value of forward rates, I rerun their equation (1) but look at moving 2-year windows instead of using exogenously set cut-off dates.⁴⁸ The results for β are plotted

⁴⁸ The authors provide the dataset for download at <http://eh.net/databases/earlyforward/>. Data are monthly, so the two-year window is a compromise between fineness and statistical significance. Using longer windows does not alter the basic results, though it blurs the decline in efficiency at the end of the period.

in figure 8 along the 95%-confidence interval.⁴⁹ As can be seen, efficiency increased in fact markedly in 1901, right around the cut-off point chosen by Flandreau and Komlos. The confidence interval around β becomes relatively tight and centered around 1. Afterwards the estimated β was not always equal to one, but always positive, meaning that on average the forward rates predicted at least the *direction* of future changes in the exchange rate correctly. After 1910-1911 however, efficiency deteriorated markedly. β started to behave increasingly randomly and was essentially zero for the final years 1912-14. The moving-window regression clearly suggests that the period 1901-1914 in fact should be considered as two periods, one from 1901-1910 of high efficiency, followed by a breakdown in efficiency between 1910 and 1914.

Figure 8: Moving window regressions of Fama efficiency test, β with 95% confidence intervals



Note: For repos see figure 3, author's computations. Results are reported for the starting point of the two-year period, i.e. April 1901 refers to the period April 1901-March 1903. Outstanding repos end-of-year are shifted one year back to match the two-year regression window.

What were the driving factors? Interestingly, the chronology of market efficiency conforms very well with the large scale use of repos by the OeUB. Alongside the estimates for β figure 8 also shows the level of outstanding repo contracts, taken from figure 3 above and lagged by a year to match the two-year regression window. Repo volumes increased strongly in 1901/1902 and dried up from 1911/12 onwards. Efficiency rose and declined in line, suggesting that the high level of market efficiency between 1901 and 1911 owed something to the active role of the Bank at the intersection of spot and

⁴⁹ $\alpha = 0$ cannot be rejected from 1901 onwards.

forward markets. As we have seen in section 3, the scale-back of repo operations was due to the legal restrictions on reserve composition and exogenous shocks that reduced the resources available to the Bank. The position of the market leader was lost, at least for the moment, and the market reverted to the kind of behaviour exhibited before 1901.

6 Why? Some hints from modern central banking practice

While the coincidence of a change in structure of the foreign exchange market with a change in its performance is interesting in itself, it does not answer the question of the ‘why’ from the point of view of the OeUB. In fact, observations by contemporaries, the practices of other central banks as well as economic theory suggest various interpretations consistent with the observed actions of the Bank. Most of these are not exclusive: The evolution in the various uses of repurchase operations is a case in point.

So instead of dressing an exhaustive portrait, which would anyway go far beyond the scope of an article, the following section will focus on two specific aspects of OeUB policy: (in-)transparency in foreign exchange operations and monetary policy implementation, both of which will be put into the perspective of current central bank practice.

Intransparency in central bank operations is today often rationalized under the term of ‘constructive ambiguity’, i.e. ambiguity that is intentionally created. While the OeUB was very clear that the defense of the gold parity was its ultimate objective, it never committed to any specific prices at which it would unconditionally sell or buy foreign exchange. Ambiguity also concerned the disclosure of foreign exchange intervention. As described in section 3, the weekly published balance sheets contained only certain parts of the reserve assets, making it very easy to hide operations among other items in the balance sheet. While OeUB transactions in the Vienna foreign exchange market could in principle have been observed by counterparties, the Bank disposed of additional means to reduce the visibility of operations, if it wanted to. After 1901 the Bank considerably expanded its network of correspondent banks in foreign financial centres, that in 1913 encompassed eleven partner banks in

London and Berlin and nine in Paris.⁵⁰ Using this network, the Bank could conceal transactions by passing through third markets, by using foreign accounts or shipping gold itself instead of selling it in Vienna, without that any of this information would come directly to the knowledge of the Viennese banks. This mix of transparency about the objectives (the exchange rate target) and intransparency about intervention tactics (what triggers intervention, like maximum/minimum tolerated exchange rates) as well as limited visibility and disclosure of interventions (both real-time and ex-post) is not too much unlike to what central banks do today (Chiu 2003). Although practices vary and there are theoretical arguments both against and in favour of transparency (Geraats 2002), central bankers nowadays seem to concur that a degree of ambiguity not on intervention *objectives*, but on intervention *tactics* is useful. One reason is that central banks are big players, or at least players that influence market prices and want to avoid being perceived as distress buyers or sellers. In regimes with predetermined bands there is the additional risk of one-side bets, which can lead to the quick built-up of speculative positions at the edges of the band.⁵¹ The parallels between now and then are evident.

This brings us to the second point, i.e. the management of the domestic market.⁵² So far, domestic conditions have been touched upon only in passing, either as a second objective of the central bank, which, if in contradiction to monetary conditions abroad, had to be protected by allowing a temporary appreciation or depreciation of the exchange rate, or as balance sheet constraint limiting the availability of resources for foreign exchange repos. Ultimately, of course, both foreign exchange and domestic monetary operations act upon domestic liquidity and have to serve the same common objective, which is the defence of parity. This leads to the question of the interaction between the control of the domestic money market and interventions in the foreign exchange market. The focus

⁵⁰ BHA, balance sheets.

⁵¹ As a consequence, the Hong Kong Monetary Authority guards a limited scope of discretion about the width of the band.

⁵² I thank Claudio Borio for pointing out the connection between foreign exchange operations and domestic liquidity management.

will be again not on an account of the actual conduct of policy over time but on the instruments. The key challenge for central banks in monetary policy implementation is to influence the interest rate(s) that are relevant for the agents in the economy (Bindseil 2004, Borio 1997). Lowering and increasing the official policy rate alone is not enough, if the market rates do not move accordingly. The issue is an old one. Throughout the 19th century, the Bank of England experimented with various ways of ‘making Bank Rate effective.’ As early as in the 1870s, it employed open market sales and repurchase operations in government securities to drain liquidity from the market, pushing up the market interest rates towards Bank Rate and thereby forcing the commercial banks to borrow at the BoE (Sayers 1976).⁵³ Occasional complaints about ‘too easy conditions in the money market’ suggest that the OeUB faced similar challenges. In the early 1900s in particular, rediscounting by banks at the OeUB fell to very low levels, limiting the capacity of the OeUB to determine short-term market rates. The optimal method to reduce liquidity depends on the structure of the domestic money market. In Austria-Hungary, with its limited number of big banks, which were through arbitrage operations closely linked to money markets in London, Paris and Berlin, the use of foreign exchange repos could have been a superior alternative to operations in domestic securities for managing the amount of liquidity in the banking system. The experiences in money market management underline again the continuities in the challenges and practices of central banking.

7 Conclusion

The article has presented fresh archival material to understand how central banks managed exchange rates under the gold standard. While the literature on the gold standard extensively discussed discount rate policy, the objectives and techniques in operations in reserve assets, be they gold or foreign exchange, have remained underexplored. The article looked at the example of the central bank of Austria-Hungary. The picture that emerges is resolutely modern.

The OeUB disposed of a highly sophisticated tool box, including not only operations on the spot market but equally forward interventions and foreign exchange repurchase contracts, whose use is for

⁵³ In modern terms, the Bank of England created a structural liquidity deficit.

the first time documented for a 19th century central bank. The article also points to the attention given by the Bank to the structure of the foreign exchange market and its own position within. The OeUB sought to dominate both with respect to resources held as well as its share in daily market turnover. The shift in policy coincides with and was mostly likely causal for the change in the way the Vienna foreign exchange market operated that occurred roughly around 1901/1902. In particular, the increase in market efficiency combined with high credibility of the peg led to stabilizing speculation, in turn supporting the conduct of monetary policy.

Several elements appear crucial to the policy of the OeUB: the role of market maker, reducing exchange rate volatility and enhancing forward market efficiency, the strong commitment to parity combined with a degree of ambiguity about the exact moment of intervention to discourage one-side bets, the use of innovative instruments linked to the specific characteristics of the Vienna foreign exchange market, like the presence of developed forward markets and high degree of international integration, and finally the dominating position relative to the commercial banks. All these elements underscore the importance of the structure of financial markets for the conduct of monetary policy.

The results give a clear direction for future research, which should try to bring together more case studies on foreign exchange operations in order to develop a more systematic and comprehensive perspective. There are some obvious candidate countries like Spain or Italy, which were also shadowing the gold standard in the same period. Reis (2007) and Reis et al. (2005) present intriguing evidence on the *Banco de Portugal*. But even the central banks of centre countries like the *Reichsbank* invested in foreign exchange and the *Banque de France* on occasion managed the liquidity needs of the big French banks by buying sterling bills in the market (Bopp 1954; Flandreau, Gallice 2005). A fascinating field is open there.

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Amtliches Coursblatt der Wiener Börse

Compass

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