The Foreign Exchange Option Market, 1917-1921

Scott Mixon*

This version: April 2011

Abstract

Foreign exchange option markets were active during and after the First World War. Heightened price volatility and U.S. Treasury efforts to financialize inexperienced, small investors encouraged speculation. Call options on German marks were the dominant instrument, but calls on French francs, Italian lira, and other currencies also traded. The largest clientele for the options consisted of optimistic investors of German heritage. The ultimate focus on less sophisticated investors, and the low status of the entities offering options, illustrates why option markets were locked into a position on the fringes of legitimate financial markets for so long.

keywords: options, status, social networks, foreign exchange, First World War

*Lyxor Asset Management Inc., 1251 Avenue of the Americas, New York, NY 10020 (scott.mixon@lyxor.com). This paper reflects the opinions of the author and do not necessarily reflect the opinions of Lyxor AM. I thank three anonymous referees, whose suggestions led to a substantial improvement in the paper. I am especially grateful to Jeroen Euwe, who generously provided guidance regarding the Amsterdam market.
Foreign exchange option markets were active during and after the First World War. Heightened price volatility and U.S. Treasury efforts to financialize inexperienced, small investors encouraged speculation. Call options on German marks were the dominant instrument, but calls on French francs, Italian lira, and other currencies also traded. The largest clientele for the options consisted of optimistic investors of German heritage. The ultimate focus on less sophisticated investors, and the low status of the entities offering options, illustrates why option markets were locked into a position on the fringes of legitimate financial markets for so long.
Foreign exchange option markets were active during and after the First World War. The widely held belief is that foreign exchange options emerged after exchange rates began to float in the 1970s, but this article traces the evolution of option market activity during the World War I era.1 I use archival newspapers and a variety of other sources to document the market’s character, participants, and pricing behavior. Call options on German marks were the dominant instrument, but calls on French francs, Italian lira, and other currencies also traded. The market evolved from one involving relatively large sums of money per transaction to one focused on tiny retail transactions. The ultimate focus on less sophisticated investors, and the low status of the entities offering options, provides insight into the perception of option brokers and dealers in the early 20th century.

The first contribution of this paper is to illustrate how and why option market participants became mired in their low status position. Status groups play an integral signalling role in the functioning of financial markets, and the low status of option markets relegated them to the margins for centuries. High status groups confer legitimacy on their actions, but interacting with low status actors diminishes status. Donald MacKenzie and Yuval Millo show how the Black-Scholes model helped to legitimize options and support the creation of organized option trading in the 1970s.2 Options were viewed with wariness by mainstream investors and regulators prior to these events. Officials from the Chicago Board of Trade, for example, encountered sharp hostility from SEC officials when they began to float the idea of introducing options on stocks in the late 1960s. SEC officials compared options to “marijuana and thalidomide” and warned of “absolutely insurmountable obstacles” to the idea.3 This structural break in the 1970s moved option market participants from a low status to a high status. Option trading subsequently exploded in popularity.

1For example, David DeRosa, *Options on Foreign Exchange* (New York, 2000), 1, begins a brief overview of foreign exchange options by stating “Trading in currency options began in the 1970s and 1980s in the venue of the listed futures and options markets of Chicago, Philadelphia, and London.”


A case study of foreign exchange options after World War I illustrates why options were in disrepute for so long. The trade in long-shot call options on German marks in the 1920s relied heavily on the patriotism and national pride of investors with German heritage. The call options would have appeared overpriced except to investors who were extremely optimistic about the recovery of the German mark after the First World War. Reputable investment houses, wary of losing prestige, did not deal in such options, leaving the field open for less reputable (and often fraudulent) foreign exchange dealers. Options were therefore the province of the disreputable, bucket shop operators, or other actors who were lowest in the hierarchy of financial institutions.

A second contribution of this paper is to emphasize the social and ethnic aspect of the growth in financial markets after the First World War. Investment ideas regularly diffuse through social networks. Investors hear about new ideas from their peers, and they may use the actions and advice of their network’s actors as a shortcut instead of doing their own due diligence. Individual investors, in particular, may rely on word-of-mouth referrals to circumvent a lack of time and expertise in investment analysis. They rely on ethnic, religious, or professional ties to find credible agents with which to do business. Fraudulent investment schemes, such as Ponzi schemes, exploit such social ties to steal money from investors. Indeed, Ponzi himself relied on the close knit Italian community in Boston as the source of his funding. Bernard Madoff’s recent fraud, which purportedly used options to generate extraordinary returns, relied heavily on Jewish social networks for asset gathering.

Individuals with strong ties to their European heritage, especially German Americans, purchased the vast majority of foreign currency and foreign currency options during the War era. These ethnic groups had been specifically targeted by the U.S. Treasury Department during the Liberty Loan campaigns of the War. The official campaign urged them to prove their loyalty to the United States by buying bonds. The unofficial campaign sometimes turned into public humiliation or violence.

---


if an individual’s participation was seen as lacking. Individuals of little means were thrust into becoming first-time participants in organized financial markets. These inexperienced investors were soon seen as prospects by brokers who offered allegedly higher yielding investments. One such investment allowed European Americans the chance to invest in their culture by buying currency.

Other authors have briefly noted the existence of foreign exchange option trading during the period covered in this paper. For example, Paul Einzig, recounting the history of the forward exchange market after the First World War, noted that some New York banks experimented with put and call options but quickly abandoned the idea. He also moralized that it was in no way desirable for any banks to engage in such dealings. Gerald Feldman pointed to mark option purchasers as evidence of the speculative interest in the mark during the early 1920s, and Carl-Ludwig Holtfrerich even reproduced newspaper advertisements for mark options in an appendix to his study of investment flows into Germany after the War. None of the authors, however, elaborated on the social aspects of the flows within the U.S. or of option markets, which is key to the discussion here. I can also report a negative result: I examined a number of foreign exchange manuals published during the late 1910s and early 1920s and unearthed no mention of foreign exchange options.

There is virtually no literature on foreign exchange options as they existed before the 1970s.  

---

I find only a few meaningful examples. First, in discussing the activity at the Antwerp Exchange in the 16th century, Herman van der Wee notes in passing that options on foreign exchange were among the instruments traded. Second, when the Russian ruble floated during the late 19th century, an active exchange market developed in Berlin. In addition to contracts for delivery of foreign currency in the future (i.e., forward contracts), cancellable forward contracts (i.e., options) were also offered to facilitate trade. Consider a German entity making a ruble-denominated price to a Russian counterparty, where the Russian firm has time to decide to take or reject the offer. The German entity faces exchange rate risk. An option on rubles would hedge the exporter’s risk, as he would have the option to execute (or not) the forward contract and purchase the rubles at a price locked in at contract inception; this example and rationale appear in the German literature of the 1890s.

There also exists an expanding empirical literature focused on pre-20th century equity option markets in the U.S. and England. Joseph Kairys and Nicholas Valerio use modern pricing models to evaluate 19th century equity option prices and conclude the options were substantially overpriced. Scott Mixon finds that the price behavior of 19th century options, despite the absence of analytical and computational methods available today, was quite similar to option price behavior in the 21st century. Similarly, Anne Murphy finds a broad correspondence between rational option pricing and observed market behavior during the English stock market boom of the 1690s. Gary Shea has examined option prices to shed light on investor rationality during the South Sea bubble. A key theme in this literature is the evaluation of historical option prices with modern methods and comparisons of the trading experience across time periods.

10 See Leland Yeager, International Monetary Relations: Theory, History, and Policy (New York, 1976), 269 for discussion and references to the original German sources discussing the ruble trade.
This paper differs from the aforementioned research in its focus and goals. The paper demonstrates how option dealers became identified with low status groups and how social networks facilitated this identification. The first two sections provide international finance background for understanding option market developments during the World War I era, including a discussion of the issuance of sovereign bonds with embedded foreign exchange options. The next section discusses the broadening participation in financial markets following the Liberty Loan drives and price volatility during the War. The following two sections discuss the short-lived ruble option market after the February Revolution of 1917, when Czar Nicholas II abdicated, and the 1919 rebirth of the market after exchange rates among the Allied powers were released from government intervention. The discussion segues into the market’s ultimate focus on German mark options, and it pays particular attention to the focus on less sophisticated, less affluent German heritage individuals. The penultimate section surveys evidence from the spot and forward foreign exchange business in order to validate the impressions given in prior sections. The final section offers concluding thoughts.

**Foreign Exchange and the War**

Quiet, stable markets are not conducive to option trading. Option buyers want prices to move. During the gold standard, exchange rates were generally quite stable and anchored by arbitrage of gold versus currencies pegged to gold. When the gold standard disintegrated in summer 1914 and belligerent countries effectively went off the gold standard, the preconditions for an active option market were in place. Figure 1 displays exchange rates from 1914 through 1922. The figure shows the U.S. dollar price of French francs, German marks, and Italian lira. One broad trend is the weakening of the European belligerent currencies versus the dollar. Imports of those countries increased and exports of the United States increased as demand for war materiel rose. U.S. imports even fell in 1914 and 1915 and increased in the second half of the war to only about half the value of U.S. exports.\(^{12}\) As foreign exchange was required to facilitate this trade, the exchange rates

reflected this real flow of goods. At the same time, debt increased for the belligerents and issuance of paper money exploded. Governments imposed various exchange controls and intervened as best they could to maintain exchange rate stability. Exchange rates were unpegged in March 1919, and they began to float more freely. At the time, and for several years thereafter, the American balance of trade was significantly positive, with exports to European nations and the UK far exceeding imports from them. The exchange rate had one direction to go.\textsuperscript{13}

Pre-war parity for the franc was 19.3 cents. Francs generally held near that level but began to slide in late 1914. The Bank of France began selling exchange at a below market price to commercial users in the summer of 1915. The $500 million Anglo-French loan was negotiated and issued around this time, helping to facilitate stability in the exchange rate by providing dollars with which to purchase francs. The franc was stabilized in April 1916 as the British and French governments agreed to support the rate jointly. This level, slightly more than 10\% below the pre-war parity, was maintained until summer 1918, when the franc enjoyed support from the war’s imminent end. From the summer of 1919 to early 1920, market forces pushed the franc from 17 to six cents. Currency issuance had increased by a factor of nearly seven relative to 1914 levels.

Pre-war parity for the mark was approximately 23.8 cents. The price of German exchange spiked slightly above this level at the onset of hostilities in 1914 as securities in New York were sold and the proceeds repatriated to Germany. Thereafter, the mark exchange rate fell more or less unimpeded until the summer of 1917. German authorities then intervened in markets to prop up the rate, moving it from less than 15 cents per mark to nearly 20 cents per mark by year-end. It held at that level until May 1918 before sliding to a penny per mark in early 1920, having lost over 95\% of its value relative to the pre-war parity. Note circulation was nearly 20 times that of pre-war levels and growing.

As with the French franc, parity for the lira was at 19.3 cents. The trend in the exchange rate was down after the gold standard fell apart. Military reverses in Italy in 1917 helped push the lira down,

but the American, British, and Italian Treasuries agreed in mid-1918 to stabilize the lira at a rate 17% below the pre-war parity with sterling. As with the franc, the currency enjoyed a speculative boost as prospects of the war’s end neared, potentially signalling a move toward “normal” parity rates for the currencies. Italian lira notes in circulation in 1920 had grown to a level just under six times that of 1914 levels.

Figure 2 displays the Russian ruble exchange rate versus the U.S. dollar during the period 1914-1918. The gold standard parity was 51.45 U.S. cents per ruble, at which level the exchange rate stayed until hostilities began in mid 1914. The ruble slipped more or less continuously from that level to approximately 28 cents during the first quarter of 1917. The Russian government borrowed heavily to finance the war, and it also dramatically increased issuance of paper money. In March 1917, Nicholas II abdicated during the February Revolution. As Russia descended into anarchy during the next few months, the value of the ruble plummeted.

Volatility Breeds Creativity: Currency Option Bonds

Emerging markets, seeking credibility, have long since denominated bond issues in gold, perhaps with payments available in financial centers such as Paris or Frankfurt at the sight exchange rate. Nonetheless, there were other variations used by issuers. The Argentina Gold 5s of 1909, for example, featured principal and interest payable “in Buenos Aries in gold pesos, in London in pounds sterling at the fixed exchange of 4s per peso, in Paris at fcs. 5.04 per peso, in Berlin at reichsmarks 4.09 per peso, and in New York at $0.973 per peso.” Some issuers were more flexible and offered an explicit option-like payoff, such as the Russian 4% rentes of 1894, payable “in London, Paris, Berlin, Frankfort, Amsterdam, Petrograd and New York, at the sight exchange rate of the day on Petrograd, but in no case below the following parities: 100 rubles = £10 11s 5d, 266.67 francs, 216 reichsmarks, 128 Dutch florins, or $51.35 U.S. gold.”

During the turbulence caused by the First World War, highly developed nations tapped the U.S. capital markets with dollar denominated bonds, and the bonds sometimes carried an exchange

---

rate option attached as a sweetener. Russia offered $50,000,000 of $1,000 denomination bonds in the summer of 1916. These three year, 6.5% bonds had interest payable in gold in New York. The bonds featured a provision whereby the syndicate bankers could sell up to 150,000,000 rubles on the Imperial Bank of Russia, then buy back the loan with the proceeds and split any remaining profit equally with the Russian government. That is, the Imperial Bank provided the syndicate a call option on 150,000,000 rubles struck at 33.33 cents per ruble. (The ruble was trading around 31.5 cents in July 1916.) If, for example, the ruble were to trade up to 40 cents, the syndicate could sell the rubles at the market price, receive $60,000,000, and pay off the loan with $50,000,000. The remaining $10,000,000 would be split between bondholders and the government.15

The City of Paris issued $50 million of five year 6% notes through Kuhn, Loeb & Co. in October 1916. Principal on the notes was payable in USD or in Paris at the fixed exchange rate of 5.50 francs per dollar (pre-war parity was approximately 5.18 francs per dollar). This was quickly followed by another 6% issue underwritten by Kuhn, Loeb & Co. for the cities of Bordeaux, Lyons, and Marseilles. Bonds were issued in the amount of $36 million, split among the three cities. These three year notes included the option of receiving principal in francs at the rate of 5.60 per dollar. Both issues underwritten by Kuhn, Loeb & Co. were in denominations of $100, $500, and $1,000. The issue was planned to be $50 million, but the Federal Reserve advised against purchasing foreign obligations during the subscription period, dampening the appetite for such loans. In March 1917, the Government of the French Republic sold $100 million of two year 5.5% bonds, where the holder had the option of demanding payment in Paris at 5.75 francs per dollar. The syndicate offering the bonds was led by J.P. Morgan & Co. These bonds were sold in larger denominations than the Kuhn, Loeb & Co. ones ($1,000, $5,000, and $10,000 denominations).16 Just before maturity, J.P. Morgan & Co. offered to redeem the bonds at 105.25, approximately the equivalent of converting them at the promised exchange rate.17

European issuance of U.S. dollar bonds continued after the war. In January 1920, J.P. Morgan

16Offering details for these three issues can be found in the New York Times, 3 October 1916, 18; 23 November 1916, 17; and 23 March 1917, 13.
underwrote a Belgian loan of $25,000,000 in the form of 6% five year and one-year notes. Noteholders had the option of surrendering notes and requesting that 11,000 Belgian francs be sold for each $1,000 note issue (i.e., a call struck at 11 francs per dollar). Upon such a sale, the noteholder would receive par and accrued interest and one-half the profit on the foreign exchange. The exchange rate was approximately 10.75 francs per dollar in January 1920; the call option was therefore struck just in the money.\textsuperscript{18}

The bonds described here represent a subset of the bonds offered during the War era, and other bonds often had different bells and whistles to induce investors. Bonds such as the ones described above obviously represent the combination of a straight bond (denominated in USD) plus an exchange option based on currency prices. Indeed, the descriptions of the bond offerings were explicit about this combination of securities. The notice for the 1921 City of Paris bonds states “... there is the possibility of a very substantial profit in exchange, in view of the option to collect the principal and interest of the Bonds at the rate of Francs 5.50 per Dollar, while the normal rate of exchange before the war was about Francs 5.18 per Dollar.” They highlight the sophistication of fixed income and foreign exchange markets during the early 20th century. The key conclusion from this section is that prestigious firms such as Kuhn, Loeb and J.P. Morgan were not at all reluctant to underwrite or promote foreign government bonds with currency options attached. They appear to have had no strong fear of diluting their status by being associated with options, as long as they were bundled with high quality fixed income instruments. None of these high status firms, however, engaged in the issuance of options.

**Financial Market Participation and the War**

This section provides context to understand why so many individuals engaged in such an arcane area of finance as foreign currency options. Financial market participation became much more widespread and active during the early decades of the 20th century. The high level of price volatility due to the War created an environment where speculation had a high potential payoff. For many

\textsuperscript{18} Kimber’s Record of Government Debts (New York, 1920), 27.
low status individuals or ethnic groups (e.g., recent immigrants), the U.S. government’s efforts during the war to financialize inexperienced investors left these investors comfortable speculating in financial instruments, such as options, despite their lack of knowledge and expertise.

A readily measurable indicator of financial activity is stock trading volume, which grew sharply during the early part of the 20th century. Mary O’Sullivan estimated that the annual U.S. stock trading volume per million population was 2.0 in 1900, 2.6 in 1915, but it leaped to 9.4 by 1930. Volume in more speculative stocks traded on the Curb Exchange (the outdoor market) can be compared to volume in more established New York Stock Exchange (NYSE) stocks. The ratio of Curb / NYSE volume averaged 13% from 1911-1913, but the ratio grew each year from 1912 to 1917, when it stabilized. The ratio moved to just over 30% in 1914 and 1915 and went to nearly 70% as the U.S. entered the war. The average ratio was 52% for the 1914-1920 period.19 The Curb Association bought a building and moved indoors following this surge in trading activity. Option trading did not move indoors with the exchange, even though the Curb Market’s descendant, the American Stock Exchange, would be one of the first exchanges to move into equity option trading in the 1970s. The option market migrated to an over-the-counter telephone market instead. It would seem that the Curb Association was seeking legitimacy for its stock and bond trading platform and did not wish to taint it with option trading.

Lawrence Mitchell concluded that the trend in financial market participation started in bonds and gradually oriented itself to the more speculative stock market. In particular, he finds that participation ballooned because of the U.S. Treasury’s Liberty Loan campaign. A widely cited study by H.T. Warshow estimated that the number of shareholders in the U.S. grew sharply between the beginning of the 20th century and the early 1920s and that the increase represented a wider inclusion of lower-paid workers. He examined a large panel of publicly held firms and estimated that the average number of shareholders per firm in his sample increased from 7,500 to over 12,000 between 1913 and 1923. His estimate for the aggregate number of shareholders in the U.S. similarly increased from 7.5 million in 1913 to 14.4 million in 1923. Warshow, like Mitchell, suggested that

one of the reasons for the growth in the number of savers and investors - small investors who had not previously participated in formal financial markets - was the success of the Liberty Bond campaigns. Gardiner Means provided evidence supporting this thesis when he updated Warshow’s study and found that the great diffusion of ownership into the middle class was from 1916-1921, but it leveled out and did not expand greatly during the rest of the 1920s.\(^{20}\)

Narratives of the Liberty Bond drives directly support the proposition that small investors were brought into financial markets through the program’s efforts. For example, Walter Greenough estimated that there were 10,000 bond investors in the state of Indiana before the First World War, but that number soared to between 150,000 and 200,00 during the War. Liberty Bonds were also available on an installment plan, allowing investors to purchase the bonds over time. A $100 face value bond, for example, could be purchased with $10 down and $10 per month until the bond was paid for. Large businesses financed the purchases of bonds by employees and would allow the employees to pay for the bonds with money set aside from future earnings. At least one large manufacturing firm paid an extra 1.5% interest to workers who had purchased Liberty bonds, taking the coupon payments from 3.5% to 5% per annum. Banks eventually financed the purchase of bonds over time, with $50 bonds being made available for $2 down and $1 a week payments. War savings stamps were available in denominations as low as 25 cents, and these could be applied toward purchases of $5 discount bonds.\(^{21}\)

The U.S. Treasury Department specifically established a Foreign Language Division to reach out to ethnic groups and exploited ethnic pride in friendly competition to drive bond sales.\(^{22}\) The motives of German Americans were highly suspect during the War, and the Liberty Bond drives were a highly visible way of proving “100% Americanism”. Individuals who were deemed as not


purchasing enough bonds were subject to coercion which often included violence.\textsuperscript{23}

Lizabeth Cohen has concluded that social pressures by businesses and the Treasury succeeded in stimulating demand for Liberty bonds. As evidence, she noted a 1918 survey of 600 mothers (nearly all foreign born) working as unskilled workers at packinghouses showed that 84\% of the families represented owned Liberty Bonds. By the Fourth Liberty Loan drive in 1918, 46.5\% of subscribers were of foreign birth or parentage despite making up just one third of the general population. These subscribers bought heavily, but in modest amounts; they represented just 16\% of the total dollar amount of bond purchases. She concluded that these workers became more comfortable conducting business with commercial banks, and they also became accustomed to owning financial instruments through Liberty Bond purchases or employee stock ownership plans being offered to rank and file workers.\textsuperscript{24}

The new, inexperienced investors soon became targets for unscrupulous securities salesmen. Julia Ott noted that a series of exposés of fraudulent stock promoters in late 1919 and early 1920 helped to bring the issue to public attention. The articles left no room for equivocation; an example was elaborately and bluntly titled “Pirates of Promotion, Who Are After Your Liberty Bonds with Their Get-Rich Quick Schemes.” The New York Stock Exchange responded to the issue in 1919 by forming the Business Man’s Anti-Stock Swindling League, essentially a public relations campaign. The association garnered favorable press coverage for the Exchange, although the League folded soon after its creation.\textsuperscript{25}

At precisely the same time that the option business was burgeoning, Charles Ponzi’s famous scheme was unfolding in Boston. Ponzi offered a get-rich-quick scheme in 1920 based on arbitrage among international reply coupons. He sold notes promising a 50\% return in three months. Prices


\textsuperscript{24}Lizabeth Cohen, \textit{Making a New Deal: Industrial Workers in Chicago, 1919-1939} (Cambridge, 1990), 77, 175.

of the coupons had been fixed in various currencies before the War, but the dramatic moves in exchange rates meant that a virtually worthless amount of European currency could be exchanged for a postal coupon that could, in turn, be exchanged for a postage stamp at a U.S. Post Office. Ponzi never figured out how to exploit the idea and actually make money, but he proceeded as if he had. Rivals of Ponzi, such as the Old Colony Foreign Exchange Company of Boston, caught on and sold notes promising 100 percent interest in six months, with the company reserving the right to call the note at 50% interest within three months. Old Colony, which purported to deal in commercial interests rather than international reply coupons, was as much a fake as Ponzi.

Ponzi’s business grew rapidly once it was established. He began collecting investments in December 1919 through an intermediary, an Italian immigrant grocer. He had written 18 notes by the end of January 1920, and he wrote another 17 in February. In March, business expanded such that he wrote 110 notes, and business quadrupled in April to 471 notes. Ponzi experienced exponential growth over the next three months, writing over 1,500 notes in May, nearly 8,000 in June, and over 20,000 in July. Ponzi stopped accepting new investments in July as the regulators took notice of his operation. Over the eight month period, he had collected just under $9.6 million and issued over 30,000 notes, yielding an average note size of $317.26.

It is worth asking how grown adults could be so gullible as to believe in a promise of 50% returns in three months. One factor to consider is that wages and prices were very volatile at the time. Wages for manufacturing had more than doubled from 1915 to 1920, and prices had gone up nearly as much. Food prices had roughly doubled from 1915 to 1919, although some staples like bread went up only 10% per year while potatoes averaged annual price changes of 35% (decreasing in some years).27 Stock prices mirrored these sharp changes: after troughing in late 1917, the Dow Jones Industrial Average rose 80% in less than a year but was cut in half within another year. Immigrants saw the value of their homeland’s currency vanish (equivalently, they saw the value

---

26 A detailed audit of Ponzi’s books was presented at his trial. The summary data are reproduced in “Doubts Ponzi has a Million,” Boston Daily Globe, 7 November 1922, 13. A more comprehensive examination of the fraud can be found in Mitchell Zuckoff, Ponzi’s Scheme (New York, 2005).

27 Calculations are made using NBER series 08039, 04071, 04022, and 04033. Broad price levels are represented by the CPI-U.
of the U.S. dollar soar). This substantial price volatility would have made a 200% annual rate of return seem plausible to many, especially if this period constituted their entire investing experience.

The Market Opens, 1917

I begin this narrative by setting up the well-documented equity option market as a reference point. Options on stocks were relatively common in the U.S. market during the 19th century, when they were known as privileges. The buyer of a call option, for example, had the “privilege” of calling for the stock at the prespecified “strike price” at any time before expiration, or not calling for it. The standard option was on 100 shares, cost $100, and expired in one month. An option buyer might find that call options on a stock were quoted at “1/8”, for example, which meant that the strike price for the $100 option was 1/8 of a dollar above the current market price.28

For small speculators, this was a one-sided market, as they could purchase a call or a put but could not sell them. A few large market participants sold options, often through intermediaries who resold them in smaller amounts. Wealthy individuals such as Russell Sage constituted the bulk of option supply. This over-the-counter setup worked well to eliminate credit risk concerns on the individuals who wanted to speculate: they paid for the option up-front and received a payment, if any, at the terminal date of the option. The options usually expired worthless, because the limited supply of options generally meant that terms favored the seller: strike prices were set far away from spot and the stock never moved enough for the option to pay off. The counterparty credit risk of the seller, however, remained, and the market attempted to distinguish between option sellers that were credit-worthy or not. During extreme market downturns when many options would contractually provide large payoffs, option sellers were sometimes overwhelmed by the demand for

28 James K. Medbery, Men and Mysteries of Wall Street (Boston, 1870) details the institutional conventions of the 19th century equity markets and provides copious detail on option markets of the time. A call option gives the buyer the right, but not the obligation, to purchase the underlying asset at a prespecified (“strike”) price. For the example described above, the call buyer could purchase the stock at $100.125 during the term of the contract, irrespective of the market price of the stock. A call buyer would therefore benefit if the stock price rose above $100.125 according to the function profit = \max(0, s - k) - c, where s is the market price of the stock, k is the strike price, and c is the cost initially paid for the option.
Somewhat confusingly, a standard method of purchasing stock was “on buyer’s option”. The buyer might buy stock at a fixed price on one month buyer’s option, meaning that he could call for the stock at any time during the month following the trade date (and pay at that time). While the buyer had flexibility on the exact timing, he was required to take ownership of the stock at or before the end of the contract. This led to a terminology whereby futures contracts were often referred to as “options” in the newspaper summaries of trading.

This terminology and market structure carried over into the foreign exchange business. The Wall Street Journal distinguished in early 1917 between privileges on foreign exchange (American exercise call options), which were “a new development since [the] beginning of the war”, and options. The option purchaser generally agreed to buy marks, for example, within 30 to 60 days at a rate 0.5 points above the spot price. As margin, the buyer deposited $400 to $700 per 100,000 marks ($18,000 of notional value at an exchange rate of $0.18 per mark).

The New York Times and Wall Street Journal began carrying advertisements in March 1917 for dealers trading in ruble options, and the ads often refer to the availability of Russian, French, and Italian government bonds. At least six separate dealers placed advertisements at this time. The standard option was an American style call on 1,000,000 rubles (approximately $300,000 worth) and expired at the end of 1917. Interestingly, news stories generally discussed the market from the buyer’s point of view, but some of the ads noted that the dealers bought and sold ruble options. The Wall Street Journal pointed out that the purchase of the options was becoming quite popular with bankers in the interior, not just around New York City. The ads and articles are also noteworthy in that they refer explicitly to ruble options (not privileges), although the word “options” was

---

30 “Heavy local trading in foreign exchange privileges,” Wall Street Journal, 17 January 1917, 8. Atkin, The Foreign Exchange Market, 120, suggests that such foreign exchange contracts, where the buyer agreed to buy the currency but had flexibility on the exact delivery date, was an innovation from the 1960s, but they clearly date to earlier decades.
31 Recall that an “American style” option can be exercised any time prior to the option’s expiration. A “European style” option can be exercised only at contract maturity.
sometimes in quotation marks in the article text. The earlier usage of the term “option” had been supplaned.

The ruble had declined just below 29 cents at the time of the February revolution, compared to the pre-war parity of 51.45 cents. The revolution actually strengthened the ruble and made financial markets more optimistic about the future of Russian finances. “Bankers here pleased at news of revolution,” the New York Times headline blared, “Prediction made that finances will be handled more efficiently under Duma control.” Responding to a reader’s question about the advisability of buying rubles as an investment, the Wall Street Journal gushed that “The revolution in Russia has unquestionably improved that country’s credit abroad, and the entrance of the United States into the war, with the express intention of extending assistance to the Allies, is bound to steady the exchange rates of these countries, including rubles. After the war there will undoubtedly be a sharp recovery in all the exchanges now selling below par, and it is reasonable to suppose that rubles will not be long in recovering at least two-thirds of the present discount, amounting to about 44%, which would bring the rate above $.40.”

Table 1 displays detailed data on option prices and provides several clues about the structure of ruble option trading in March and April 1917. First, multiple options were available on a given date, differentiated only by the strike price and option price. Second, all of the options expire at the end of 1917. Third, the option buyer would have broken even if the rate advanced 12-20% by the end of the year, which does not seem so implausible a magnitude given the volatility of the ruble. This structure is very different than the equity option market described above, which did not feature multiple strike prices and a common expiration date. The matrix of options priced is compatible with the existence of a secondary market for the options, as indicated in the ads. News reports indicate that early buyers of the options were indeed able to sell them and lock in their profits rather than waiting for the end of the year or exercise the option at the market price. The size of trades and standardization of contracts suggests a sophisticated market focus.

---

34 Wall Street Journal, 9 April 1917, 2.
35 Reports of the sales before expiration are in The Financier, 21 April 1917, 1029. It almost goes without mentioning that option markets put a lower value on options with strike prices further from the spot exchange rate.
The Russian situation had deteriorated by the end of June, and the ruble had fallen another 20% from its levels a couple of months before. The ruble soon depreciated rapidly, falling off a cliff during the disarray of the Provisional government prior to the Bolshevik Revolution in October 1917. After the Provisional government took control, aggressive military efforts combined with minimal revenues led the government to finance operations with paper money issues. The rate of issuance was stepped up by a factor of four in 1917 as compared to 1916. The exchange rate’s decline therefore mirrored the increase in the number of rubles. Ads and news stories on ruble options disappeared as the ruble began to plunge in May.

**The Market Reopens, 1919**

Government intervention over the key sterling-dollar exchange rate ended in March 1919, but currencies did not float freely until several months later. Until August 1919, the British Treasury prohibited various financial transactions that would have required selling sterling, such as buying foreign currencies for speculative, non-merchandise transactions, or importing bonds or other securities held outside the U.K.

By August 1919, the *Washington Post* was reporting that buying German mark call options was a popular transaction. Calls had an underlying notional amount of 100,000 marks and expired in nine months. The strike price was about 15% higher than the spot rate; the spot was around 5 cents per mark, and the call strike at 5.75 cents. A month later, one could find financial establishments advertising foreign exchange, government bonds from Argentina, France, Italy, Japan, Russia, Spain, and Switzerland, as well as options on francs and marks. That same month, however, the *Wall Street Journal* was warning that “Trading in calls on marks is taboo with most exchange bankers.” The writer went on to note that only one or two houses did this business on any scale, and others declined to tie up the exchange necessary to hedge the option (presumably with the entire notional amount). Sales of mark options apparently emanated from Swiss banking (and hence less likely to have value at contract expiration), consistent with rational valuation of options.

---

houses with outstanding loans denominated in marks.\textsuperscript{39} The calls expired at the end of 1919. Such sales of calls would have produced a yield enhancement on the loan, even if the exchange risk were hedged with forward contracts.

Boston exchange houses claimed they were discouraging mark call buying and reported little demand for such trade. They cited difficulties in assuring delivery of marks and, especially, the possible imposition of German legal/regulatory bans that would complicate consummation of the trades. Elaborating on their reluctance to endorse the trade, they recommended purchases of German municipal bonds as a better option.\textsuperscript{40}

The institutional market in the fall of 1919 was apparently quite concentrated, with thin trading in other currencies besides marks. Virtually all of the trading in call options on sterling (90 day contracts, struck just above the spot price) at that time were due to a single banking house’s sales to brokers and a few importers. Trading in options on French francs had also begun after the war, but that trade had come to a halt.\textsuperscript{41}

Newspaper advertisements aimed at retail purchasers of options began appearing with greater frequency during the spring and summer of 1920, as the mark rallied.\textsuperscript{42} Many ads offered options on marks, French francs, and lira, but mark options became the focal point of the ads. Option prices were roughly standardized in the newspaper advertisements, but the strike prices were less visible. Many of the ads showed six month options priced at $40-$50 for a call on 10,000 marks, $300-$400 for a call on 100,000 marks, and so on, but no mention is made of strike prices. Actual transaction records are hard to come by, but a glimpse into the exact terms can be found in news reports. An example is a six month option on 45,000 marks for $150, struck at $0.0275 per mark. The news story, from October 1920, quotes spot marks at $0.0165 and forward marks at $0.0160. Given these data, the option would be struck 67\% out-of-the-money and the buyer would not break even until


\textsuperscript{40}“German Mark Suffers Ignominy of Defeat,” \textit{Wall Street Journal}, 15 September 1919, 11.

\textsuperscript{41}“Trading in Sterling Calls,” \textit{Wall Street Journal}, 10 September 1919, 12.

\textsuperscript{42}The retail trade had begun in 1919, however: “Buying of marks has become a wide speculation of small investors, they [sic] taking a fler in them as they might have earlier in the year done on so many cents per share oil stocks,” “Bonds Recede to Old Record Low,” \textit{Washington Post}, 13 September 1919, 11.
marks could be sold at $0.0383 (187% of the spot price).

To get a back of the envelope idea of how rich that pricing was, consider the probability equating the expected option value at maturity to the option price (ignoring any time value of money considerations). Assuming the spot price would stay constant with probability \((1 - p)\) and jump to the breakeven price by maturity with probability \(p\), \(p\) would have to be 100% to justify the option price. Breaking even with lower probability jumps would have required commensurately higher rate increases. For example, if the holder expected the exchange rate to jump to 200% of spot, a 60% probability would have been required for the option buyer to break even.\(^{43}\) At some price, the options would have been an interesting opportunity, but these prices appear extraordinarily high. Apparently, only highly optimistic buyers would have been enticed.

A sample advertisement illustrates the pitch to those highly optimistic buyers: “LARGE PROFITS IN OPTIONS ON German Marks, French Francs, Italian Lire. The Currency of these Countries is selling at about one-fourth to one-tenth of its normal value. Large profits with small risks are now possible through the purchases of 6-month Options. Financial experts are predicting a sharp advance shortly.”\(^{44}\) The news story mentioned above, documenting the warning of the Washington Advertising Club’s better business bureau against buying mark options, notes that “…economic experts have advised the local bureau that there is no probability of a substantial increase in the rate for a number of years.”\(^{45}\) The poor outlook for the German situation was widely understood at that time; consider the discussion of current events in MIT’s \textit{Review of Economic Statistics} from August 1920: “In short, Germany has been continuing at an accelerated pace toward the currency debacle which has overtaken her eastern neighbors. ... It is too much to say that improvement is in sight.”\(^{46}\)

It is worthwhile to verify that these options were, in fact, call options. Journalists provide

\(^{43}\)The general formula is to equate the expected profit of the option to zero and solve for the probability. The equation is \(0 = (1 - p) \times 0 + p \times \max(0, s - k) - c\), where \(c\) is the option cost, \(s\) is the spot exchange rate at the terminal date of the option, and \(k\) is the strike price for the option. Note that this probability should be interpreted as one that a risk neutral investor would use.


confusing prose regarding the transactions, often confusing options with futures or installment purchases of foreign exchange. As noted earlier, the old usage of the term option referred to non-contingent purchases of exchange, whereby the buyer deferred settling the trade until a nearby date of his choice (but he was obligated to make the purchase). The text of a contract issued by one of the advertisers verifies the call option interpretation and is as follows:

For value received, the bearer may call upon us for ___ German marks, bank draft on Berlin, at any time at bearer's option between now and January __, 1921, at 3 p.m., at $4.25 per one hundred marks.

Rothschild, Campbell Co, Ltd.

Expires January __, 1921, 3 p.m.47

Some of the interesting features of options, from a buyer's viewpoint, derive from the nonlinearity of the option payoff. Out-of-the money call options, with a strike price more than the current market price, cost less than the underlying asset, meaning that they provide leveraged exposure to the upside (relative to an equivalent expenditure on the asset), and the maximum loss is the up-front payment. Option dealers were clear in highlighting these features that would be attractive to their target audience: "THE PURCHASE OF OPTION LIMITS ALL RISK, as the cost of Option covers entire liability and requires only about one-sixth as much capital. In other words, you can take profits on six times as many Marks, Francs or Lire with the same investment."48

The newspaper advertisements for brokerage houses obviously targeted less sophisticated retail buyers with limited capital. Next to ads touting installment plans for stocks and bonds (twenty monthly payments buys outright any stock or bond, available in one share lots and up), ads illustrated the possibilities of investing in German bonds. In an ad noting that a package of ten 1,000 mark German government bonds and ten 1,000 mark City of Berlin bonds could be purchased for $450 ($90 now and $36 per month for ten months), the message was clear. These bonds would have cost $4,760 before the war, and they would have cost $375 two weeks prior to the ad, Henri

& Bernhard Wolf & Co. urged, so the time to buy was NOW: the dealer “firmly believe[s] that these very bonds will be selling for at least $30 each within a month.”49 Opportunities abounded for the man with money burning a hole in his pocket: he was advised that $100 could make him $50,000 in a Louisiana oil gusher, or he could get in on the ground floor of the “Greatest Speculation of the Age ... the Saliger Ship Salvage System” which offered shares for 25 cents (but raising of the first ship from the ocean floor would send the stock value up 10, 20, or even 40 times the present price). Nonetheless, foreign exchange option dealers helpfully pointed out that they knew of no other speculation offering possibilities of greater profits than purchases of foreign exchange options.50

The perception of the New York business press was that foreign exchange dealing since the war was often the purview of legitimate businesses, but that many of the foreign exchange dealers that popped up since the war’s end were “endeavoring to fool ignorant foreigners”. The legitimate ones may have had quite a large profit margin, but this was justified due to the small sizes of transactions, as they catered to a clientele of “domestics and working men who remit part of their wages to mother countries.” The opinion was lower for less scrupulous dealers, however. “Their method of business is as follows: Circular letters usually bearing a pretentious name, are sent to mining and industrial centers where a large percentage of the population is foreign. These letters point out the potential profits that may derived from the purchase, at present prices of marks, francs, and lire; ‘if only these exchanges go to half their normal value, during the next six months,’ or words to that effect. They add that in view of events abroad it would not be surprising to see a sharp upward turn in the exchanges, offering an option on a large amount of marks, lire or francs, for a term of six months, for the small sum of a few hundred dollars.

These propositions, which offer possible thousands in return for the risk of a few hundred dollars, are obviously gambles. While it is not altogether impossible for these exchanges to touch half their parity within the next six months it is well beyond the bounds of probabilities.”51

The Wall Street Journal disdainfully provided detail on the pricing practices of these small

50 Washington Post, 4 April 1920, 57.
foreign exchange dealers. German bonds selling at 60% of par in marks, for example, would be sold
to U.S. investors at face value times the spot exchange rate. Hence, a 10,000 mark face value bond
available for $90 (60% x 10,000 marks x $0.015 per mark) from “reputable” bond houses would go
for $150 (10,000 marks x $0.015 per mark) from the less established concerns.\footnote{“Sharp Practice in Marks,” \textit{Wall Street Journal}, 5 Feb 1921, 4.}

Option dealers even offered contracts for the investor with an extremely small budget. Buyers
could pick up contracts on 1,000 marks for $5, or spend $10 for contracts on 2,000 marks. These
dealers appeared to have been flexible, offering options of those sizes as well as outright foreign
exchange. Rothschild, Campbell Co., Ltd of Massachusetts, for example, noted that “$300 will buy
in German cash currency 10,000 marks. These have a par value of $2380. This currency you can put
away and keep. On an option, $300 will control 100,000 marks, and these have the astounding par
value of $23,800, so that with $300 there is a possible profit of $19,500. An option is controllable
for six months.”

Similar figures for potential profits if marks advanced to par value of $0.2383 were shown in
a George H. Perkins & Co. ad just above the one noted above. (Coincidentally, both firms had
Boston offices in the same building, 14 Kilby Street, and were open until 8 p.m. and 10 p.m.,
respectively, to allow ease of trading for the working man. Ponzi’s competitors also set up shop in
the same building as he did in order to catch the overflow crowd.) Options for $40 were on 10,000
marks, $75 options were for 20,000 marks, $150 were for 45,000 marks, and $300 options were for
100,000 marks, so the firm offered a sliding scale with discounts on larger trades. Possible profits
were computed assuming an advance back to par within six months. Even if the mark advanced
to only one-half of par, profits would be over $7,000 on the $300 option.\footnote{The advertisements are in the \textit{Hartford Courant}, 17 August 1920, 11.} What strike prices were
implicit in these option payoffs?

To make a potential profit of $19,000 on such a 100,000 mark option, the strike price would
have been approximately $0.048, around twice the spot rate of $0.024 at the time. This value was
only 20% of the “normal” pre-war par value of the mark, and yet it represented a doubling of the
exchange rate within half a year. Breaking even would have required the spot rate to climb to 217%
of the current spot rate. If the dealer had meant “profit” before paying for the option (i.e., payoff), this more conservative computation would lead to an implicit strike price of around 5.1 cents per mark, with a breakeven if the exchange rate rose to 229% of spot.

By early 1921, those six-month options sold to individuals were beginning to expire. The District Attorney in Massachusetts, for example, was alerted by one Herman Neithardt who had purchased option on 20,000 marks for $100. When Neithardt visited the Worcester office of Rothschild Campbell, Co. Ltd., he demanded his 20,000 marks. Told that he would have to pay $800 to receive them (marks were trading around 0.16 cents in January 1921), Neithardt declined and notified the police. I can find at least two competing conclusions regarding this transaction. First, assuming Neithardt purchased an American call option on marks in the summer of 1920, he had absolutely no understanding of his transaction and was simply angry that he had lost $100. Or, Neithardt had actually purchased foreign exchange on an installment plan (the old usage of the term “option”), and he was simply angry the price had not increased to the point where he did not owe any money to complete the contract. It is difficult not to conclude that Neithardt was simply a man who spent his money foolishly on a get rich quick scheme and did not get rich.54

One Michael Sherry of Springfield, Massachusetts believed he was purchasing 500,000 Austrian kronen on an installment plan through Rothschild Campbell, Co., Ltd. He was purchasing the currency at the rate of $7.50 per 1,000 kronen and had paid $875 (of a total of $3,750). Upon traveling to the dealer’s office and finding it had closed and moved, Sherry became alarmed. (Note that kronen were trading in the interbank market at a rate of approximately $5.00 per 1,000 in late summer 1920.) To the extent that the dealers at Rothschild Campbell moved to abscond with the funds of installment purchasers such as Sherry, they were apparently acting fraudulently. While the option purchasers were simply out of luck because they had purchased options that expired worthless, the firm apparently intended to defalcate with the money paid by installment purchasers. One can readily infer that, had the mark actually made the highly unlikely jump to 4+ cents, the firm would have defaulted on the options.

---

54The 1920 Federal Census lists Hermann Neidhardt as a German-born, 45 year old polisher at a harness shop. It is difficult to imagine his being financially sophisticated based on this description.
Police suggested that $500,000 had been taken in from the scam in trades of approximately $100 each. If this estimate is to be believed, that translates into 5,000 buyers. The number of customers sounds large, but it is quite small when compared to the relevant population. The firm had offices in Boston, Springfield, and Worcester; these cities had a combined population of over one million people, predominantly first generation American or foreign born. Specifically, over 40% of the population had foreign parents or at least one parent of non-US nationality, and over 30% were foreign born.\textsuperscript{55}

Police suggested that the foul intent of the operators was evidenced by their ownership of only 1,000,000 marks against trades with a notional amount of 100,000,000 marks (5,000 buyers x 20,000 marks notional). Had the trades been all call options, that may not have been such an unreasonable hedge by modern standards, given the astonishing out-of-the-moneyness of the options and the unlikely exercise of them. If any non-negligible fraction were in installment plan purchases of currency, their book may have been severely underhedged. The individuals first arrested for running the operation were Gardner Bostedo, Nathaniel Goodman, and Abraham Horowitz. William Campbell was soon charged with larceny after allegedly stealing $3000 from an investor wishing to purchase stock through Rothschild, Campbell, Co. Ltd.\textsuperscript{56} There is little evidence the firm was legitimate. It is probably safe to assume that the firm had no connection with anyone named Rothschild, but the name would have obviously added a veneer of credibility to the gullible.

At least some of the dealers in currency options were convicted of criminal acts stemming from their business. For example, Max Bressler, operator of a firm called the Standard Securities Company, was convicted of using the mail to defraud after he sent out circulars in May 1921 offering German mark options. The options were struck at $0.0275 per mark (75% above the then-current spot rate), and the “[l]iterature mailed ... stated that the mark was sure to rise.”\textsuperscript{57}

The discussion suggests that a few reputable entities originally wrote options as a way to enhance the yield on outstanding foreign currency positions, and a few importers and speculators were willing to buy the options. The trade quickly turned to the smaller speculator who wanted a leveraged bet

\textsuperscript{55} Population data are from the \textit{Statistical Abstract of the United States} (Washington, D.C., 1921), 39, 55-57.
\textsuperscript{56} “Campbell Taken for $3000 Larceny,” \textit{Boston Daily Globe}, 22 January 1921, 3.
\textsuperscript{57} \textit{New York Times}, 18 April 1924, 16.
on exchange rates of the European countries returning to pre-war “normal” levels. Small foreign exchange dealers sprang up to serve these desires, but they often had no intention of continuing business after accepting investors’ money. These dealers also misled investors (who apparently wanted to believe) that an upturn and return toward normality was imminent for Continental exchanges.

One final note provides quantitative evidence that the market evolved along these lines. Anecdotal reports of transactions suggest a noticeable shift in trading patterns over time. One banker bought one year options on 1,000,000 marks in early 1917 for premiums of $6,000. Using the CPI and the exchange rate of $0.18 per mark, the broker spent $100,000 in 2010 dollars to purchase options on approximately $3 million of notional value. Standard ruble options were for 1,000,000 rubles ($300,000 notional) and cost in the range of $5,000 - $10,000 for near the money strikes in 1917. Ninety-day sterling options were for £100,000 underlying, or over $400,000 worth, and cost $1,750 in 1919.

Trading sizes quickly diminished: the standard size declined to 100,000 marks in 1919, and the typical 1920 newspaper ad targeted at small investors was for a notional amount of 10,000 to 100,000 marks. Using exchange rates of a nickel per mark in 1919 and 1.5 cents per mark in 1920, these figures translate into notional amounts of $5,000 in 1919 and $150 to $1,500 in 1920. The option costs similarly declined, as the 10,000 mark option from 1920 cost only $40 (approximately $440 in 2010 dollars). The cheapest contract, $5 for an option on 1,000 marks, therefore represented an outlay of $55 in 2010 dollars. The focus on small, less sophisticated speculators is clear.

Spot and Forward Exchange Rates

In this section, I examine the evidence on the spot market for marks just after the war, as well as the market for forward foreign exchange. The first goal in this section is to understand how large the foreign exchange trade was in the 1920s, who participated in it, and what can be inferred about market perceptions by examining observable market prices and quantities. The second goal is to synthesize those conclusions with information on the option market in order to put the option
How many marks did American investors buy? While no statistics are available for the over-the-counter foreign exchange option market, there are data and estimates for the broad business of foreign exchange. Post-war purchases of German marks and German bonds and stocks totalled $960,000,000 in a 1922 newspaper estimate (80 billion marks purchased at an average price of 1.2 cents per mark). With the decline in the mark value since purchase, the value of the marks and mark-denominated assets was estimated at $56 million, leaving a loss of $904 million.\footnote{“Mad Buying of Marks Cost U.S. $904,000,000,” \textit{Washington Post}, 3 October 1922, 1-2.} (I focus on this estimate, among the many that have been made, because the reports elaborating on the estimate provide the most detail on the U.S. population that made the purchases. This characterization, rather than a particular dollar figure, is my real interest.)

Table 2 displays a breakdown of this estimate by Germanic vs. non-Germanic ancestry of the investors and whether or not the assets were in cash or bonds/equities. The data appear to have been constructed by taking aggregated estimates and apportioning 80\% to investors of German heritage. The data also suggests that the average investment size was $91 per person. This is a plausible enough value, but the investor base of 10.5 million means that one in ten U.S. residents invested in marks, which seems implausibly high. Census data from 1920 record 8.6 million U.S. residents with Germanic mother tongue (either foreign born or of at least one foreign born parent), which is clearly a lower bound for residents of such ancestry.\footnote{Population data are from the \textit{Statistical Abstract of the United States} (Washington, D.C., 1921), 39, 65.} Assuming the total amount invested is as shown, if the average amount invested was actually, say, $300, this implies 3.2 million investors (of which 2.6 million would be of Germanic heritage). I find the smaller number of investors more plausible but probably still too high. The fact that the average note size for Ponzi’s scheme was just over $300 and the total number of investors was around 30,000 suggests that the newspaper estimate is far too high.

The estimate explicitly covered investments in physical currency, deposits in Germany, and securities in Germany. Statistics in the report beyond the headlines break out the 55 billion marks held as currency or deposits by U.S. investors into 30 billion held in the U.S., 20 billion held in...
Germany, and 5 billion held in Amsterdam.

Previous researchers have estimated the total amount invested/lost by U.S. purchasers of marks and have utilized various independent estimates. Carl-Ludwig Holtfrerich, for example, discussed several estimates, such as one by Leonard P. Ayres, an American financial expert who was a consultant to the Dawes and McKenna committees that evaluated the German reparations situation in 1924. Ayres estimated the amount of loss for U.S. bank balances in Germany at $770 million (compared to the $360 million estimate implicit in the newspaper reports described above). Holtfrerich estimated that German mark denominated securities sold in the U.S. from 1919-1923 totalled $300 million (consistent with the estimate above), and he further noted that the volume of mark notes in foreign hands was roughly of the same size as the amount of foreign bank deposits in Germany. These components suggest U.S. purchases of marks in the $1-2 billion range.60

Stephen Schuker has also examined the estimates of capital provided to Germany during the post-War period and provided a similar total invested by U.S. investors ($1.4 billion). Schuker, it should be pointed out, noted that German Americans were probably disproportionately exposed to mark losses, especially due to holdings of Reich treasury bonds purchased just before the U.S. entry into the War. He pointed to contemporary estimates from bankers suggesting that German Americans alone might have sustained losses of $1 billion.61

Who were the buyers of German marks? The perception was that the most sympathetic purchasers of marks were of Germanic origin. Perhaps some were reacting to the wartime pressures to invest in Liberty bonds and saw the opportunity to express their confidence in the German people. The Washington Post stated that “Buying in America began with those who speak German, and they remained the bulk of the market. The millions of American dollars they poured into paper marks purchasing as soon as the Versailles peace treaty was signed in midsummer 1919, attracted the notice first, and soon aroused the cupidity of non-Germanic observers. The bankers, brokers, foreign exchange dealers here and throughout the country agree that German speaking buyers took

---

60 Holtfrerich, The German Inflation, 287 and 294.
80 percent of the German paper marks bought for America. ...

This easy money mirage ... sent millions of dollars in Liberty bonds to market here to get money to invest in Germany’s paper marks. ...

Brokers trading in German marks opened up offices all over the United States. They hired hordes of clerks who spoke German and had them telephone to every subscriber in the directory whose name was suggestive of the Teutonic. Lists of club memberships known to be Germanic [or] similarly identified corporation stockholders, gymnasiums, singing societies, even of church memberships, were ‘rented’ from office to office at high premiums.”

The Post elaborates further regarding mark purchases in various U.S. cities: “Bankers and brokers estimate that $3,000,000 to $4,000,000 has been spent in buying German marks, bought by foreign residents of Detroit since 1920. ... Individuals of German ancestry took 60 per cent of the total. The People’s State bank officials estimate that 10 per cent was bought by other foreigners, mostly Austrians and Poles. The remaining 30 per cent was bought by German lodges and clubs.”

(Detroit) “Brokers and bankers here intimate that less than one-fifth of the marks investments made by the general public were by other than the Germanic element.” (Milwaukee) “More than 50 per cent of the marks purchasers were of German blood, according to the foreign exchange dealers.”

(St. Louis) “Heads of foreign exchange departments of two of the largest banks in San Francisco ... report that 50 to 75 per cent of investors in marks are of German blood.”

Speculation in depreciated currencies was not confined to U.S. investors. The 1922 newspaper reports of estimates for the losses to buyers of marks puts a figure of $672 million for British losses in mark speculation. This dollar estimate starts with an estimate of marks purchased for £200 million up to 1 November 1921 and a value of $4.20 per pound. Foreign exchange was traded on the exchanges in Spain along with securities, and trading occurred for both customers and bank proprietary trading desks. Banks allowed customers to speculate on currencies on margin, facilitating the retail trade. El Economista estimated that Spanish speculators purchased 700

---


63 City-level quotes are from “All Sections of the Nation Plunged on German Marks,” Washington Post, 4 October 1922, 4.
million marks (approximately $35 million) in the summer of 1919. Speculation in marks intensified in October and November as marks fell even lower; this activity diminished after the government imposed curbs on exchange dealing.\textsuperscript{64} Government curbs did not extinguish Spanish speculation in marks; speculation merely moved offshore. Mark deposits by Spanish citizens were second in size only to deposits by U.S. citizens at Deutsche Bank, for example, the largest recipient of foreign currency deposits during this period.\textsuperscript{65}

Contemporary writers noted an exuberance over foreign currency speculation that spanned much of the globe. One facetiously expressed amazement over mark investment clubs in remote parts of Scotland, the fact that Austrian peasants delighted in passing the time speculating in foreign currencies, and that “hundreds of millions” of marks were deposited in Dutch banks by speculators of all nationalities.\textsuperscript{66} Amsterdam, in fact, was an important foreign exchange trading center, with daily volumes of five million pounds sterling.\textsuperscript{67} Houwink ten Cate cites a February 1920 estimate that three to four billion marks (roughly $100 million, if valued at a plausible 2.5 cents per mark) were held by the Dutch. These purchases were made by optimists said to be from a wide range of social backgrounds, such as maids, students, but especially farmers.\textsuperscript{68} Purchases by farmers were facilitated by the sale of agricultural products, which made up the majority of Dutch exports to Germany. The Dutch acquisition of marks continued into 1921 and ramped up in 1922, as Germans eagerly exchanged marks for guilders.\textsuperscript{69}

Dresdner Bank estimated that about one-quarter of paper marks in circulation was held outside Germany in September 1922 (about 60 billion marks out of 245 billion total). The geographic breakout of this estimate was 30 billion held in the U.S., 5 billion marks held in each of Belgium,\textsuperscript{64}\textsuperscript{Arthur Young, Spanish Finance and Trade, U.S. Department of Commerce Special Agents Series No. 202 (1920), 100.\textsuperscript{65}\textsuperscript{Holtfrerich, The German Inflation, 287.\textsuperscript{66}\textsuperscript{“Reparations: A Revue in Five Acts,” E.M.L.H., The New Statesman, 10 December 1921, p. 279.\textsuperscript{67}\textsuperscript{Christoph Kreutzmüller, Händler und Handlungsgehilfen, Der Finanzplatz Amsterdam und die Deutschen Grossbanken (1918-1945) (Stuttgart, 2005) p. 38. For a more comprehensive examination of Amsterdam’s role in international finance, see Jeroen Euwe, “Amsterdam as an International Financial Centre, 1914-1933: A Consequence of Interwoven Economies?”, 2008 manuscript, Erasmus University.\textsuperscript{69}\textsuperscript{F.A.G. Keesing, De Conjecturale Ontwikkeling van Nederland en de Evolutie van de Economische Overheidspolitiek, 1918-1939 (Nijmegen, 1978). Originally published (Utrecht/Antwerpen, 1947).}}
France, the Netherlands, South America, Switzerland, and the U.K., with Scandinavia and Spain holding 3 million and 2 million marks, respectively. Russia and Poland jointly accounted for 1 million more marks.\footnote{"Official Currency Issue Figures as Supplied by German Banks," \textit{Washington Post}, 3 October 1922, 4.}

\textbf{Who sold German marks?} The delineation of low prestige firms that dominated option sales carried over to the spot market. The \textit{Post} went on to state: “Experts on foreign exchange conditions in the leading Philadelphia houses have consistently advised against purchase of the mark as an investment. Hence, dealings of the larger banks in marks have, with few exceptions, been confined to purely commercial transactions. ... The attitude of Philadelphians toward the mark is aptly illustrated by Drexel & Co., one of the largest if not the largest brokerage firm in the city, of which Edward Stokesbury is president. Drexel & Co. will not deal in marks on any consideration, regardless of the purpose and the importance of the person requesting them. That has been the firm’s policy since 1917. Many other brokers have followed this lead. Brown Bros., a large brokerage house specializing in foreign exchange, will sell marks only to its own customers to hedge commercial transactions. ... Recently, Brown Bros. stopped the sale of marks altogether. ... It has remained, therefore, for bucket shops and smaller brokerage concerns of questionable reputation to undertake to handle the demands of speculators and others desiring to gamble in German marks.”\footnote{“All Sections of the Nation Plunged on German Marks,” \textit{Washington Post}, 4 October 1922, 4.}

\textbf{What do market prices and quantities suggest about investor beliefs?} Figure 3 displays the U.S. dollar value of mark purchases (physical currency notes) for three foreign exchange houses in New York City. The data span the period July 1919 through December 1921. The total represented is 1.2 billion marks, representing over 13 million U.S. dollars worth of purchases. The newspaper reports an estimate of total New York City purchases of paper marks over the interval at 2 billion, with the 800 million mark difference apportioned to larger investors who obtained paper marks abroad and imported them. The report states that smaller investors purchased less than $100 each in marks and the totals shown in the chart represent the vast majority of purchases of actual mark bills in New York City over the period examined. The chart therefore represents the smaller, cash
purchaser of marks, as opposed to entities investing in marks via deposits in German banks.

Judging from these data, mark purchases generally trended upward from mid-1919 to mid-1920, then began to diminish before trending back up from mid-1921 to late 1922. For 1920, the pattern of purchases coincides with the mark’s rise and fall; purchasers appear to have been trend followers. Gerald Feldman has noted that German stock purchases for foreign accounts peaked in February 1920. The stabilization of the mark in early 1920 and the coincident inflows have been attributed to rational speculation, it should be noted. Steven Webb attributes the stabilization to good fiscal news regarding new tax policies and to the political stabilization after the Kapp Putsch was defeated. Holtfrerich, among others, has noted the strong growth in output in the real German economy at the time. The upturn in demand for marks in 1920 is also consistent with the proliferation of dealers advertising mark options around that time. Despite professional opinion warning there was no immediate upside to the German monetary situation, there were enough market participants willing to believe in Germany’s rebirth to drive substantial currency purchases. The volume increase in the latter half of 1921 coincides with a downward move in the mark’s value, suggesting that investors were increasingly betting on a reversal of the mark’s decline. Overall, there appears to be no strong downward trend in the amount of dollars spent buying marks, even as Germany’s economy and monetary situation began its descent into chaos.

Figure 4 displays the estimated overvaluation of several currencies relative to forward sterling for the period January 1919 to December 1922. The analysis is based on the market for forward exchange (contracts for future delivery of currency). Previous researchers have examined the levels of the forward exchange rates, but the contribution here is to be explicit about the deviation of the observed forward rate from the theoretical “fair value” forward rate computed using spot rates and

\footnote{Feldman finds that German enterprises were never in real danger of being “foreignized”, but the fear of Germany being reduced to subservient, for-hire employees of foreigners stirred up nationalist feelings as politicians and businessmen expended much effort on the issue. Gerald Feldman, “Foreign Penetration of German Enterprises after the First World War: The Problem of Überfremdung,” in Historical Studies in International Corporate Business, Alice Teichova, Maurice Lévy-Leboyer, and Helga Nussbaum, eds. (New York, 1989), 87-110.}

short-term interest rates. This deviation is a measure of price pressure and reveals the beliefs of market participants. Positive values suggest the forward currency was bid up relative to fair value against sterling, while negative values suggest the opposite.

Whereas modern forward markets admit little opportunity for forward exchange rates to deviate from theoretical values, such no-arbitrage conditions were much more of a suggestion during the interwar period. Because there was no well-defined Eurodeposit rate, for example, the interest rate differential for forward exchange rate computations was fuzzy. Was it the call money rate - the funding rate for day-to-day loans on risky assets? Was it the discount rate on Treasury bills? What about markets such as Italy, which did not have well-defined market rates of interest for short-term loans? Forward exchange rates would have been influenced by interest rates, but it would not have been a mechanical computation. Market expectations regarding future exchange rate moves would have had a significant effect on forward rates through a simple supply/demand relation.

Visual inspection of the chart reveals a general undervaluation of the dollar (i.e., an overvaluation of sterling until mid-1922), and a general overvaluation of European currencies. The combined overvaluation of the Continental currencies relative to the U.S. dollar was in the 10% range in 1920, if one adds sterling overvaluation to Continental overvaluation. This combination was in the high teens in 1921, but it trended downward to a few percent by the end of 1922 as the dollar undervaluation disappeared. The chart suggests strong evidence in favor of a significant speculative demand for European currencies and sterling, apparently in anticipation of a return to pre-war

---

74 Forward and spot exchange rates from January 1921 (March 1921 for the lira) are from Paul Einzig, Theory of Forward Exchange, and earlier data are from John Maynard Keynes, A Tract on Monetary Reform (London, 1924). The interest rates used are bankers acceptances (USA, NBER series 13007), open market three month discount rates (UK, NBER series 13016; Germany, NBER series 13018), and the central bank discount rate (France, NBER series 13014; Italy, from Einzig). Weekly data for the 1921-1922 period are averaged to produce monthly figures.

75 Theoretical forward rates rule out riskless profits. The theory equates the known price available from selling the foreign currency for future delivery with the amount available from buying foreign exchange in the spot market today, depositing it in an interest bearing foreign account, and then delivering it when the forward contract comes due. Mathematically, the theoretical forward premium ((forward rate - spot rate)/spot rate) equals the interest rate differential between the two markets.

76 The mark data become difficult to interpret precisely from mid-1922. The computation takes the 3 month quoted interest rates at face value, but borrowers paid commissions ranging 3 - 40 percent per annum in 1922. Including commissions, annual rates up to 250% were common for short-term loans for speculation (Federal Reserve Bulletin, March 1923, 347).
normal levels. This is consistent with the strong demand for currency options reported earlier.

The conclusions from this section are the following. First, the extensive work done by previous researchers on speculative losses to post-War investors in German marks provides a simple way to characterize potential investors in mark options during the same period. All of the evidence corroborates the idea that German Americans and other immigrants were disproportionately exposed to European currencies, especially the mark, after the War. Second, the financial firms catering to these investors were not top tier names. High status firms appear to have had little interest in entering the business of selling highly speculative foreign currencies to low status immigrants. Third, market prices for forward exchange and volumes of physical mark notes purchased confirm the picture painted by contemporary accounts of a demand-driven market for European currencies. Anticipation of a return to pre-War parities, or, at the least, currency values higher than the depressed levels just after the War, appears to have stimulated strong speculative demand for those currencies, including demand for options.

A final note reflects on the magnitude of the options market in relation to the magnitude of the broader foreign exchange market. The total of speculative inflows into Germany were probably in the billions of U.S. dollars, and the volume of physical notes or deposits held by U.S. speculators was in the hundreds of millions, but the actual amount of money that changed hands in the option business was probably a few million at best. Even if turnover in whole industry was, say, five times the size of Charles Ponzi’s famous scheme, this would still amount to less than fifty million U.S. dollars. The dollar value of marks changing hands was perhaps an order of magnitude smaller than the value of dollars changing hands. No estimate of capital flows would change by including, or not including, this portion of the market. If the goal were to show how economically large the option market was, the facts would have defeated us. The foreign exchange option market’s short post-War life is interesting not because of its size, but because of the social, cultural, and financial issues that it brings together.
Conclusion

Cultural and national affiliations can easily trump traditional economic incentives. Developing nations, for example, have relied on expatriates with strong emotional ties who were willing to fund national debt at far below market rates. Israel has regularly issued these “Diaspora bonds” since 1951 to finance development projects and has raised over $26 billion in this fashion. India opportunistically issued such bonds during times of financial stress in 1991, 1998, and 2000 in order to raise over $11 billion.\(^77\)

Fraudsters also exploit such ties, especially when they target inexperienced investors. A modern example perpetrated in the Korean community of the San Francisco Bay area is a textbook example. The community had learned of the investment firm by word of mouth, personal referrals, and ads in Korean language newspapers. The performance history and the business magazine articles proved that the men had used their expertise in the exotic world of currency trading to make other families rich. Five hundred individuals invested a total of $85 million; after all, the firm’s partners lived and worked in the community. But the claims were all lies, and the men allegedly used the majority of the investments to pay fake profits to early investors and for lavish living expenses. After eight years, they disappeared to Korea.\(^78\) The same basic scheme has been perpetrated for centuries, and modern regulatory scrutiny has not eliminated it.

Many European immigrants to the U.S. during the early part of the 20th century had not participated in organized financial markets before they arrived. The U.S. Department of the Treasury urged them to prove their loyalty to their adopted country by buying Liberty bonds during the First World War; the immigrants generally did their part and more. But now these neophyte investors had small piles of savings in the form of safe, boring bonds; opportunistic salesmen offered an easy path to riches via more speculative investments. German Americans were disproportionately exposed. They had been pressured the most to buy bonds and to repudiate their culture, and the salesmen offered a way for them to get rich by betting that their homeland’s currency, and by


\(^{78}\) United States Commodity Futures Trading Commission vs. SNC Asset Management, Inc. (N. Cal. CV-09-2555)
extension their culture, would reinvigorate itself. German Americans lost hundreds of millions of dollars by buying German marks before the collapse.

Small speculators liked call options on currency because they offered leveraged exposure to the upside along with a known, maximum potential loss (the option cost). Illegitimate option sellers liked calls because of that same nonlinear payoff profile. The sellers would continue collecting premiums from buyers and not pay off unless the exchange rate moved up dramatically. In the unlikely situation that the exchange rate did appreciate sharply, option sellers would simply close up shop and move along to the next scheme.

The general lesson regarding financial market development is not that options are bad investments or that only fraudsters sell options. In a world with many option buyers and few option sellers, terms naturally favored sellers. Few direct observations on defaults served to distinguish high quality option houses from low quality ones. Small buyers attempting to use status signals to gauge reputability would have found few, if any, reputable houses selling such speculative contracts. At the same time, optimistic, patriotic speculators of German heritage would have found reputable sounding firms willing to supply small denomination contracts. Illegitimate market participants exploited the nonlinear contingent payoff profile to conceal their true nature, and options became identified with scams. To make the jump to legitimacy, option trading required a transformative event: the launch of a full-fledged exchange and clearinghouse to mitigate operational and counterparty risk.
Table 1.
Ruble call option prices and breakevens, 1917

The table displays call option prices on 1,000,000 Russian rubles and associated breakeven price changes (as a percentage of the underlying spot price). Breakeven price changes reflect the increase in the ruble exchange rate required for a call option purchaser to break even on his purchase at the expiration date. All options expire December 31, 1917. Price data are from *The New York Times*, “Gambling in Russian Rubles,” 13 March 1917, 16, and *Wall Street Journal*, “Foreign Exchange,” 12 April 1917, 8.

<table>
<thead>
<tr>
<th>Strike Price (g per ruble)</th>
<th>Option Price (USD)</th>
<th>Breakeven (% of spot)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mar 12</td>
<td>Mar 31</td>
</tr>
<tr>
<td>30.5</td>
<td>5,000</td>
<td>-</td>
</tr>
<tr>
<td>31.5</td>
<td>-</td>
<td>6,900</td>
</tr>
<tr>
<td>32.5</td>
<td>3,500</td>
<td>5,850</td>
</tr>
<tr>
<td>33.5</td>
<td>-</td>
<td>4,850</td>
</tr>
</tbody>
</table>
Table 2.

Breakout of U.S. Investors and Assets in German Marks, September 1922

The table displays a contemporary estimate of the total amounts invested in German marks by U.S. purchasers, broken out into a) amounts held by buyers of German versus non-German heritage and b) assets held in cash equivalents versus investments such as bonds. Source: “Mad Buying of Marks Cost U.S. $904,000,000,” Washington Post, 3 October 1922, 2.

<table>
<thead>
<tr>
<th>Investors</th>
<th>Category</th>
<th>Millions</th>
<th>Held in marks</th>
<th>Held in investments</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germanic origin</td>
<td>8.3</td>
<td>44</td>
<td>22.5</td>
<td>66.5</td>
<td></td>
</tr>
<tr>
<td>Non-Germanic origin</td>
<td>2.2</td>
<td>11</td>
<td>2.5</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.5</td>
<td>55</td>
<td>25</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1.
U.S. Dollar Price of Foreign Exchange, 1914 - 1922

Figure 2.
U.S. Dollar Price of Russian rubles, 1914-1918

Figure 3. 
Monthly Purchases of German Marks, July 1919 - December 1921

The figure displays USD value of marks purchased from three New York foreign exchange houses, as presented in the *Washington Post*, 5 October 1922, 1. The figure also shows the USD value of a mark over the period.
The figure displays the excess of market prices of forward exchange relative to theoretical "fair value" computed using spot exchange rates and interest rate parity (observed percentage premium minus percentage premium for "fair value"). Positive values represent the forward currency was bid up relative to sterling, while negative values represent the opposite. Source: See text.