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INFLATION AND INDIVIDUAL INVESTORS' BEHAVIOR: EVIDENCE FROM THE GERMAN HYPERINFLATION

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JEL Classification: D14, E31, G11, G41, N14

Keywords: inflation, Investor behavior, Money illusion, Individual investors, Behavioral biases

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February 25, 2023

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1 Introduction

Inflation is among the most important economic risks faced by individual investors. Following the outbreak of the COVID-19 pandemic, inflation resurfaced in many countries.[1] Even though individual investors play an increasingly important role in capital markets, little is known about how they respond to the prospect of higher inflation, and theory provides conflicting hypotheses on this question.[2] On the one hand, the hedging hypothesis predicts that investors are *more likely to buy and less likely to sell stocks* when expected inflation increases. This is because investors understand that stocks entitle them to a fraction of the income generated by the underlying real assets, allowing them to preserve the real value of their investments (e.g., Fama and Schwert, 1977; Fama, 1981; Boudoukh and Richardson, 1993; Bekaert and Wang, 2010). On the other hand, the money illusion hypothesis suggests that investors are *less likely to buy and more likely to sell stocks* in periods of higher expected inflation. This is because they adjust nominal interest rates but ignore that firms' cash flows also grow with inflation, leading them to require higher dividend yields to hold stocks (e.g., Modigliani and Cohn, 1979; Ritter and Warr, 2002; Cohen et al., 2005). Given these two competing hypotheses, understanding how investors react to expected inflation is an empirical question.

A test of individual investors' response to inflation is subject to three main empirical challenges. First, one needs granular data on investors' security transactions. This allows for a direct analysis of investment decision-making in inflationary periods. Second, one needs a time period in which inflation, if overlooked, produces sizable financial losses and thus attracts the attention of investors.[3] Third, one needs a reliable measure of expected inflation that varies both over time and across investors. This is a necessary condition for a within-

[1] See, e.g., "U.S. inflation hit 7% in December, fastest pace since 1982", *Wall Street Journal*, January 12, 2022; "Eurozone inflation hits its highest level since the creation of the euro in 1999", *New York Times*, May 31, 2022; "Leading economies at risk of falling into high-inflation trap, BIS says", *Financial Times*, June 26, 2022.

[2] See, e.g., "Everyone's a day trader now", *Wall Street Journal*, July 25, 2020; "Individual-investor boom reshapes U.S. stock market", *Wall Street Journal*, August 31, 2020; "Rise of the retail army: the amateur traders transforming markets", *Financial Times*, March 9, 2021.

[3] In periods of low inflation, investors may not react to inflation because of rational inattention (e.g., Mankiw and Reis, 2002; Sims, 2003; Katz et al., 2017).

person analysis and enables one to control for the overall time trend.

This setup is not available in the most common investor-level datasets. In this paper, we therefore introduce a unique dataset containing security portfolios of over 2,000 private clients of a German bank between 1920 and 1924, covering the German hyperinflation. While our sample is smaller compared to contemporaneous datasets, we show that the bank can be considered representative of a large German bank at the time, the clients representative of individual investors in Germany during the early 1920s, and the clients' investment behavior comparable to the investment behavior of individual investors today. The data and the time period are well-suited to address each of the empirical challenges outlined above. First, we have detailed information on every trade executed by the bank's clients, allowing for a direct analysis of individuals' investment behavior. Second, between January 1920 and September 1923, inflation was high, potentially yielding large financial losses if overlooked, and arguably grabbing investors' attention. Third, we have inflation data at the monthly level for hundreds of towns in Germany, resulting in an inflation measure that captures inflation experienced locally over time, which should be a reliable proxy for expected inflation.[4]

Figure 1 visualizes our main finding. Each month, we sort towns in Germany into deciles based on their local inflation and compute, for each inflation decile, the average buy-sell imbalance for stock trades of clients living in those towns. We then plot average buy-sell imbalances against inflation deciles. The figure shows a strong negative relationship between inflation deciles and investors' buy-sell imbalances. This suggests that investors buy less (sell more) stocks when facing higher local inflation. Moving from the decile with the lowest inflation to the decile with the highest inflation reduces buy-sell imbalances by 17 percentage points.[5] This result is consistent with the money illusion hypothesis, but inconsistent with the hedging hypothesis.

In a more formal analysis, we regress investors' buy-sell imbalances in stock trades on local inflation, including town-level controls, time fixed effects, and client fixed effects. We

[4]Existing empirical work shows that the inflation experienced personally is a crucial determinant of individuals' inflation expectations (e.g., Malmendier and Nagel, 2016; D'Acunto et al., 2021).

[5]Many companies issued new equity during our sample period, providing an explanation for why buy-sell imbalances are positive on average. This was driven by firms' capital needs following the war (e.g., Aron, 1927; Bresciani-Turroni, 1937, p. 255).

find that a 1% increase in local inflation is associated with a significant decline in the buy-sell imbalance for stocks of 3.5%. This regression analysis therefore confirms the negative slope across the bars observed in Figure 1.

We also analyze individual investors' behavior around a reverse inflation shock. In October 1923, Germany successfully reformed its currency. As inflation declined close to zero within weeks, nominal and real discount rates converged. Hence, we expect that investors subject to money illusion no longer make a valuation error and increase their demand for stocks after the reform. The effect should be greater for clients who experienced higher inflation right before the reform as they made greater errors. We find evidence consistent with this prediction.

We then analyze the heterogeneity in the relation between local inflation and stock trades. We begin by examining whether our results vary across investor types. Existing research shows that sophisticated investors are less prone to behavioral biases (e.g., Feng and Seasholes, 2005; Locke and Mann, 2005; Grinblatt et al., 2016). Thus, we test whether sophistication reduces the effect. We find the negative relationship between local inflation and buy-sell imbalances for stocks to be attenuated for individual investors considered more sophisticated. Moreover, we document a positive and weakly significant association between local inflation and buy-sell imbalances for stocks when replicating our analysis for institutional investors, suggesting that institutional investors do not suffer from money illusion. These findings support the notion that sophistication reduces money illusion.

We also investigate whether our results vary across stocks. Since investors subject to money illusion do not properly adjust firms' future cash flows to inflation, the documented effect should be stronger for stocks where future growth prospects are more important than current cash flows. We find the relation between local inflation and buy-sell imbalances to be significantly more negative for stocks with low dividend yield and for high-tech stocks. Thus, the effect is more pronounced for stocks where money illusion is more likely.

We then examine the relation between local inflation and the performance of stock sales. Investors subject to money illusion are more likely to sell stocks in inflationary periods because they perceive them to be overvalued. If these stocks were truly overvalued, we should observe negative real returns following inflation-induced stock sales. However, we find a positive relation between local inflation and foregone real returns following stock sales. This evidence is again consistent with investors committing an inflation-induced valuation error.

While our findings provide support for the money illusion hypothesis, we also explore several competing explanations. First, as argued by Fama (1981), inflation could proxy for economic prospects. Hence, if local inflation increases, investors might lower their cash flow expectations, which reduces their demand for stocks. Second, inflation could make individuals more risk averse, thus explaining the negative relationship between local inflation and buy-sell imbalances for stocks (e.g., Brandt and Wang, 2003; Cohen et al., 2005). Third, our results could be driven by investors liquidating stocks to buy consumption goods, which become more expensive as local prices rise. Fourth, the negative relation between local inflation and buy-sell imbalances for stocks could be due to investors shifting funds from stocks to other asset classes that potentially offer a hedge against inflation. We perform a battery of tests to shed light on these alternative explanations. However, we do not find much support for them. Thus, all our evidence points towards money illusion driving our findings.

Finally, Modigliani and Cohn (1979) argue that investors subject to money illusion make a second valuation error in inflationary periods. Investors do not understand that decreasing accounting profits of firms caused by higher nominal interest payments are offset by the depreciation of the real value of nominal liabilities. Thus, investors subject to money illusion reduce their demand for stocks of firms that issue new debt. In line with this second form of money illusion, we show that buy-sell imbalances for stock trades are on average lower for firms with greater increases in nominal liabilities when inflation rises at firms' headquarters.

Our paper makes three contributions. First, we contribute to the empirical literature on investors' response to inflation. Existing work focuses mostly on the relation between inflation and stock price changes. Lending support to the hedging hypothesis, some papers find inflation to be positively correlated with stock returns (e.g., Branch, 1974; Firth, 1979; Boudoukh and Richardson, 1993). However, numerous studies also document a negative association between inflation and stock returns (e.g., Fama and Schwert, 1977; Fama, 1981; Bekaert and Wang, 2010). Some articles rely on money illusion to explain this negative relation (e.g., Ritter and Warr, 2002; Cohen et al., 2005), while others have identified rational explanations.

For instance, according to Fama (1981), the negative relationship between inflation and stock returns is due to higher expected inflation proxying for lower expected economic growth. Our approach is different from the approach of the existing literature. Rather than analyzing stock returns, which only provide *indirect* evidence of investors' behavior, we study investors' security transactions. This enables us to provide the first *direct* evidence of investors' response to inflation. Our findings lend support to the money illusion hypothesis.

Second, we contribute to the literature on individual investors' behavior. Extant studies show that individual investors are subject to various behavioral biases.[6] To the best of our knowledge, we are the first to investigate individual investors' response to inflation. We provide evidence that individual investors reduce their demand for stocks during inflationary periods, consistent with money illusion.

Third, we contribute to the literature on hyperinflations. Existing research mainly studies hyperinflations to understand how individuals form inflation expectations and how these expectations affect their demand for money (e.g., Cagan, 1956; Frenkel, 1977; Evans, 1978; Salemi and Sargent, 1979). However, little is known about individual investors' decisions during hyperinflations. Our study fills this gap.

Our results stress the importance of the ongoing debate on the financial literacy of individuals. Recently, the European Commission pointed towards the limited financial literacy of households and advocated for making financial education a priority for Europe. Similar calls were made in the U.S.[7] Our results underscore concerns that the financial literacy of individuals may not be sufficient to respond appropriately to the currently resurfacing inflation.

[6]Barber and Odean (2013) provide a review of the literature on individual investors' behavior.

[7]See, e.g., "'We need people to know the ABC of finance': facing up to the financial literacy crisis"; *Financial Times*, October 4, 2021; "Education Secretary Miguel Cardona says personal finance lessons should start as early as possible", *CNBC*, October 13, 2021; "Improving financial literacy must be a priority for Europe", *Financial Times*, January 17, 2022.

2 Historical background

2.1 The German hyperinflation

The origins of the German hyperinflation lie in the economic and political situation that characterized the First World War and its aftermath. At the onset of the war in 1914, the German government suspended the convertibility between the *Mark* and gold and switched to a fiat money system. The war effort was predominantly financed by domestic debt and newly printed money. As a result, when Germany surrendered in November 1918, the national consumer price index (CPI) had increased by more than 100% compared to the beginning of the war (e.g., Bresciani-Turroni, 1937, pp. 23-28; Dalio, 2018, pp. 7-11).

After the First World War, the newborn German republic needed to finance post-war reconstruction, current expenditures, and war reparations. However, tax revenues were low and Germany lacked the political and administrative strength to cut spending or to impose new taxes. Uncertainty about tax collection also impaired the possibility to issue new debt to German citizens. The international debt market remained inaccessible as international investors had no confidence in the *Mark* and questioned Germany's creditworthiness. Therefore, printing money increasingly became the way to meet financial obligations. Between the end of the war and the beginning of 1920, the price level had increased by a factor of four (e.g., Moulton and McGuire, 1923, pp. 201-207; Bresciani-Turroni, 1937, p. 30).

In 1920, both the internal price level and the exchange rates of the *Mark* to foreign currencies stabilized. The expansionary monetary policy of the German Central Bank (*Reichsbank*) made German exports more attractive and increased the demand for *Mark* as foreign consumers looked for the German currency to purchase German goods (e.g., Dalio, 2018, pp. 16-19). Figure 2 shows the CPI for Germany from February 1920 onwards. The average monthly national inflation rate between March 1920 and April 1921 was about 2.2%.

The London Ultimatum in May 1921 again worsened Germany's financial situation and the trust in the *Mark*. The Allies now demanded reparations of 132 billion *Mark*, which represented an increase in government debt of around 330% of GDP (e.g., Dalio, 2018, pp. 20-22). From May to December 1921, the average monthly national inflation rate was about

7.1% (see Figure 2).

At the beginning of 1922, optimism spread as the Allies acknowledged that reparation demands were unsustainable. However, when renegotiations failed in June, the *Mark* fell (e.g., Dalio, 2018, pp. 26-32). The average monthly inflation rate was 13.7% in the first half of 1922 and 61.2% in the second half (see Figure 2).

In January 1923, France and Belgium invaded Germany's industrial heartland, the Ruhr region, after the Allies found that Germany had defaulted on reparation payments. The consequences were a government-financed general strike in the Ruhr region and the need to import coal for the rest of Germany, which further burdened the state's budget. By March 1923, inflation had spun out of control. In October 1923, the *Mark* stood at six billion-to-one relative to its pre-war value (e.g., Bresciani-Turroni, 1937, p. 36; Dalio, 2018, pp. 33-34).

In mid-October 1923, the government introduced a stabilization policy that stopped the hyperinflation. The main element of the policy was the introduction of a new currency, the *Rentenmark*, which was backed by gold as well as German land and was pegged to the dollar. Strict limits were placed on the amount of *Rentenmark* that could be printed. Stabilization also came with fiscal consolidation and renewed renegotiations with the Allies over reparation demands, which led to substantially reduced reparation claims and culminated in the Dawes Plan (e.g., Bresciani-Turroni, 1937, p. 98; Dornbusch, 1985; Dalio, 2018, pp. 35-42).

2.2 Financial investments in Germany in the early 1920s

In the early 1920s, stocks and bonds were traded on about 20 different exchanges in Germany. Berlin was the country's largest exchange and also one of the largest exchanges in the world (e.g., Ferguson and Voth, 2008; Moore, 2012; Lehmann-Hasemeyer and Streb, 2016). The investment universe in Berlin comprised over 4,000 securities issued by about 2,000 entities. Around 60% were fixed income securities, the remaining were equity securities.[8] Most issuers were companies, in particular manufacturing firms, iron and steel works, as well as railroads. In order to conduct a trade, investors commissioned a broker, often by phone, who traded

[8]There was little trading in derivatives on German stock exchanges. Official trading in derivatives was stopped completely prior to the First World War and was not resumed until the currency had stabilized (e.g., Buchwald, 1924, p. 233; Schütze, 1925, p. 507).

on their behalf and was awarded a fee for the service. Trading was possible six days a week (all days but Sundays). For most securities, supply and demand were matched by dedicated market makers in one auction per day, resulting in one market price at which all trades were executed (e.g., Buchwald, 1924, pp. 233-236).

Another potential investment was foreign exchange. However, to finance the war effort, between 1914 and 1918 German citizens had to surrender most of their foreign exchange to the government. After the war, Germans' foreign assets in the Allied countries were expropriated. Moreover, during the 1920s, German authorities introduced even more rigorous rules that prevented investors from owning and purchasing foreign exchange. As a result, there was little ownership in foreign exchange and purchasing foreign exchange was difficult during our sample period.

Another asset class to potentially invest in was real estate. However, since the outbreak of the war, rents were fixed to preserve social peace (so-called *Friedensmiete* or "peace rent"). Fixed rents disincentivize individuals to become landlords, even more so in a high-inflation environment. As prices increased, rents covered an ever-shrinking fraction of the maintenance costs, forcing many landlords to sell (Bresciani-Turroni, 1937 p. 299). In the course of the hyperinflation, many houses were bought by foreigners.[9]

Figure 2 shows the evolution of the national CPI, the German stock market index, the dollar/*Mark* exchange rate, the price of the 4.5% German government bond (one of the most liquid debt securities), and real estate prices for Germany in nominal terms between February 1920 and September 1923.[10] Investments in stocks and the dollar closely follow the consumer price index, implying that investments in these two asset classes offered the ability to hedge against inflation. In contrast, prices of government bonds and real estate remain almost flat, indicating that such assets did not offer inflation protection.

[9]According to the Statistical Office of Berlin, 63% of house purchases were conducted by individuals living outside of Germany between September 1922 and January 1923.

[10]The data on real estate prices come from Jordà et al. (2019).

3 The money illusion hypothesis

Modigliani and Cohn (1979) describe how inflation influences investors' valuation of stocks. They argue that investors mistakenly use nominal rates to discount real future cash flows of firms. Following Cohen et al. (2005), we formalize this idea using the Gordon Growth Model, and express the dividend-price ratio at time t as

$$\frac{D_{t+1}}{P_t} = R - G, \tag{1}$$

where D_{t+1} is the nominal dividend per share paid at time $t+1$, P_t is the price per share at time t, R is the nominal discount rate, and G is the nominal growth rate of future cash flows. A rise in inflation increases both R and G equally, leaving the dividend-price ratio unaffected. However, investors subject to money illusion adjust the discount rate R, but do not sufficiently update the growth rate G. As a result, when inflation increases, investors subject to money illusion require a higher dividend yield in order to hold stocks, which makes them less likely to buy and more likely to sell stocks. However, money illusion only leads to trading if there is disagreement among investors about the valuation of stocks. If all investors agree on the (mis)valuation of stocks, we expect to find no significant trading response to inflation.

Notice that investors subject to money illusion do not make the same mistake when they value bonds. As bonds offer constant cash flows, the growth rate G is irrelevant. Under increasing inflation, investors only have to adjust R, which they do correctly, even if they suffer from money illusion. Therefore, the valuation of bonds should be unbiased.

According to Modigliani and Cohn (1979), investors subject to money illusion commit a second valuation error. Such investors do not understand that decreasing accounting profits of firms caused by higher nominal interest payments are offset by an increase in the market value of equity resulting from the deprecation in the real value of nominal liabilities. As a result, investors suffering from money illusion reduce their demand for stocks of firms that issue new debt. We discuss this second form of money illusion in detail in Internet Appendix E.

4 Empirical approach

We test for Modigliani and Cohn (1979)'s money illusion hypothesis using the following equations:

$$Buy - sell\,imbalance_{i,t} = \alpha_t + \alpha_i + \beta Local\,inflation_{i,t} + Controls_{i,t} + \epsilon_{i,t}. \quad (2)$$

The $Buy - sell\,imbalance_{i,t}$ of investor i in month t is defined as

$$Buy - sell\,imbalance_{i,t} = \frac{\#\,buys_{i,t} - \#\,sells_{i,t}}{\#\,buys_{i,t} + \#\,sells_{i,t}}, \quad (3)$$

where $\#\,buys_{i,t}$ ($\#\,sells_{i,t}$) is the number of stock purchases (sales) by investor i in month t. The buy-sell imbalance captures investors' net demand for stocks in a given month.[11] α_t are year-month fixed effects that control for the overall time trend, thereby accounting for factors such as national inflation and overall economic conditions. α_i are client fixed effects, which control for time-invariant investor characteristics, such as gender. $Local\,inflation_{i,t}$ is the inflation in month t of the town where investor i lives. We assume that local inflation experienced by investors shapes their inflation expectations. This assumption is in line with Malmendier and Nagel (2016) and D'Acunto et al. (2021), who show that, when individuals form inflation expectations, they rely heavily on experienced price changes. $Controls_{i,t}$ represents a set of time-varying town-level characteristics. $\epsilon_{i,t}$ is the error term. The money illusion hypothesis predicts a negative β for stock trades, i.e., a negative relationship between local inflation experienced by investors and investors' buy-sell imbalance for stocks. The hedging hypothesis predicts a positive β.

To test for Modigliani and Cohn (1979)'s second form of money illusion, we analyze clients' trading behavior in stocks of firms that experience changing inflation and changing net leverage. The empirical approach used to test this hypothesis is discussed in detail in Internet Appendix E.

[11] Our buy-sell imbalance measure is based on the number of purchases and sales. In robustness tests reported in Table IA1 in the Internet Appendix, we replicate our main analysis using buy-sell imbalances based on the face value of stock trades and using clients' stock holdings. This does not materially change our findings.

5 Data

5.1 Investor data

We obtain security portfolio data from a German bank. The bank's core business was in private and investment banking, serving private and institutional clients. The bank offered a broad range of wealth management services to its private clients, including securities accounts. While the bank was headquartered in Germany, and thus mainly targeted German clients, it also offered its services to clients living abroad.

In the pre-digital era, banks kept track of client-level security portfolios in so-called deposit books (*Depotbücher*). The Law of Deposits (*Depotgesetz*) required them to do so, which ensures that the information on transactions and holdings in these books is comprehensive (e.g., Buchwald, 1924, pp. 427-428). Specifically, the deposit books record, for each client, every transaction, and after each transaction, the holdings in the respective security. The deposit books also provide several investor characteristics, such as clients' place of residence and whether they hold accounts at other banks. The deposit books contain information on roughly 3,000 private clients with a security portfolio during our sample period. We drop around 700 clients for which we cannot identify the account holder.[12] This leaves us with 2,262 clients who execute 49,415 transactions between January 1920 and December 1924. Figure IA1 in the Internet Appendix shows a sample page from the deposit books.

To shed light on the representativeness of our sample, we perform several comparisons. First, we compare our bank to other German banks at the time. Since only very limited information is available for certain types of banks (e.g., savings banks, cooperative banks, private banks), existing research counts the number of issuers for which a bank acts as paying agent to shed light on banks' relative importance (e.g., Jeidels, 1905; p. 127; Riesser, 1911, p. 371; Wixforth and Ziegler, 1997; Ziegler, 2009).[13] Based on this comparison, our bank ranks among the 30 largest banks in Germany, which is considerable given that around 20,000 banks

[12]In a robustness test reported in Table IA1 in the Internet Appendix, we replicate our main analysis using an extended sample that also includes accounts for which we cannot clearly identify the person responsible for the investment decisions. We find effects that are only marginally weaker, suggesting that the filtering of our sample does not have a meaningful impact on our findings.

[13]A paying agent makes dividend, coupon, and principal payments to investors on behalf of security issuers.

operated in Germany at the time (Bundesbank, 1976, pp. 67, 121). This suggests that our bank is representative of a large German bank.

Second, we compare our clients to the shareholder base in Germany during the early 1920s. We assign clients to social classes based on their profession and their title using the approach of Schüren (1989) and compare the obtained distribution to the one of Lehmann-Hasemeyer and Neumayer (2022), who assign attendees of annual general meetings of German firms during our sample period to social classes using the same approach. Figure IA2 in the Internet Appendix shows that the two distributions align closely, suggesting that our clients are representative of the German stockholding population.

We also compare the wealth of clients to the wealth of the German population. Data on the distribution of the population's net wealth come from the wealth tax collected at year-end 1913.[14] Note that only individuals with net wealth of more than 10,000 *Mark* were subject to this wealth tax, corresponding to about 2.8 million individuals (or 4.3% of the population). We use clients' portfolio market value in January 1920 (the beginning of our sample period) and adjust it to obtain an estimate of clients' net wealth in December 1913. Based on these estimates, around 76% (24%) of clients in our sample have a net wealth of more (less) than 10,000 *Mark*. Figure IA3 in the Internet Appendix shows that wealthy clients in our sample have a wealth distribution similar to individuals subject to the wealth tax, suggesting that these clients are representative of the wealthiest 5% of the population.

Finally, we compare the investment behavior of clients in our sample to the investment behavior of individual investors today. We find that our clients hold portfolios with characteristics very similar to portfolios in the dataset of Barber and Odean (2000), that clients exhibit a strong preference for local investments (e.g., Seasholes and Zhu, 2010), that men trade more than women (e.g., Barber and Odean, 2001), and that clients are subject to the disposition effect (e.g., Shefrin and Statman, 1985), suggesting that the investment behavior of our clients is representative of the investment behavior of individual investors more generally.

[14]Germany not only collected a wealth tax in 1913, but also in other years. However, there is no or only limited data available on wealth taxes collected in other years. Data on the wealth tax in 1913 come from the German Statistical Office.

5.2 Firm data

For each German firm whose shares the clients trade, we hand-collect annual balance sheet data. This information comes from the Handbook of German Stock Corporations (*Handbuch der Deutschen Aktiengesellschaften*). We follow French et al. (1983) and Ritter and Warr (2002), who compute net leverage as the sum of nominal liabilities less the sum of nominal assets, all scaled by total assets. The change in net leverage is the difference between this year's and last year's net leverage. In our final sample, we have 623 German companies whose securities are traded by the clients and for which we have balance sheet data. Figure IA4 in the Internet Appendix shows a sample page from the handbooks.

We also hand-collect month-end market prices of stocks traded on the Berlin Stock Exchange. These data come from the Berlin Stock Exchange Newspaper (*Berliner Börsen-Zeitung*). We then use monthly stock prices to compute monthly stock returns. Clients in our final sample trade stocks of 553 firms for which we have return data. Figure IA5 in the Internet Appendix provides a sample page from the Berlin Stock Exchange Newspaper.

In addition, we hand-collect dividend data for each firm listed on the Berlin Stock Exchange. These data come from a book entitled The Coupon (*Der Zinsschein*). Our clients trade stocks of 485 firms for which we have dividend data. Figure IA6 in the Internet Appendix shows a sample page from this book.

5.3 Local inflation data

We additionally hand-collect information on monthly local consumer prices from the Quarterly Issue of the German Statistical Office (*Vierteljahresheft zur Statistik des Deutschen Reichs*). Starting in December 1919, the statistical office collected prices of a basket of goods considered representative for a family of five members in each German town with more than 10,000 inhabitants and constructed a local consumer price index.[15] These data were originally compiled because the German Department of Labor (*Reichsarbeitsministerium*) needed

[15] D'Acunto et al. (2021) show that when forming inflation expectations, individuals strongly rely on experienced grocery price changes. Groceries are the most important category in the basket of goods used by the statistical office. According to a sample calculation from 1920, groceries make up approximately 80% of the basket.

information on local price changes as a basis for wage negotiations. We compute monthly local inflation as the percentage change in a town's CPI between the current and the previous month. In total, we have monthly inflation data for 633 German towns between January 1920 and December 1924. We merge inflation data, investor data, and firm data by assigning clients and firms to the closest town for which we have inflation data within a 25 km radius.[16] We end up with clients and firms being matched to 256 different towns with inflation data. Figure IA7 in the Internet Appendix provides a sample page showing the consumer price index data from the German Statistical Office.

5.4 Descriptive statistics

Table 1 reports descriptive statistics. Panel A presents sociodemographic variables of the clients in our sample. About 72% of the bank customers are male and 89% live in Germany. Moreover, 9% of clients hold an account with another bank. This suggests that clients typically do not have additional accounts with other banks and our bank appears to be the house bank of most clients. This allows for a comprehensive view of investors' behavior.

Panel B describes the composition of clients' portfolios. On average, a portfolio consists of about three securities, of which 49% are stocks denominated in *Mark*, 32% bonds denominated in *Mark*, and 13% securities denominated in foreign currencies.[17]

Panel C provides information on clients' trades. Clients on average execute 0.8 trades per month (i.e., almost ten trades per year). Around 54% of all trades are purchases, 51% involve stocks, 30% bonds, and 13% foreign securities. Our main variable capturing clients' investment behavior is the monthly buy-sell imbalance. The average monthly buy-sell imbalance for stocks is 0.18. It is 0.07 for bonds and 0.07 for securities denominated in foreign currencies. The positive average buy-sell imbalance for stocks can be explained by many

[16]For 92% (64%) of clients (firms), we have inflation data for the town where they live (have their headquarters). For the remaining clients (firms), the average distance between their place of residence (headquarters) and the town for which we have inflation data is 9 (5) km.

[17]Stocks denominated in foreign currencies account for 18% of the holdings in foreign securities, bonds denominated in foreign currencies account for 74%, and foreign bills account for 7%. Holding and purchasing foreign exchange was difficult for German investors during our sample period. Some foreign securities were still available to them. These were mainly securities of issuers located in countries that were allied with Germany during the First World War (e.g., the countries that were part of the Austro-Hungarian Empire and the Ottoman Empire).

companies issuing new shares during our sample period. The equity issuance volume was primarily driven by substantial capital needs of firms in the early 1920s, when the German economy did relatively well (e.g., Aron, 1927; Bresciani-Turroni, 1937, p. 255).[18]

Panel D presents summary statistics on net leverage of firms in our sample. The average net leverage amounts to 14%. The average annual change in net leverage is 1%.

Panel E shows descriptive statistics on monthly local inflation of towns where at least one client lives or where at least one firm is headquartered. This is our main explanatory variable. The average (median) monthly local inflation rate amounts to 538% (9%) between 1920 and 1924. However, this number hides substantial cross-sectional and time-series variation. For instance, in October 1920, the town with the highest inflation rate was Beuel, which is a part of Bonn today, with 18%, while Aschaffenburg, near Frankfurt am Main, the town with the lowest inflation rate, experienced a reduction in prices of 3%. In 1920, the average monthly local inflation rate across all towns was 7%. It declined to 5% in 1921, rose to 38% in 1922, and reached 2,945% in 1923. In 1924, the year after the successful stabilization of the currency, the monthly local inflation rate averaged only 0.9%. To make the local inflation variable more normally distributed, we follow previous research and apply the inverse hyperbolic sine transformation (e.g., Burbidge et al., 1988; Kale et al., 2009; Karlan et al., 2016).[19] In Figure 3, we plot the inverse hyperbolic sine of monthly inflation of all 256 towns in our sample over time.

Figure IA8 in the Internet Appendix shows the locations of clients and firms in our final sample. We plot the map of Germany in 1920 and the map of Germany today (in grey). We mark the 256 towns for which we have inflation data and to which we assign at least one client (dots) or at least one firm (crosses). The figure reveals that both investors and firms are quite evenly distributed across Germany, with clusters that broadly follow the distribution of the population.

[18]If we exclude stocks purchased in equity issues, the average buy-sell imbalance for stocks decreases from 0.18 to 0.05.

[19]The inverse hyperbolic sine is an alternative to a log-transformation when a variable takes on zero or negative values. In robustness tests shown in Table IA1 in the Internet Appendix, we rerun our main analysis using raw inflation, the natural logarithm of inflation (setting months with negative inflation to zero), and inflation deciles. Our findings remain qualitatively unchanged.

5.5 Determinants of local inflation

The cross-sectional and time-series variation in monthly local inflation that we exploit in our analysis is likely not random. Thus, we next explore the determinants of local inflation. We estimate ordinary least squares (OLS) regressions and use the inverse hyperbolic sine of monthly inflation of towns in our sample as dependent variable. The sample starts in January 1920 and ends in September 1923, shortly before Germany reformed its currency. As explanatory variables, we use the natural logarithm of local population in 1919, a dummy variable that equals one for territories occupied by the French or Belgian troops, the monthly local unemployment rate, a dummy variable that equals one for towns with a branch of the central bank, and the fraction of local employees working in the paper industry in 1921.[20]

Results are reported in Table 2. We find that inflation is higher in towns that are larger (Column 1), that were occupied (Column 2), that have lower unemployment (Column 3), that are home to a branch of the central bank (Column 4), and where a higher fraction of employees works in the paper industry (Column 5). The latter result lends support to the notion that the German Central Bank relied on local firms to produce bank notes.[21] In Column 6, we include all explanatory variables simultaneously. We still find the occupied dummy variable, the unemployment rate, and the fraction of employees working in the paper industry to be significantly related to inflation. Finally, in Column 7, we add year-month and town fixed effects, which control for the overall time trend and all time-invariant determinants of local inflation. We find that the dummy variable indicating the occupation of a town remains significantly related to inflation. Taken together, we document that local inflation is not randomly distributed, but correlated with other local factors. Thus, regressions that follow include year-month and client fixed effects as well as our two time-varying determinants of local inflation.

[20]The German Statistical Office provides data on the population of towns in 1919. Data on monthly local unemployment come from the German Employment Agency (*Reichsamt für Arbeitsvermittlung*) and the German Department of Labor. The German Department of Labor also provides information on the number of employees working in the paper industry in 1921. Finally, the German Central Bank reports the locations of its branches in its annual reports.

[21]At the end of 1923, more than 300 paper mills worked continuously to produce bank notes (Braun, 1990, p. 39). In an additional test, we run instrumental variables regressions in which we use the local availability of raw paper, proxied by the fraction of local employees working in the paper industry, as an instrument for local inflation.

6 Empirical results

This section contains our empirical results. First, we investigate the relationship between local inflation and clients' investment behavior in stocks (Section 6.1). Second, we analyze whether there is heterogeneity in this relationship (Section 6.2). Next, we study the association between local inflation and returns following stock sales (Section 6.3). We then run numerous tests to rule out alternative explanations (Section 6.4). Finally, we investigate the second form of money illusion (Section 6.5).

6.1 Local inflation and stock trades

To test for money illusion, we regress monthly buy-sell imbalances for stock trades of clients on the monthly local inflation rate, as outlined in Equation (2). Depending on the estimated specification, we include controls and fixed effects. In all our regressions, we double-cluster standard errors at the town and month level.[22]

We present the results in Table 3. In Column 1, we include year-month fixed effects to control for the overall time trend. The coefficient estimate is negative and statistically significant at the 5% level. In Column 2, when adding client fixed effects that control for all time-invariant investor characteristics, the documented effect becomes statistically and economically stronger. The negative coefficient estimate suggests that investors buy less (sell more) stocks when facing higher local inflation. We find that a 1% increase in local inflation is associated with a 3.5% decline in buy-sell imbalances for stocks. In Column 3, local inflation is measured over the current month and the previous month (rather than over the current month only). Consistent with the idea that not only contemporaneous inflation affects clients' inflation expectations but also inflation experienced in the recent past, we again find a strong negative relation between local inflation and buy-sell imbalances. In Column 4, we augment the regression with the two time-varying control variables from Table 2, a dummy variable that equals one if a town was in occupied territory in a given month and the local unemployment rate. Including them, however, does not materially change our findings. In Columns 5 and

[22] We also estimate our main regressions using the spatial correction proposed by Conley (1999), with different thresholds (25 km, 50 km, 75 km, 100 km, 125 km, and 150 km). Results remain virtually unchanged.

6, we split the sample period into two subperiods. In the first subperiod, from January 1920 to June 1922, the German economy did relatively well and experienced comparably low inflation.[23] The second subperiod, from July 1922 to September 1923, is characterized by the hyperinflation. We find a negative and statistically significant relationship between inflation and buy-sell imbalances in both subperiods. Taken together, we document a strong negative relation between local inflation and buy-sell imbalances for stocks, which supports the money illusion hypothesis, but not the hedging hypothesis.[24]

To shed additional light on whether contemporaneous or lagged inflation matters for investors, we replicate our analysis at the weekly level, including several lags of inflation. Weekly inflation data are available from July 12, 1923, onwards. We compute weekly buy-sell imbalances over the same time period over which weekly inflation is measured. Results are presented in Table IA2 in the Internet Appendix. In Column 1, we include time fixed effects. Column 2 additionally contains client fixed effects. In Column 1, we find the relationship between local inflation and buy-sell imbalances to be negative up to the fourth lag, albeit not statistically significant. In Column 2, the relationship is significantly negative up to the fifth lag. This finding suggests that it is local inflation in the last few weeks that matters for investors, and not local inflation in the more distant past, supporting the use of contemporaneous inflation as our main explanatory variable.

So far, we restricted our analysis to the period from January 1920 to September 1923, which is the time period characterized by rising prices. Next, we test whether we find consistent results when we explore a reverse inflation shock. In particular, we investigate trading patterns in a 12-month window around October 1923, when the government successfully stabilized the currency. Within a few weeks, inflation dropped sharply (see Figure 3). In principle, a reduction in inflation should produce the opposite effect of what we showed in Table 3. As

[23]In Figure IA9 in the Internet Appendix, we show the monthly number of applicants per 100 open positions in Germany between January 1920 and December 1924. These data come from the German Statistical Office. Unemployment only started to rise towards the end of 1922, providing evidence that the Germany economy did well in the first part of our sample period.

[24]In robustness tests reported in Table IA1 in the Internet Appendix, we replicate our main analysis using alternative measures for local inflation and individual investors' trading response as well as an extended sample. The details of these tests are described in Internet Appendix C. Across all specifications we find a negative and statistically significant relation between local inflation and investors' demand for stocks.

inflation declined close to zero, nominal and real discount rates converged. Hence, investors subject to money illusion no longer make a valuation error and we expect them to increase their demand for stocks after the reform. The effect should be greater for clients who experienced higher inflation right before the reform as they made greater errors. We identify these investors in two ways. First, we take the cumulative local inflation rate over the six months preceding the currency reform. Second, we compare clients living in Germany with clients living in neighboring countries.[25] To test this conjecture, we adapt Equation (2) in the following ways:

$$Buy - sell\, imbalance_{i,t} = \alpha_t + \alpha_i \\ +\beta Local\, inflation_{i,Apr.-Sep.1923} \times Post\, reform\,(d)_t + \epsilon_{i,t} \quad (4)$$

$$Buy - sell\, imbalance_{i,t} = \alpha_t + \alpha_i + \beta Germany\,(d)_i \times Post\, reform\,(d)_t + \epsilon_{i,t}, \quad (5)$$

where $Local\, inflation_{i,Apr.-Sep.1923}$ is the cumulative inflation rate in the 6-month period preceding the currency reform (from April to September 1923) of the town where investor i lives. $Post\, reform\,(d)_t$ is a dummy variable that takes the value of one in the 6-month period following the currency reform (from October 1923 to March 1924), and zero otherwise. $Germany\,(d)_i$ is a dummy variable that equals one for investors who live in Germany and zero for investors who live in neighboring countries. For both regressions, the money illusion hypothesis predicts a positive β.

We present the results in Table 4. Estimates from Equation (4) are shown in Column 1. We find that clients living in towns with higher pre-stabilization inflation buy more (sell less) stocks after the stabilization compared to clients in towns with lower pre-stabilization inflation. Estimates for Equation (5) are presented in Column 2. We document that clients living in Germany increase their demand for stocks after the currency reform compared to clients living abroad. Figure IA10 in the Internet Appendix graphically illustrates the increase in buy-sell imbalances of clients living in Germany around the currency reform relative to clients living in neighboring countries. Hence, the analysis of the currency reform of October

[25]In 1923, Germany's neighboring countries were Austria, Belgium, Czechoslovakia, Denmark, France, the Free City of Danzig, Lithuania, Netherlands, Poland, Switzerland, and the Territory of the Saar Basin (*Saargebiet*). Germany not only had the highest inflation rate among its neighbors, but the highest inflation rate in the world (e.g., Hanke and Krus, 2013).

1923 confirms that there is a negative relation between local inflation experienced by investors and investors' demand for stocks.

6.2 Cross-sectional results

Next, we analyze the heterogeneity in the relation between local inflation and stock trades. We begin by investigating whether our results differ across investor types. Existing research shows that sophisticated investors are less prone to behavioral biases (e.g., Feng and Seasholes, 2005; Locke and Mann, 2005; Grinblatt et al., 2016). Moreover, anecdotal evidence suggests that sophisticated investors bought large amounts of stocks during our sample period (e.g., Bresciani-Turroni, 1937, pp. 290-298). Hence, we investigate whether sophistication reduces the documented effect. We use four different measures to capture individual investors' sophistication. Following existing studies, we take the portfolio value as a proxy for sophistication (e.g., Hirshleifer et al., 2008; Barber et al., 2016). We create a dummy variable that takes the value of one (zero) if clients' portfolio market value in January 1920 is above (equal to or below) the median. The second sophistication proxy is a dummy variable that equals one (zero) if clients' number of different stocks in the portfolio in January 1920 is above (equal to or below) the median. This measure captures investors' degree of diversification (e.g., Feng and Seasholes, 2005). The third sophistication measure is a dummy variable that equals one for clients who are employees of our bank. Prior research shows that financial professionals tend to be more sophisticated than retail traders (e.g., Locke and Mann, 2005). The fourth sophistication proxy is a dummy variable that equals one for investors who traded on margin. As highlighted by Bresciani-Turroni (1937, p. 294), sophisticated investors quickly realized during the German hyperinflation that trading with borrowed money increased profits as debt depreciated quickly due to rising prices. To test the conjecture that sophistication reduces money illusion, we use our main specification from Column 2 of Table 3 and interact the local inflation variable with our sophistication measures.

Results are shown in Table 5. We continue to find a negative and statistically significant coefficient on the local inflation variable across all four columns. However, the significantly positive coefficient on the interaction term implies that the negative relationship between local inflation and buy-sell imbalances is weaker for more sophisticated investors. For instance, the coefficient estimates in Columns 2 and 3 suggest that the effect is more than 10% weaker for more diversified investors and employees of the bank. This is in line with our conjecture that sophisticated investors are less prone to money illusion.[26]

To shed additional light on the behavior of sophisticated investors, we rerun our analysis for institutional clients. Our bank not only served as a broker for private clients, but also for institutional clients, such as banks, insurance companies, and pension funds. Professional investors are typically considered more sophisticated than individual investors (e.g., Locke and Mann, 2005). We hand-collect security portfolio data of 172 institutional investors who execute 5,426 stock trades between January 1920 and September 1923. We then replicate the main regression specifications from Table 3 using these institutional transactions. We report the results in Table IA3 in the Internet Appendix. The relationship between local inflation and buy-sell imbalances for stocks is positive across all specifications. It is not statistically significant at conventional levels in Columns 1 and 4 but is statistically significant at the 10% level in Columns 2 and 3. This suggests that institutional investors are not subject to money illusion. If anything, they buy more (sell less) stocks when facing higher local inflation, which is consistent with institutional investors hedging against local price increases.

We also analyze whether our results vary across stocks. Since investors suffering from money illusion do not properly adjust the growth rate of firms' cash flows to inflation, we expect the documented effect to be stronger for stocks where growth prospects are more important than current cash flows. To proxy for current cash flows and future growth prospects, we use stocks' dividend yield and firms' industry classification. Stocks with low dividend yield and stocks of high-tech firms are likely more susceptible for money illusion. We classify stocks as low-yield (high-yield) stocks if their average dividend yield over the past three months is equal to or below (above) the median. Moreover, we classify chemical companies, electric power companies, and machine building companies as high-tech firms and companies active in other industries (e.g., mining, iron and steel works, timber) as low-tech firms (e.g.,

[26]We also investigate whether the documented effect is different for clients typically considered having sticky wages, such as civil servants and retirees. Hedging motives might be more pronounced when wages are stickier. However, we do not find evidence that our results differ for these investor types.

Bresciani-Turroni, 1937, p. 410; White, 1990). We then rerun our main specification from Column 2 of Table 3 separately for low-yield and high-yield stocks and for high-tech and low-tech stocks.

Results are reported in Columns 1 to 4 of Table 6. The coefficient estimates on local inflation are more negative for low-yield stocks (Column 1) than for high-yield stocks (Column 2) and for high-tech stocks (Column 3) than for low-tech stocks (Column 4). Differences in coefficient estimates between the groups are statistically significant, as indicated by the results of tests for differences reported at the bottom of the table. Hence, we indeed find that the effect is more pronounced for stocks where money illusion is more likely.

6.3 Local inflation and the performance of stock sales

Next, we analyze the relation between local inflation and the performance of stock sales. In inflationary periods, investors subject to money illusion are more likely to sell stocks since they perceive them to be overvalued. If these stocks were truly overvalued, we should observe negative real returns following inflation-induced stock sales. To test this conjecture, we investigate whether foregone profits following stock sales are correlated with local inflation experienced at the time of the sale. We estimate the following regression:

$$r_{i,j,t+1,t+\tau} = \alpha_t + \alpha_i + \alpha_j + \beta Local\,inflation_{i,t} + \epsilon_{i,j,t}, \tag{6}$$

where $r_{i,j,t+1,t+\tau}$ is the real return of stock j over the window $t+1, t+\tau$ sold by investor i in month t. α_t are year-month fixed effects, α_i correspond to client fixed effects, and α_j are firm fixed effects. Including year-month fixed effects has an effect similar to computing market-adjusted returns because we compare returns of trades conducted in the same month over the same post-trade time window. $Local\,inflation_{i,t}$ is the inflation rate experienced by client i in month t. The money illusion hypothesis predicts β to be zero or positive.

We present the results in Table 7. In Columns 1 to 3 (Column 4), we measure real returns of stock sales over a 3-month (6-month) period following the sales. Across all specifications, we find a positive relationship between local inflation in the month of the sale and real returns in the following months. We find the relationship to be statistically significant at the 10%

level in Column 1, where we only include time fixed effects, and in Column 2, where we add firm fixed effects. Results are not statistically significant at conventional levels in Columns 3 and 4, when adding client fixed effects and when investigating the performance over a 6-month period. The positive coefficient suggests that sales in periods of high local inflation deliver higher real returns than sales in periods of low local inflation. Thus, stocks sold by investors facing high inflation tend to be undervalued, rather than overvalued, which is again in line with investors suffering from money illusion.

6.4 Alternative explanations

Up to this point, we have established that investors buy less (sell more) stocks when local inflation increases. To credibly claim that these results are consistent with money illusion as in Modigliani and Cohn (1979), we need to rule out a number of alternative explanations.

6.4.1 Do investors shy away from stocks because inflation reveals information about gloomy economic prospects of firms?

As argued by Fama (1981), inflation could proxy for economic prospects. Thus, in our setting, investors might reduce their demand for stocks with rising inflation because they expect lower growth in firms' future cash flows. We already presented evidence inconsistent with this hypothesis. In particular, in Column 5 of Table 3, we found a negative relationship between local inflation and buy-sell imbalances for stocks for the beginning of our sample period, when inflation was comparably low and economic prospects were good.

We run two additional tests to rule out this alternative explanation. First, we rerun the analysis from Table 3 but change the unit of observation. Recall that, in Table 3, the dependent variable is the buy-sell imbalance for all stocks traded by investor i in month t. As our raw data come at the transaction level, we can also compute the buy-sell imbalance for each stock j traded by investor i in month t. This enables us to saturate the regression with security-year-month fixed effects, which control for any time-varying characteristic of the security, such as changes in cash flows. We present results in Table 8. The coefficient estimates on local inflation have economic magnitudes similar to those in Table 3 and stronger statistical significances. Hence, these results suggest that local inflation does not proxy for economic conditions at the firm level.

In a second test to examine whether our results are driven by inflation making investors more pessimistic about future economic conditions, we investigate the relation between local inflation and investment behavior around economic and political events that likely had a negative effect on economic prospects. If local inflation negatively affects clients' beliefs about future economic conditions, we expect clients located in high-inflation areas to be more pessimistic than clients located in low-inflation areas. As a result, clients located in high-inflation areas should react less to bad news about future economic prospects than clients located in low-inflation areas, as expectations of the former are already low. Inspired by Bittlingmayer (1998), we analyze investors' behavior around four important events between January 1920 and September 1923. Specifically, we study the announcement of the reparation amount to be paid by Germany in May 1921, the assassinations of finance minister Matthias Erzberger in August 1921 and foreign minister Walther Rathenau in June 1922, and the invasion of the Ruhr region in January 1923. We employ regression specifications similar to Equation (4). We compare investors' response to inflation in the six months prior to each event to investors' response to inflation in the six months after each event. Local inflation is measured as the cumulative inflation rate over the six months preceding the respective event. For each event, we create a dummy variable that equals one after the event. Each of the four dummy variables is interacted with the respective cumulative local inflation variable. The coefficients of interest are the ones on the interaction terms as they capture investors' differential response to inflation around bad news. We report results in Table IA4 in the Internet Appendix. Across all specifications, the coefficient estimates on the interaction terms are never statistically significant, indicating that investors' response to inflation is uncorrelated with these events. Taken together, the results in this subsection suggest that our main findings are not driven by increases in investors' fear of deteriorating economic prospects of firms.

6.4.2 Do investors shy away from stocks because inflation increases risk aversion?

Next, we investigate whether clients buy less (sell more) stocks because higher inflation increases their risk aversion (e.g., Brandt and Wang, 2003; Cohen et al., 2005). The tests presented in Table IA4 in the Internet Appendix and discussed above enable us to also address this concern. Bad news most likely not only affected investors' expectations about economic prospects, but also their risk aversion. If high local inflation results in higher risk aversion, investors located in these areas should react less to bad news as their risk aversion is already high. However, as discussed above, we do not find a differential response to inflation around these events.

We perform an additional test to rule out that changes in risk aversion explain our findings. Inspired by Cohen et al. (2005), we analyze whether results vary across more and less risky stocks. If inflation increases risk aversion, we expect clients to primarily divest risky stocks. We capture stocks' riskiness by their return volatility and their market beta. We classify stocks as low-volatility (high-volatility) stocks if their return volatility over the past six months is equal to or below (above) the median. Moreover, we classify stocks as low-beta (high-beta) stocks if their market beta over the past three years is equal to or below (above) the median. We then rerun our main specification from Column 2 of Table 3 separately for low-volatility and high-volatility stocks and for low-beta and high-beta stocks. Results are presented in Columns 5 to 8 of Table 6. Coefficient estimates neither differ significantly for low-volatility and high-volatility stocks nor for low-beta and high-beta stocks. Thus, changes in risk aversion are unlikely to explain our results.

6.4.3 Do investors shy away from stocks to finance consumption?

Next, we consider the potential concern that investors sell stocks to finance consumption. Under this alternative explanation, clients are less likely to buy (more likely to sell) stocks if local inflation increases because goods for daily consumption become more expensive.

We address this concern in two ways. First, we investigate the relation between local inflation and clients' trades in bonds. If clients were to reduce their demand for stocks because of consumption needs, we would also expect them to reduce their demand for bonds, since bonds are inferior to stocks as a hedge against inflation. Like stocks, bonds protect against expected inflation, but unlike stocks, they do not protect against unexpected inflation. On the other hand, as suggested by Cohen et al. (2005), investors suffering from money illusion do not make the same valuation mistake when they value bonds. Thus, relative to stocks, bonds become more attractive for investors subject to money illusion. To test this conjecture, we replicate the main specifications from Tables 3 and 8 for bond trades. Results are reported in Table 9. Across all specifications, we find a positive relationship between local inflation and the buy-sell imbalance. In three specifications, the effect is also statistically significant at least at the 10% level. These results suggest that clients are more likely to buy (less likely to sell) bonds in periods of high inflation. This pattern is not consistent with investors reducing their demand for stocks to finance consumption in times of rising prices. Rather, it suggests that clients reallocate funds from stocks to bonds in inflationary periods.[27]

Second, we compare clients' stock trading behavior in months in which they receive dividends with months in which they do not receive any dividends. If clients liquidated stocks to finance their consumption when local prices rise, we would expect them to be less likely to reduce their stock exposure when they receive dividends. To test this hypothesis, we construct a dummy variable that equals one in months in which at least one stock in a client's portfolio pays a dividend, and zero otherwise. We then interact this dummy variable with our local inflation variable. If dividend payments alleviate financial constraints and reduce the need to sell stocks to finance consumption, the coefficient on the interaction term should be positive. We present the results in Table IA6 in the Internet Appendix. Across all specifications, the coefficient on the interaction term is negative and statistically significant. In line with previous results, this suggests that clients do not reduce their demand for stocks to finance consumption when local prices rise.

[27] In theory, investors could also buy bonds to protect against inflation. For instance, short-term bonds can provide a hedge against inflation if interest rates adjust quickly to changes in inflation. In Table IA5 in the Internet Appendix, we replicate Table 9 separately for short-term German government bonds and all other bonds, which tend to be longer term. We find most coefficient estimates to be positive. Results are statistically stronger for longer-term bonds than for short-term bonds.

6.4.4 Do investors shy away from stocks because they invest in other asset classes?

We also consider the possibility that the negative association between inflation and buy-sell imbalances is due to clients shifting their funds from stocks into other asset classes that potentially offer a hedge against inflation. We first evaluate potential investments in foreign exchange. Trading in foreign currencies was severely restricted during our sample period. This suggests that foreign exchange most likely did not offer a viable alternative to hedge against inflation.

Nevertheless, we run two tests to rule out this alternative explanation. First, we explore the relationship between local inflation and the buy-sell imbalance for securities denominated in foreign currencies. Even though trading in foreign exchange was restricted, we observe some trades in foreign securities. We replicate the main specifications from Tables 3 and 8 using the buy-sell imbalance for foreign securities as dependent variable. Results are shown in Table 10. We predominantly find negative coefficients on the local inflation variable that are never statistically significant at conventional levels. Hence, there is no evidence that clients reallocate funds from stocks to foreign securities.

Second, we investigate the relation between local inflation and the investment behavior of our clients around a regulatory change introduced on October 12, 1922, that essentially outlawed the use of any currency other than the *Mark* for all types of transactions (*Verordnung gegen die Spekulation in ausländischen Zahlungsmitteln*, *Reichsgesetzblatt* 1922, p. 796). Hence, transactions in foreign currencies became significantly more difficult, thereby reducing the set of investment opportunities and making stocks a relatively more attractive hedging instrument. If investors were actively trading foreign exchange to hedge against inflation, they should buy more (sell less) stocks after the regulatory change and we would expect a more positive association between local inflation and buy-sell imbalances for stocks. This effect should be stronger for clients living in towns with higher local inflation. To test this conjecture, we again employ a regression specification similar to Equation (4). We present the results in Column 1 of Table IA7 in the Internet Appendix. We do not find a significant change in the investment behavior of clients around October 1922, suggesting that clients' trading in stocks did not change following the restrictions to trade foreign currencies.

Next, we evaluate whether clients shift assets from stocks to real estate to protect against inflation. The housing market was also highly regulated during our sample period. This resulted in negative real returns, suggesting that real estate investments did not offer protection against inflation. Nevertheless, we also run a test to rule out that investors sold stocks to acquire real estate. In March 1922, the German government introduced a new law that softened the cap on rents and increased the relative attractiveness of real estate investments (*Reichsmietengesetz*, *Reichsgesetzblatt* 1922, p. 273). If investors actively invested in real estate to hedge against inflation, they should buy less (sell more) stocks after the deregulation of the housing market and we would expect a more negative association between local inflation and buy-sell imbalances for stocks after March 1922. This effect should be stronger for clients with higher inflation expectations. To test this prediction, we again employ a regression specification similar to Equation (4). Results are presented in Column 2 of Table IA7 in the Internet Appendix. We do not find a significant change in the investment behavior of clients around this regulatory change, suggesting that investments in real estate were also not a viable alternative to hedge against inflation. Hence, the results in this subsection do not support the conjecture that investors reduce their exposure to stocks to invest in other asset classes that offer a hedge against inflation.

6.4.5 Instrumental variables regressions

In a final test to address the concern that local inflation may be correlated with unobservable determinants of stockholdings, we run instrumental variables regressions that exploit quasi-exogenous variation in local inflation. Results from these regressions lend support to a causal interpretation of our findings. We discuss this test in detail in Internet Appendix D.

6.5 The second money illusion hypothesis

We also test for the second form of money illusion of Modigliani and Cohn (1979). This form of money illusion predicts that investors reduce their demand for stocks of firms that are exposed to increasing inflation and increasing net leverage. As discussed in detail in Internet Appendix E, we find results consistent with this prediction.

7 Conclusion

In this paper, we study the relationship between inflation and individual investors' decision-making. There are conflicting theories on how inflation affects investors' behavior. We test these competing hypotheses using a unique dataset containing all trades of private clients of a German bank between 1920 and 1924, covering the hyperinflation. We find that investors buy less (sell more) stocks when local inflation rises. This effect is more pronounced for investors considered unsophisticated by the extant literature. The relation between local inflation and clients' buy-sell imbalances is also more negative for stocks where money illusion is more likely. Moreover, we find a positive relation between local inflation and foregone returns following stock sales. Overall, our results are in line with individual investors suffering from money illusion as in Modigliani and Cohn (1979). Additional tests indicate that our findings are unlikely to be driven by investors using local inflation as a proxy for future economic outcomes, by investors' risk aversion increasing with local inflation, by investors liquidating stocks to meet consumption needs, and by investors shifting to other asset classes also offering a hedge against inflation.

To the best of our knowledge, our paper is the first to document empirically that individual investors' behavior is consistent with money illusion. Thus, our results are of particular importance in light of the ongoing debate on the financial literacy of individuals. As highlighted in the introduction, individuals might not be financially literate enough to respond appropriately to the resurfacing inflation currently observed.

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Tables

Table 1: Descriptive statistics

This table presents descriptive statistics on client characteristics (Panel A), portfolio characteristics (Panel B), trade characteristics (Panel C), firm characteristics (Panel D), and local inflation (Panel E). We focus on the time period from January 1920 to December 1924. For time-varying variables, we report averages, except for Panel E, where we report monthly observations. In Panel D, the sample includes firms whose stocks the clients trade. In Panel E, the sample includes towns where at least one client lives or where at least one firm is headquartered. We assign clients and firms to the closest town for which we have inflation data within a 25 km radius based on the place of residence and the location of headquarters, respectively. Internet Appendix A provides detailed descriptions of all variables used throughout the study.

	Mean	Min.	Median	Max.	Std. dev.	N
Panel A: Client characteristics						
Male (d)	0.72	0.00	1.00	1.00	0.45	2,262
Germany (d)	0.89	0.00	1.00	1.00	0.31	2,260
Europe (d)	0.97	0.00	1.00	1.00	0.18	2,260
Other bank account (d)	0.09	0.00	0.00	1.00	0.29	2,262
Panel B: Portfolio characteristics						
Avg. # securities	3.12	1.00	1.53	60.88	4.44	2,262
Avg. % stocks	48.70	0.00	50.00	100.00	42.56	2,262
Avg. % bonds	31.91	0.00	4.59	100.00	40.54	2,262
Avg. % foreign exchange	13.44	0.00	0.00	100.00	28.21	2,262
Panel C: Trade characteristics						
Avg. # trades per month	0.78	0.00	0.50	16.22	1.03	2,262
Avg. % buys	54.21	0.00	50.00	100.00	22.55	2,225
Avg. % stock trades	51.21	0.00	58.82	100.00	41.84	2,225
Avg. % bond trades	30.33	0.00	4.44	100.00	39.65	2,225
Avg. % foreign exchange trades	13.36	0.00	0.00	100.00	27.42	2,225
Avg. buy-sell imbalance for stocks	0.18	-1.00	0.11	1.00	0.40	1,508
Avg. buy-sell imbalance for bonds	0.07	-1.00	0.00	1.00	0.53	1,172
Avg. buy-sell imbalance for foreign exchange	0.07	-1.00	0.00	1.00	0.52	817
Panel D: Firm characteristics						
Avg. net leverage (%)	14.31	-88.89	14.05	89.86	24.02	623
Avg. Δ net leverage (%)	1.10	-74.71	0.10	92.50	16.11	584
Panel E: Local inflation						
Raw local inflation (%)	537.92	-12.36	8.63	35,117.90	3,746.72	13,112

Table 2: Determinants of local inflation

This table presents the results from panel regressions with year-month and town fixed effects. The dependent variable is the inverse hyperbolic sine of local inflation of town c in month t. We focus on the time period from January 1920 to September 1923 and on towns where at least one client lives or where at least one firm is headquartered. We assign clients and firms to the closest town for which we have inflation data within a 25 km radius based on the place of residence and the location of headquarters, respectively. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Local inflation$_{c,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(local population)$_{c,1919}$	0.021*					0.016	
	(1.69)					(1.67)	
Occupied (d)$_{c,t}$		0.081**				0.073*	0.029*
		(2.20)				(1.86)	(1.89)
Local unemployment rate$_{c,t}$			-6.387***			-6.471***	-0.084
			(-3.28)			(-3.17)	(-0.56)
German Central Bank (d)$_{c,1920}$				0.065*		0.013	
				(1.73)		(0.48)	
% local employees in paper$_{c,1921}$					0.116***	0.162*	
					(3.28)	(1.81)	
Year-month fixed effects	No	No	No	No	No	No	Yes
Town fixed effects	No	No	No	No	No	No	Yes
Adj. R^2	0.001	0.001	0.008	0.001	-0.000	0.010	0.986
N	10,634	10,634	9,629	10,634	10,634	9,629	9,629

Table 3: Local inflation and stock trades

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. In Column 5 (Column 6), we restrict the sample to the time period from January 1920 to June 1922 (July 1922 to September 1923). The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$					
					Jan. 1920–Jun. 1922	Jul. 1922–Sep. 1923
	(1)	(2)	(3)	(4)	(5)	(6)
Local inflation$_{i,t}$	-0.536**	-0.650**		-0.548**	-0.990*	-0.584**
	(-2.48)	(-2.63)		(-2.07)	(-1.83)	(-2.42)
Local inflation$_{i,t-1,t}$			-0.353**			
			(-2.57)			
Occupied (d)$_{i,t}$				-0.484*		
				(-1.93)		
Local unemployment rate$_{i,t}$				-2.188		
				(-0.74)		
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.036	0.036	0.035	0.037	0.021	0.055
N	8,057	8,057	7,961	7,962	3,394	4,663

Table 4: Local inflation and stock trades around the currency reform

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period starting six months prior to the currency reform and ending six months after the currency reform. In Column 2, the sample includes all clients who live in Germany and all clients who live in neighboring countries. The variable *Local inflation* is the inverse hyperbolic sine of cumulative local inflation of the town where the client lives over the six months preceding the currency reform. The variable *Post reform (d)* equals one after Germany reforms its currency (October 1923 onwards), and zero otherwise. The variable *Germany (d)* equals one for clients who live in Germany, and zero otherwise. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$	
	(1)	(2)
Local inflation$_{i,Apr.-Sep.\ 1923}$ × Post reform (d)$_t$	0.365*	
	(1.89)	
Germany (d)$_i$ × Post reform (d)$_t$		0.339***
		(3.53)
Year-month fixed effects	Yes	Yes
Client fixed effects	Yes	Yes
Adj. R^2	0.081	0.088
N	3,544	3,891

Table 5: Local inflation, client characteristics, and stock trades

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. The variable *Wealthy (d)* equals one (zero) if the client's portfolio market value in January 1920 is above (equal to or below) the median. The variable *Diversified (d)* equals one (zero) if the client's number of different stocks in the portfolio in January 1920 is above (equal to or below) the median. The variable *Bank employee (d)* equals one for clients who are employees of the bank, and zero otherwise. The variable *Levered (d)* equals one for clients with a levered portfolio, and zero otherwise. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{i,t}$	-0.748***	-0.784***	-0.674***	-0.683***
	(-2.82)	(-3.04)	(-2.72)	(-2.80)
Local inflation$_{i,t}$ × Wealthy (d)$_{i,Jan.\ 1920}$	0.035***			
	(4.29)			
Local inflation$_{i,t}$ × Diversified (d)$_{i,Jan.\ 1920}$		0.095***		
		(5.83)		
Local inflation$_{i,t}$ × Bank employee (d)$_{i}$			0.085***	
			(6.61)	
Local inflation$_{i,t}$ × Levered (d)$_{i}$				0.053***
				(3.86)
Year-month fixed effects	Yes	Yes	Yes	Yes
Client fixed effects	Yes	Yes	Yes	Yes
Adj. R^2	0.078	0.080	0.038	0.036
N	3,561	3,561	8,057	8,057

Table 6: Local inflation, stock characteristics, and stock trades

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client i in month t. We focus on the time period from January 1920 to September 1923. In Column 1 (Column 2), we restrict the sample to trades in low-yield (high-yield) stocks. We classify stocks as low-yield (high-yield) stocks if their average dividend yield over the past three months is equal to or below (above) the median. In Column 3 (Column 4), we restrict the sample to trades in high-tech (low-tech) stocks. We classify chemical companies, electric power companies, and machine building companies as high-tech firms and companies active in other industries as low-tech firms. In Column 5 (Column 6), we restrict the sample to trades in low-volatility (high-volatility) stocks. We classify stocks as low-volatility (high-volatility) stocks if their return volatility over the past six months is equal to or below (above) the median. In Column 7 (Column 8), we restrict the sample to trades in low-beta (high-beta) stocks. We classify stocks as low-beta (high-beta) stocks if their market beta over the past three years is equal to or below (above) the median. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for $\text{stocks}_{i,t}$							
	Low-yield stocks	High-yield stocks	High-tech stocks	Low-tech stocks	Low-volatility stocks	High-volatility stocks	Low-beta stocks	High-beta stocks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local $\text{inflation}_{i,t}$	-1.645***	-0.397	-1.420***	-0.450	-0.912**	-0.792**	-0.346	-0.413
	(-3.85)	(-1.10)	(-3.72)	(-1.24)	(-2.03)	(-2.14)	(-0.40)	(-0.79)
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Client fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	-0.019	-0.004	-0.013	-0.021	0.046	0.021	-0.094	-0.009
N	2,671	3,107	2,809	4,035	2,269	2,602	1,215	1,886
F-statistic (p-value) of difference in coefficients	5.037 (0.027)		3.453 (0.066)		0.044 (0.835)		0.005 (0.946)	

Table 7: Local inflation and the performance of stock sales

This table presents the results from panel regressions with year-month, firm, and client fixed effects. The dependent variable is either the 3-month real return following the sale of stock j by client i in month t (Columns 1 to 3) or the 6-month real return following the sale of stock j by client i in month t (Column 4). We focus on trades executed between January 1920 and September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Real return of individual stock sale$_{i,j,t+1,t+3}$			Real return of individual stock sale$_{i,j,t+1,t+6}$
	(1)	(2)	(3)	(4)
Local inflation$_{i,t}$	1.459*	1.656*	1.159	0.261
	(1.83)	(1.94)	(1.26)	(0.17)
Year-month fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	Yes	Yes	Yes
Client fixed effects	No	No	Yes	Yes
Adj. R^2	0.307	0.457	0.482	0.374
N	4,585	4,585	4,585	4,569

Table 8: Local inflation and individual stock trades

This table presents the results from panel regressions with client and security-year-month fixed effects. The dependent variable is the buy-sell imbalance for stock *j* of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for individual stocks$_{i,j,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Local inflation$_{i,t}$	-0.364**	-0.570***	-0.614***	-0.514***		-0.492**
	(-2.10)	(-3.48)	(-3.90)	(-3.08)		(-2.44)
Local inflation$_{i,t-1,t}$					-0.296**	
					(-2.30)	
Occupied (d)$_{i,t}$						-0.312
						(-1.10)
Local unemployment rate$_{i,t}$						-7.510**
						(-2.30)
Year-month fixed effects	Yes	Yes	Yes	No	No	No
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes
Security fixed effects	No	No	Yes	No	No	No
Security-year-month fixed effects	No	No	No	Yes	Yes	Yes
Adj. R^2	0.026	0.032	0.038	0.330	0.331	0.329
N	15,189	15,189	15,189	15,189	14,986	15,051

Table 9: Local inflation and bond trades

This table presents the results from panel regressions with year-month and client fixed effects. In Columns 1 to 4, the dependent variable is the buy-sell imbalance for bonds of client i in month t. In Columns 5 to 7, the dependent variable is the buy-sell imbalance for bond j of client i in month t. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for bonds$_{i,t}$				Buy-sell imbalance for individual bonds$_{i,j,t}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Local inflation$_{i,t}$	0.085	0.413		0.391	0.836*		1.134**
	(0.21)	(1.11)		(1.01)	(1.98)		(2.22)
Local inflation$_{i,t-1,t}$			0.473			0.759**	
			(1.66)			(2.56)	
Occupied (d)$_{i,t}$				0.579***			-0.147
				(7.84)			(-0.83)
Local unemployment rate$_{i,t}$				1.023			-0.176
				(0.23)			(-0.03)
Year-month fixed effects	Yes	Yes	Yes	Yes	No	No	No
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Security-year-month fixed effects	No	No	No	No	Yes	Yes	Yes
Adj. R^2	0.026	0.065	0.075	0.068	0.424	0.433	0.424
N	4,406	4,406	4,321	4,296	5,191	5,056	5,076

Table 10: Local inflation and trades in securities denominated in foreign currencies

This table presents the results from panel regressions with year-month and client fixed effects. In Columns 1 to 4, the dependent variable is the buy-sell imbalance for securities denominated in foreign currencies of client i in month t. In Columns 5 to 7, the dependent variable is the buy-sell imbalance for security j denominated in foreign currency of client i in month t. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for foreign exchange$_{i,t}$				Buy-sell imbalance for individual foreign exchange$_{i,j,t}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Local inflation$_{i,t}$	-0.301	-0.486		-0.501	-0.937		-0.966
	(-0.50)	(-0.50)		(-0.52)	(-1.12)		(-1.15)
Local inflation$_{i,t-1,t}$			0.214			-0.461	
			(0.30)			(-0.56)	
Occupied (d)$_{i,t}$				-0.645*			0.000
				(-1.97)			(0.00)
Local unemployment rate$_{i,t}$				2.334			6.313
				(0.32)			(0.52)
Year-month fixed effects	Yes	Yes	Yes	Yes	No	No	No
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Security-year-month fixed effects	No	No	No	No	Yes	Yes	Yes
Adj. R^2	0.060	-0.058	-0.062	-0.061	0.194	0.197	0.196
N	1,868	1,868	1,837	1,855	1,550	1,527	1,542

Figures

Figure 1: Local inflation and stock trades

This figure shows the average monthly buy-sell imbalance for stocks of clients experiencing different local inflation. We focus on the time period from January 1920 to September 1923. Each month, we sort towns into deciles based on their local inflation. We assign clients to the closest town for which we have inflation data within a 25 km radius based on the place of residence. Internet Appendix A provides detailed descriptions of all variables used throughout the study. The figure shows point estimates together with 99% confidence intervals.

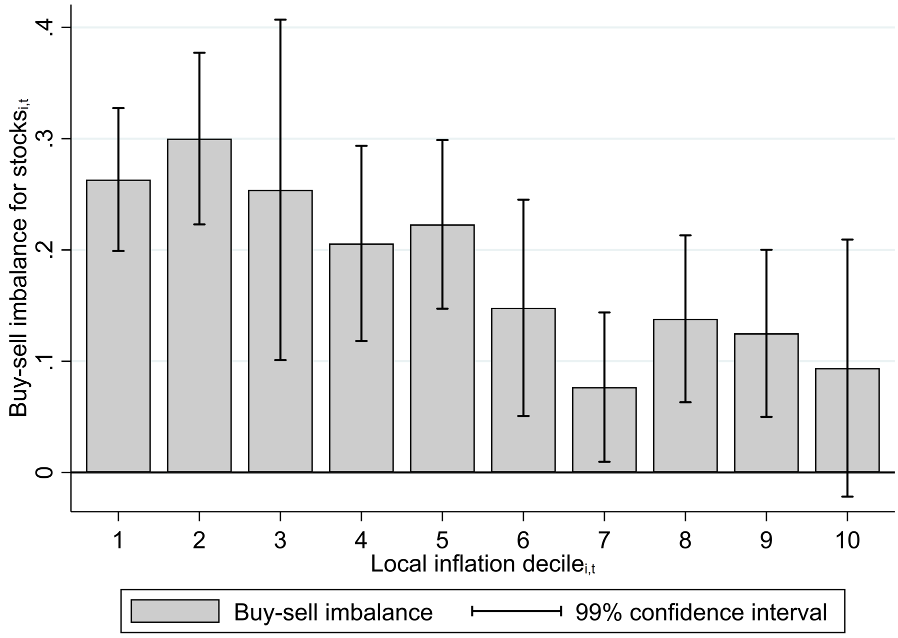


Figure 2: Nominal prices

This figure shows the German consumer price index (CPI), the German stock market index, the dollar/*Mark* exchange rate, the price of one of the most liquid German government bonds, and German real estate prices in nominal terms between February 1920 and September 1923. All time-series are normalized to 1 in February 1920.

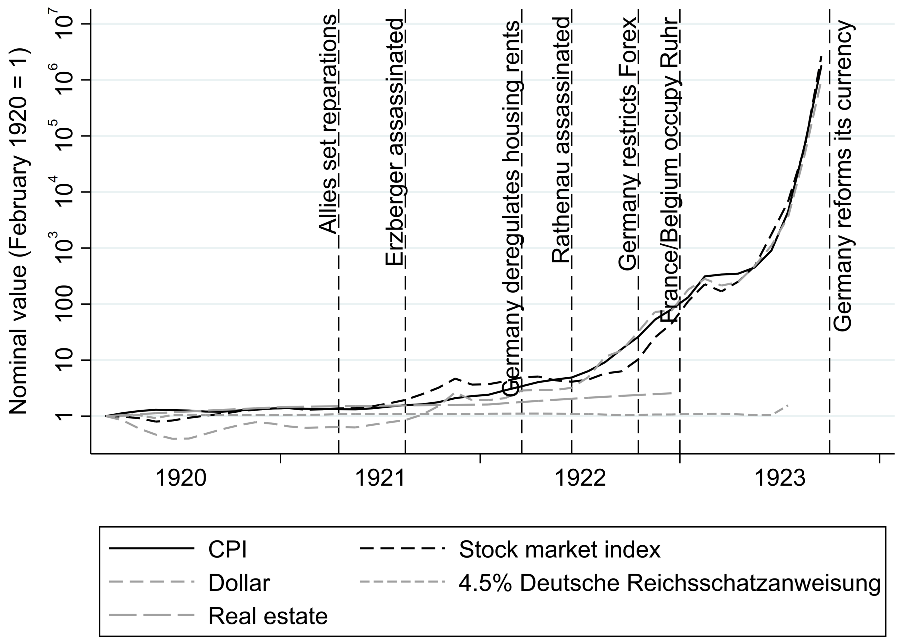
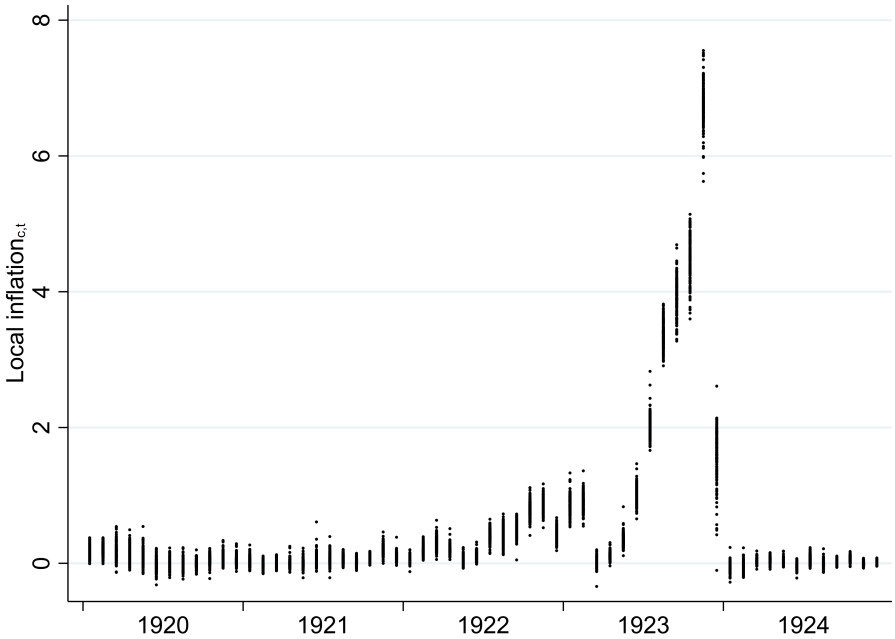


Figure 3: Local inflation

This figure shows the inverse hyperbolic sine of monthly local inflation for towns where at least one client lives or where at least one firm is headquartered between January 1920 and December 1924. Each dot represents the monthly local inflation rate of one town. We assign clients and firms to the closest town for which we have inflation data within a 25 km radius based on the place of residence and the location of headquarters, respectively. Internet Appendix A provides detailed descriptions of all variables used throughout the study.



Internet Appendix to
“Inflation and Individual Investors’ Behavior: Evidence from the German Hyperinflation”

Internet Appendix A: Variable descriptions

Variable	Description
Client characteristics	
Male (d)	Dummy variable that equals one for male clients and zero for female clients
Germany (d)	Dummy variable that equals one for clients who live in Germany, and zero otherwise
Europe (d)	Dummy variable that equals one for clients who live in Europe, and zero otherwise
Other bank account (d)	Dummy variable that equals one for clients who report to have an account at another bank, and zero otherwise
Bank employee (d)	Dummy variable that equals one for clients who are employees of the bank, and zero otherwise
Portfolio characteristics	
# securities	Number of different securities in the client's portfolio at the end of the month
# stocks	Number of different stocks denominated in *Mark* in the client's portfolio at the end of the month
# bonds	Number of different bonds denominated in *Mark* in the client's portfolio at the end of the month
# foreign exchange	Number of different securities denominated in foreign currencies in the client's portfolio at the end of the month
% stocks	$\frac{\#\ stocks}{\#\ securities}$
% bonds	$\frac{\#\ bonds}{\#\ securities}$
% foreign exchange	$\frac{\#\ foreign\ exchange}{\#\ securities}$
Wealthy (d)	Dummy variable that equals one (zero) if the client's portfolio market value in January 1920 is above (equal to or below) the median
Diversified (d)	Dummy variable that equals one (zero) if the client's number of different stocks in the portfolio in January 1920 is above (equal to or below) the median
Levered (d)	Dummy variable that equals one for clients with a levered portfolio, and zero otherwise
Dividend (d)	Dummy variable that equals one in months in which at least one stock in the client's portfolio pays a dividend, and zero otherwise
Trade characteristics	
# trades per month	Number of trades in the client's portfolio per month
# buys	Number of buys in the client's portfolio per month
# sells	Number of sells in the client's portfolio per month
# stock trades	Number of trades in stocks denominated in *Mark* in the client's portfolio per month
# bond trades	Number of trades in bonds denominated in *Mark* in the client's portfolio per month
# foreign exchange trades	Number of trades in securities denominated in foreign currencies in the client's portfolio per month

% buys	$\frac{\# \, buys}{\# \, trades \, per \, month}$
% stock trades	$\frac{\# \, stock \, trades}{\# \, trades \, per \, month}$
% bond trades	$\frac{\# \, bond \, trades}{\# \, trades \, per \, month}$
% foreign exchange trades	$\frac{\# \, foreign \, exchange \, trades}{\# \, trades \, per \, month}$
Buy-sell imbalance for stocks	$\frac{\# \, stock \, buys \, per \, month - \# \, stock \, sells \, per \, month}{\# \, stock \, buys \, per \, month + \# \, stock \, sells \, per \, month}$
Buy-sell imbalance for bonds	$\frac{\# \, bond \, buys \, per \, month - \# \, bond \, sells \, per \, month}{\# \, bond \, buys \, per \, month + \# \, bond \, sells \, per \, month}$
Buy-sell imbalance for foreign exchange	$\frac{\# \, foreign \, exchange \, buys \, per \, month - \# \, foreign \, exchange \, sells \, per \, month}{\# \, foreign \, exchange \, buys \, per \, month + \# \, foreign \, exchange \, sells \, per \, month}$
Firm characteristics	
% nominal liabilities	$\frac{Total \, assets \, at \, the \, end \, of \, the \, last \, fiscal \, year - Equity \, at \, the \, end \, of \, the \, last \, fiscal \, year}{Total \, assets \, at \, the \, end \, of \, the \, last \, fiscal \, year}$
% nominal assets	$\frac{Nominal \, assets \, at \, the \, end \, of \, the \, last \, fiscal \, year}{Total \, assets \, at \, the \, end \, of \, the \, last \, fiscal \, year}$
Net leverage	$\% \, nominal \, liabilities - \% \, nominal \, assets$
Δ Net leverage	$Net \, leverage \, at \, the \, end \, of \, the \, last \, fiscal \, year - Net \, leverage \, at \, the \, end \, of \, the \, second \, to \, last \, fiscal \, year$
Assets	Total assets at the end of the last fiscal year
Log(assets)	$Ln(assets + 1)$
Profitability	$\frac{Profit \, or \, loss \, in \, the \, last \, fiscal \, year}{Total \, assets \, at \, the \, end \, of \, the \, last \, fiscal \, year}$
Nominal stock return	$\frac{Stock \, price \, at \, the \, end \, of \, the \, current \, month}{Stock \, price \, at \, the \, end \, of \, the \, previous \, month} - 1$; we winsorize nominal stock returns at the 1% level and the 99% level
Real stock return	$\frac{1 + Nominal \, stock \, return}{1 + National \, inflation} - 1$; we winsorize real stock returns at the 1% level and the 99% level
Local inflation	
Raw local inflation	$\frac{Local \, consumer \, price \, index \, at \, the \, end \, of \, the \, current \, month}{Local \, consumer \, price \, index \, at \, the \, end \, of \, the \, previous \, month} - 1$; we winsorize inflation at the 1% level and the 99% level
Local inflation	$Ln(raw \, local \, inflation + \sqrt{raw \, local \, inflation^2 + 1})$ (inverse hyperbolic sine)
Log(local inflation)	$Ln(raw \, local \, inflation + 1)$; we set inflation to zero in months with negative inflation
Local inflation decile	Towns are sorted into deciles each month based on their local inflation
Town characteristics	
Log(local population)	$Ln(local \, \# \, inhabitants \, according \, to \, the \, census \, in \, October \, 1919 + 1)$
Occupied (d)	Dummy variable that equals one for towns occupied by France or Belgium, and zero otherwise
Local unemployment rate	$\frac{Local \, \# \, unemployed \, at \, the \, end \, of \, the \, month}{Local \, \# \, inhabitants \, according \, to \, the \, census \, in \, October \, 1919}$; we impute the unemployment rate by using the past unemployment rate of the town or the current unemployment rate of the state in which the town is located
German Central Bank (d)	Dummy variable that equals one for towns with a branch of the German Central Bank, and zero otherwise
% local employees in paper	$\frac{Local \, \# \, employees \, working \, in \, the \, paper \, industry \, in \, 1921}{Local \, \# \, employees \, in \, 1921}$

Major events and regulatory changes	
Post reparations (d)	Dummy variable that equals one after the Allies set the reparations to be paid by Germany (May 1921 onwards), and zero otherwise
Post Erzberger (d)	Dummy variable that equals one after the assassination of the German finance minister Matthias Erzberger (August 1921 onwards), and zero otherwise
Post housing (d)	Dummy variable that equals one after Germany allows landlords to increase housing rents (March 1922 onwards), and zero otherwise
Post Rathenau (d)	Dummy variable that equals one after the assassination of the German foreign minister Walther Rathenau (June 1922 onwards), and zero otherwise
Post Forex (d)	Dummy variable that equals one after Germany restricts trading in foreign exchange (October 1922 onwards), and zero otherwise
Post Ruhr (d)	Dummy variable that equals one after France and Belgium occupy the Ruhr region (January 1923 onwards), and zero otherwise
Post reform (d)	Dummy variable that equals one after Germany reforms its currency (October 1923 onwards), and zero otherwise

Internet Appendix B: Tables and figures

Table IA1: Local inflation and stock trades – Robustness tests

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is either the buy-sell imbalance for stocks of client i in month t (Columns 1, 2, 3, and 7), the buy-sell imbalance for stocks of client i in month t set to zero in months without any transactions (Column 4), the buy-sell imbalance for stocks of client i in month t based on the value of stock trades (in face value terms) (Column 5), or the natural logarithm of the portfolio face value of stocks of client i at the end of month t (Column 6). We focus on the time period from January 1920 to September 1923. In Column 7, we extend the sample by accounts for which we cannot clearly identify the person responsible for the investment decisions. The variable *Raw local inflation* is the local inflation of the town where the client lives winsorized at the 1% level and the 99% level. The variable *Log(local inflation)* is the natural logarithm of local inflation of the town where the client lives set to zero in months with negative inflation. The variable *Local inflation decile* is the local inflation decile of the town where the client lives. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			Buy-sell imbalance for stocks$_{i,t}$ (set to zero in months with no trades)	Buy-sell imbalance for stocks$_{i,t}$ (based on value of trades)	Log(portfolio face value of stocks)$_{i,t}$	Buy-sell imbalance for stocks$_{i,t}$ (extended sample)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Raw local inflation$_{i,t}$	-0.024***						
	(-3.07)						
Log(local inflation)$_{i,t}$		-0.770**					
		(-2.64)					
Local inflation decile$_{i,t}$			-0.017**				
			(-2.39)				
Local inflation$_{i,t}$				-0.137**	-0.591**	-0.731***	-0.564**
				(-2.49)	(-2.60)	(-3.05)	(-2.35)
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Client fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.035	0.036	0.036	0.019	0.025	0.666	0.043
N	8,057	8,057	8,057	36,175	8,057	36,175	10,204

Table IA2: Weekly local inflation and stock trades

This table presents the results from panel regressions with year-month-week and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client i in week t. We focus on the time period from July 12, 1923 to October 15, 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and week level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$	
	(1)	(2)
Local inflation$_{i,t}$	-0.622	-1.306*
	(-1.46)	(-2.34)
Local inflation$_{i,t-1}$	-0.177	-2.203
	(-0.16)	(-1.74)
Local inflation$_{i,t-2}$	-0.064	-1.606**
	(-0.13)	(-3.40)
Local inflation$_{i,t-3}$	-0.254	-3.049**
	(-0.19)	(-3.11)
Local inflation$_{i,t-4}$	-0.129	-3.643*
	(-0.22)	(-1.96)
Local inflation$_{i,t-5}$	0.278	-1.116*
	(0.20)	(-2.06)
Local inflation$_{i,t-6}$	-0.160	-0.515
	(-0.25)	(-0.61)
Local inflation$_{i,t-7}$	1.258	-1.177
	(1.34)	(-0.80)
Year-month-week fixed effects	Yes	Yes
Client fixed effects	No	Yes
Adj. R^2	0.008	0.141
N	831	831

Table IA3: Local inflation and stock trades of institutional clients

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of institutional client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the institutional client is located. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{i,t}$	0.139	0.328*		0.281
	(0.49)	(1.82)		(1.54)
Local inflation$_{i,t-1,t}$			0.476*	
			(1.69)	
Occupied (d)$_{i,t}$				0.228
				(1.54)
Local unemployment rate$_{i,t}$				3.469
				(0.60)
Year-month fixed effects	Yes	Yes	Yes	Yes
Client fixed effects	No	Yes	Yes	Yes
Adj. R^2	0.040	0.098	0.095	0.107
N	1,081	1,081	1,071	1,058

Table IA4: Local inflation and stock trades around major events

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client i in month t. We focus on the time period starting six months prior to each event and ending six months after each event. The variable *Local inflation* is the inverse hyperbolic sine of cumulative local inflation of the town where the client lives over the six months preceding each event. The variable *Post reparations (d)* equals one after the Allies set the reparations to be paid by Germany (May 1921 onwards), and zero otherwise. The variable *Post Erzberger (d)* equals one after the assassination of the German finance minister Matthias Erzberger (August 1921 onwards), and zero otherwise. The variable *Post Rathenau (d)* equals one after the assassination of the German foreign minister Walther Rathenau (June 1922 onwards), and zero otherwise. The variable *Post Ruhr (d)* equals one after France and Belgium occupy the Ruhr region (January 1923 onwards), and zero otherwise. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{i,Nov.-Apr.\ 1921}$ × Post reparations (d)$_t$	0.758			
	(0.72)			
Local inflation$_{i,Feb.-Jul.\ 1921}$ × Post Erzberger (d)$_t$		0.063		
		(0.07)		
Local inflation$_{i,Dec.\ 1921-May\ 1922}$ × Post Rathenau (d)$_t$			1.016	
			(0.95)	
Local inflation$_{i,Jul.-Dec.\ 1922}$ × Post Ruhr (d)$_t$				0.368
				(0.27)
Year-month fixed effects	Yes	Yes	Yes	Yes
Client fixed effects	Yes	Yes	Yes	Yes
Adj. R^2	0.032	0.062	0.068	0.068
N	1,337	1,367	1,629	3,204

Table IA5: Local inflation and trades in short-term and long-term bonds

This table presents the results from panel regressions with year-month, client, and security-year-month fixed effects. In Columns 1 to 4, the dependent variable is the buy-sell imbalance for bonds of client i in month t. In Columns 5 to 7, the dependent variable is the buy-sell imbalance for bond j of client i in month t. In Panel A (Panel B), we restrict the sample to trades in short-term German government bonds (other bonds). We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Short-term German government bonds

	Buy-sell imbalance for short-term bonds$_{i,t}$				Buy-sell imbalance for individual short-term bonds$_{i,j,t}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Local inflation$_{i,t}$	-0.156	-0.074		0.188	0.028		0.268
	(-0.51)	(-0.26)		(0.49)	(0.10)		(0.74)
Local inflation$_{i,t-1,t}$			0.407			0.350	
			(1.55)			(1.34)	
Occupied (d)$_{i,t}$				0.503*			0.844*
				(2.05)			(1.76)
Local unemployment rate$_{i,t}$				-1.387			1.158
				(-0.16)			(0.14)
Year-month fixed effects	Yes	Yes	Yes	Yes	No	No	No
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Security-year-month fixed effects	No	No	No	No	Yes	Yes	Yes
Adj. R^2	0.071	0.020	0.026	0.017	0.116	0.116	0.116
N	2,060	2,060	2,041	1,998	3,178	3,144	3,115

Panel B: Other bonds

	Buy-sell imbalance for other bonds$_{i,t}$				Buy-sell imbalance for individual other bonds$_{i,j,t}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Local inflation$_{i,t}$	0.218	0.483		0.405	1.893**		2.047**
	(0.40)	(0.90)		(0.78)	(2.41)		(2.52)
Local inflation$_{i,t-1,t}$			0.335			1.067	
			(0.99)			(1.55)	
Occupied (d)$_{i,t}$				0.657***			-0.256
				(6.39)			(-0.88)
Local unemployment rate$_{i,t}$				2.598			4.613
				(0.49)			(0.52)
Year-month fixed effects	Yes	Yes	Yes	Yes	No	No	No
Client fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Security-year-month fixed effects	No	No	No	No	Yes	Yes	Yes
Adj. R^2	0.062	0.074	0.083	0.077	0.310	0.304	0.302
N	2,569	2,569	2,500	2,521	3,865	3,758	3,809

Table IA6: Local inflation, dividend payments, and stock trades

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. The variable *Dividend (d)* equals one in months in which at least one stock in the client's portfolio pays a dividend, and zero otherwise. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{i,t}$	-0.533**	-0.637**		-0.533*
	(-2.49)	(-2.58)		(-2.02)
Local inflation$_{i,t-1,t}$			-0.344**	
			(-2.50)	
Dividend (d)$_{i,t}$	0.105***	0.121***	0.120***	0.126***
	(4.01)	(7.02)	(6.69)	(5.52)
Local inflation$_{i,t}$ × Dividend (d)$_{i,t}$	-0.060***	-0.061**		-0.065**
	(-2.88)	(-2.53)		(-2.50)
Local inflation$_{i,t-1,t}$ × Dividend (d)$_{i,t}$			-0.035**	
			(-2.09)	
Occupied (d)$_{i,t}$				-0.472*
				(-1.93)
Local unemployment rate$_{i,t}$				-2.224
				(-0.73)
Year-month fixed effects	Yes	Yes	Yes	Yes
Client fixed effects	No	Yes	Yes	Yes
Adj. R^2	0.037	0.037	0.036	0.039
N	8,057	8,057	7,961	7,962

Table IA7: Local inflation and stock trades around regulatory changes

This table presents the results from panel regressions with year-month and client fixed effects. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period starting six months prior to each regulatory change and ending six months after each regulatory change. The variable *Local inflation* is the inverse hyperbolic sine of cumulative local inflation of the town where the client lives over the six months preceding each regulatory change. The variable *Post Forex (d)* equals one after Germany restricts trading in foreign exchange (October 1922 onwards), and zero otherwise. The variable *Post housing (d)* equals one after Germany allows landlords to increase housing rents (March 1922 onwards), and zero otherwise. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$	
	(1)	(2)
Local inflation$_{i,Apr.-Sep.\ 1922}$ × Post Forex (d)$_t$	1.032	
	(0.96)	
Local inflation$_{i,Sep.\ 1921-Feb.\ 1922}$ × Post housing (d)$_t$		-0.348
		(-0.55)
Year-month fixed effects	Yes	Yes
Client fixed effects	Yes	Yes
Adj. R^2	0.083	0.029
N	2,212	1,630

Table IA8: Instrumental variables regressions

This table presents the second-stage results from two-stage least squares instrumental variables regressions. The dependent variable is the buy-sell imbalance for stocks of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the client lives. In Columns 1 and 2, the instrument for local inflation is the fraction of local employees working in the paper industry in 1921. In Columns 3 and 4, the instrument for local inflation is a dummy variable that equals one for towns with an above median fraction of local employees working in the paper industry in 1921, and zero otherwise. We report coefficients on the instruments from the first-stage regression at the bottom of the table. All regressions include the town characteristics *Log(local population)*$_{i,1919}$, *Occupied (d)*$_{i,t}$, *Local unemployment rate*$_{i,t}$, and *German Central Bank (d)*$_{i,1920}$ as control variables. In Columns 2 and 4, we additionally include the client characteristics *Male (d)*$_i$, *Other bank account (d)*$_i$, *Bank employee (d)*$_i$, and *Levered (d)*$_i$ as control variables. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for stocks$_{i,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{i,t}$	-4.918*	-4.686*	-4.479**	-4.273**
	(-1.86)	(-1.78)	(-2.62)	(-2.61)
First-stage instrument				
% local employees in paper$_{i,1921}$	1.312***	1.307***		
	(3.46)	(3.46)		
High % local employees in paper (d)$_{i,1921}$			0.054***	0.054***
			(3.40)	(3.39)
Year-month fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Town characteristics	Yes	Yes	Yes	Yes
Client characteristics	No	Yes	No	Yes
N	7,956	7,956	7,956	7,956
F-statistic of first-stage regression	12.199	12.198	11.999	11.939

Table IA9: The second money illusion hypothesis

This table presents the results from panel regressions with client-year-month and firm fixed effects. The dependent variable is the buy-sell imbalance for stock *j* of client *i* in month *t*. We focus on the time period from January 1920 to September 1923. The variable *Local inflation* is the inverse hyperbolic sine of local inflation of the town where the firm is headquartered. The variable *Net leverage* is the difference between nominal liabilities and nominal assets at the end of the last fiscal year divided by total assets at the end of the last fiscal year. The variable Δ *Net leverage* is the change in net leverage from the end of the second-to-last fiscal year to the end of the last fiscal year. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the town and month level. t-statistics are provided in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Buy-sell imbalance for individual stocks$_{i,j,t}$			
	(1)	(2)	(3)	(4)
Local inflation$_{j,t}$	-0.199	-0.189	-0.289	-0.239
	(-0.97)	(-0.91)	(-1.32)	(-1.35)
Δ Net leverage$_{j,t}$	0.162***	0.165***	0.155*	0.157**
	(3.07)	(2.78)	(1.89)	(2.34)
Local inflation$_{j,t}$ × Δ Net leverage$_{j,t}$	-0.122**	-0.135**	-0.129*	-0.112**
	(-2.29)	(-2.27)	(-1.98)	(-2.13)
Log(assets)$_{j,t}$	-0.013***	-0.022***	-0.035**	-0.022
	(-2.75)	(-4.16)	(-2.32)	(-1.11)
Profitability$_{j,t}$	0.087	0.095	0.042	0.052
	(0.66)	(0.57)	(0.15)	(0.13)
Year-month fixed effects	Yes	Yes	Yes	No
Client fixed effects	No	Yes	Yes	No
Firm fixed effects	No	No	Yes	Yes
Client-year-month fixed effects	No	No	No	Yes
Adj. R^2	0.035	0.039	0.038	0.243
N	11,597	11,597	11,597	11,597

Figure IA1: Sample page from the deposit books

This figure shows a sample page from the deposit books.

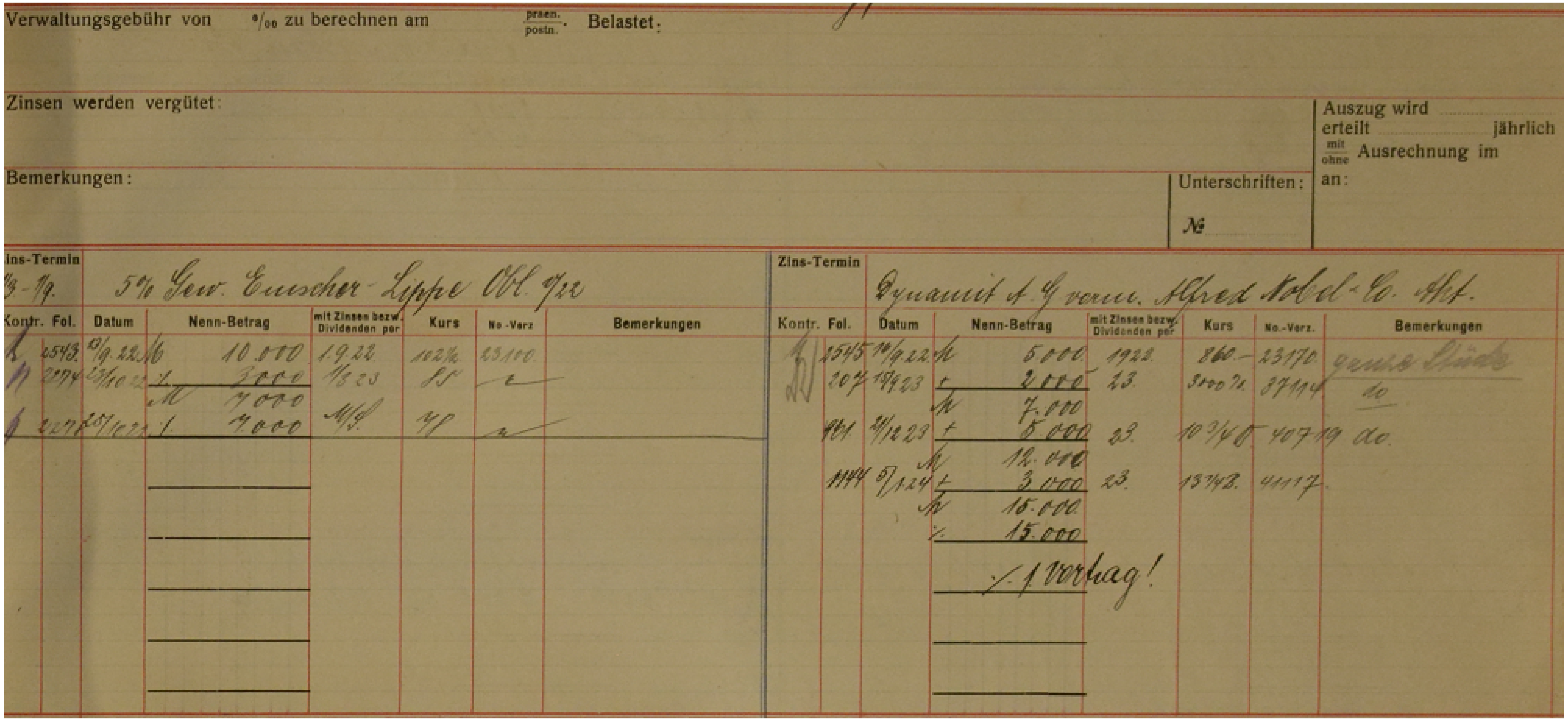


Figure IA2: Social classes of clients

This figure shows the distribution of social classes of clients and the distribution of social classes of the shareholder base in Germany during the early 1920s. We assign clients to four social classes based on their profession and their title using the classification of Schüren (1989). The information on social classes of the shareholder base in Germany during the early 1920s comes from Lehmann-Hasemeyer and Neumayer (2022).

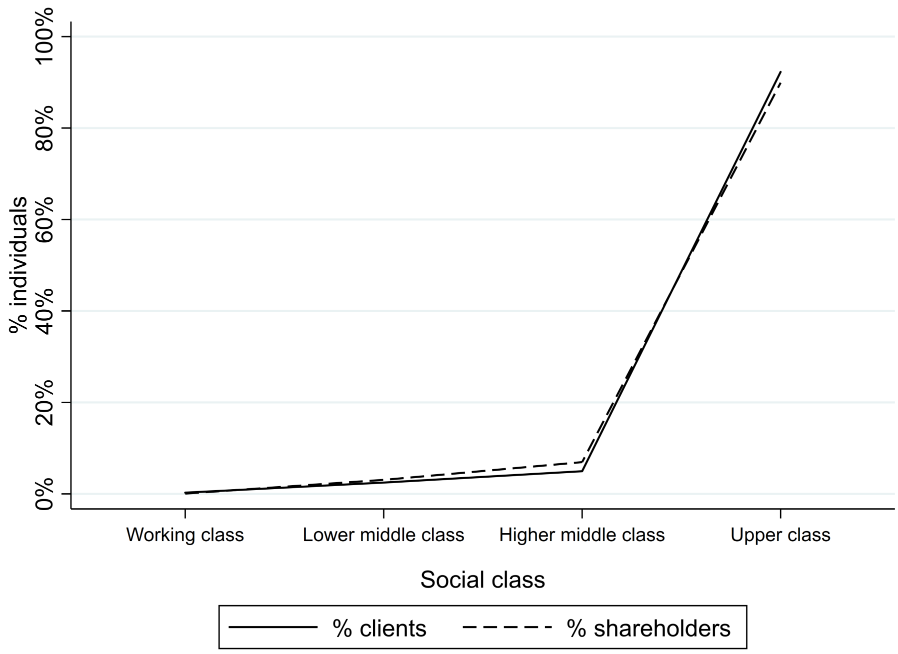


Figure IA3: Wealth of clients

This figure shows the wealth distribution of clients in January 1920 and the wealth distribution of individuals subject to the wealth tax in Germany in December 1913. Only individuals who had net wealth of more than 10,000 *Mark* had to pay the wealth tax in 1913, corresponding to around 2.8 million individuals (or 4.3% of the population). For individuals subject to the wealth tax, financial wealth accounted for 57.8% of net wealth. We use this figure to estimate clients' net wealth from the portfolio market values in January 1920. We deflate the estimated net wealth of clients in January 1920 using the national inflation rate to obtain an estimate for the net wealth of clients in December 1913. Around 76% (24%) of clients in our sample have a net wealth of more (less) than 10,000 Mark at the time.

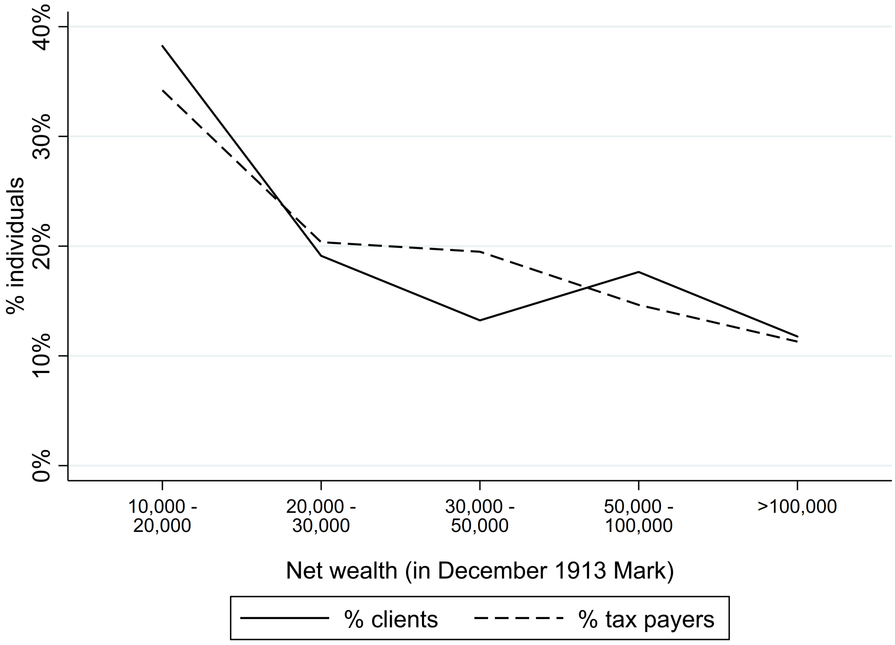


Figure IA4: Sample page from the Handbook of German Stock Corporations

This figure shows a sample page from the Handbook of German Stock Corporations.

Berlin-Burger Eisenwerk, Aktiengesellschaft Berlin W. 8.

Friedrichstr. 77.

Gegründet: 30./7. bzw. 30./10. 1913; eingetr. 8./11. 1913. (Firma bis 13./5. 1916: Herdkessel-Industrie, Akt.-Ges.) Gründer: Apparatebau & Herdkessel-Industrie Karl Alt u. Paul Jerome in Strassburg mit Zweigniederlass. in B.-Schöneberg; Aug. Rolf, Ernst Leipziger, B.-Schöneberg; Dir. Paul Meerettig, Ing. Walter Schöning, B.-Niederschönhausen.

Zweck: Anfänglich Fabrikation u. Vertrieb von Herdkesseln, Heizungsanlagen und sanitären Einrichtungen und Verwertung der der Firma Alt & Jerome zu Strassburg i. Els. erteilten Patente u. Gebrauchsmuster. Der Gegenstand des Unternehmens ist aldann erweitert auf Herstellung u. Vertrieb von Erzeugnissen der Eisen-, Stahl- u. Metallindustrie u. verwandter Fabrikationszweige. Eisen- u. Stahlwerk. Maschinenfabrik u. Lokomotiv-Reparaturwerkstatt in Burg b. Magdeburg. Die Ges. erwarb am 15./7. 1918 die Berliner Maschinenfabrik der Firma Max Kray & Co. A.-G., Böckhstr. 7. Der Fabrikationsbetrieb hier ist nach der politischen Umwälzung aufgelöst worden. Die Räume dienen als Lager. Die Ges. beteiligte sich mit M. 100 000 bei der Mitteldeutschen Eisen- u. Metallgesellschaft G. m. b. H. Berlin, die den Vertrieb von Heizkesseln. gusseisernen Radiatoren u. Zubehörteilen inne hat. Die Ges. erwarb 1920 die Aktien-Majoritäten der Fa. Gebr. Schöndorff A.-G. Waggonfabrik in Düsseldorf u. L. Georg Bierling & Co. A.-G. Metallwaren- u. Blechemballagenfabrik in Mügeln bei Dresden. Die Ges. kaufte weiterhin die Maschinenfabrik S. Aston in Burg b. Magdeburg unter Umwandlung derselben in eine Kommanditges. Die Interessengemeinschaft mit der Gebr. Schöndorff Akt.-Ges. ist wieder aufgehoben, andrerseits hat das Werk Interesse genommen an der Hermann Kramer & Co, Komm.-Ges. Danzig, der Bayer. Eisenhandelsges. Ehmer & Co. Komm.-Ges., München, u. der Sächs. Eisenhandelsges. Schaal & Co. Komm.-Ges. Chemnitz.

Kapital: M. 30 000 000 in 30 000 Aktien à M. 1000. Urspr. M. 250 000. Erhöht lt. G.-V. v. 13./5. 1916 um M. 450 000 behufs Übernahme des Burger Eisenwerkes von E. Angrick. Die G.-V. v. 11./1. 1918 beschloss die Erhöh. des A.-K. um M. 1 300 000 (also auf M. 2 000 000) in 1300 Aktien mit Div.-Ber. ab 1./10. 1917. Das gesamte Erhöh.-Kap. ist von einem Konsort. unter Führung des Bankhauses C. H. Kretzschmar, Berlin, übernommen worden, u. zwar M. 800 000 zu 107%, die restl. M. 500 000 lt. G.-V. v. 4./5. 1918 zu 130%. Das erzielte Agio nach Abzug sämtlicher Erhöh.-Unk. wurde mit ca. M. 100 000 dem R.-F. zugeführt. Weitere Kap.-Erhöh. lt. G.-V. v. 30./12 1919 um M. 3 000 000 mit Div.-Ber. ab 1./10. 1919, übernommen von C. H. Kretzschmar zu 107%. Lt. G.-V v. 12./6. 1920 ist das Kapital um M. 20 000 000 auf M. 25 000 000 mit Div.-Ber. ab 1./4. 1920 erhöht worden. Mitte 1921 erfolgte die vollständige Angliederung der L. Georg Bierling & Co. Akt.-Ges. in Heidenau (A.-K. M. 5 000 000), zu welchem Zweck die a.o. G.-V. v. 8./8. 1921 die Erhöh. des A.-K. um M. 5 000 000, also auf M. 30 000 000 beschloss.

Hypotheken: M. 392 310.

Geschäftsjahr: 1./10.—30./9. **Gen.-Vers.:** Im I. Geschäftshalbj.

Bilanz am 30. Sept. 1920: Aktiva: Grundstücke u. Wohnhäuser 1 088 609, Fabrikgebäude Burg 683 477, Gleisanlagen 66 271, Arb.-Wohnhäuser-Beteilig. Burg 1, Masch. u. Werkzeuge 537 631, Geräte u. Utensil. 422 504, Öfen 1. Generator 1, Kohlenbunker 1, Kessel u. Dampfmasch. 1, elektr. Anlage 1, Laborat.-Einricht. 1, Modelle 1, Patente 1, Mobil. 1, Fahrzeuge 143 744, Abt. Munit.- u. Mat.-Verwert.: Einricht. Burg. Gerwisch, Jüterbog u. Kelsterbach 790 971, Kassa 41 690, Effekten 535 001, Kaut. 536 280, Beteilig. 674 000. Waren 22 036 183, Debit. 27 991 702, Bankguth. 12 613 321. — Passiva: A.-K. 5 000 000, R.-F. 384 083 (Rückl. 216 796), Hypoth. 392 310, unerhob. Div. 14 940, Interims-Kto 2 175 724, Kredit. 38 277 168, Vorauszahl. 10 388 487, Konsort.-Kto Kelsterbach: Beteilig. der Dynamit A.-G. vorm. Alfred Nobel & Co., Hamburg 7 104 145, Werkerhalt.-Kto 1 000 000, 10% Div. auf M. 5 000 000 500 000, 5% do. auf M. 25 000 000 1 000 000, Bonus 10 bezw. 5% 1 500 000, Vortrag 419 538. Sa. M. 68 156 398.

Gewinn- u. Verlust-Konto: Debet: Handl.-Unk. 6 666 228, Abschreib. 5 504 437, Gewinn 3 636 335. — Kredit: Vortrag 63 750, Gewinn aus Beteilig. 80 000, Rohgewinn 15 663 250. Sa. M. 15 807 000.

Dividenden: 1913/14—1919/20: 0, 6, 0, 0, 0, 6, 10 + 10% Bonus (j. A. 5 + 5%).

Prokuristen: Dr. Wilh. Adler, Fritz Heilgendorff, Berlin; Ing. Albert Raden, Hugo Schuberth, Otto Tietz, Burg b. Magdeburg.

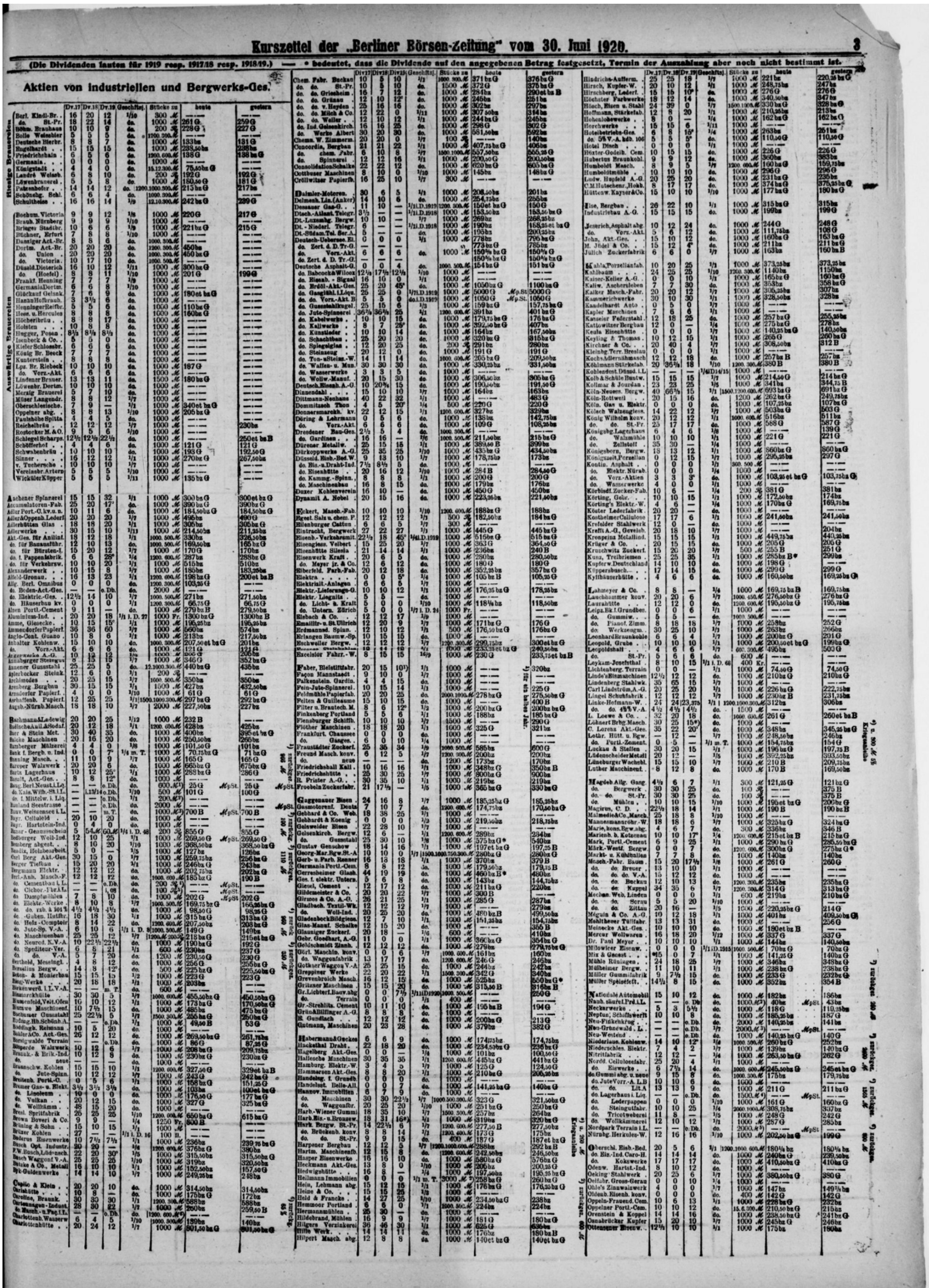
Direktion: Aug. Rolf, Ernst Leipziger; Stellv. Felix Painta, Theodor Land.

Aufsichtsrat: Vors. Ing. Ernst Angrick, Berlin-Lichterfelde; Rechtsanwalt Hugo Staub, Berlin; Konsul Dr. jur. Carl Piekenbrock, Essen; General a. D. Freih. v. Wachtmeister, Berlin; Ziviling. Gust. Berthold, Düsseldorf; Kaufm. Wilh. Heermann, Heilbronn; Bankdir. Eugen Bandel, Barmen; Senator Jul. Jewelowsky, Danzig; Bankdir. Wilh. Kleemann, Berlin; Gen.-Dir. Prof Ludwig Noé, Danzig; Bankdir. Paul Schmidt-Branden, Berlin; Dir. Otto Windgassen, Düsseldorf.

Zahlstellen: Berlin: Ges.-Kasse, Dresdner Bank, C. H. Kretzschmar; Düsseldorf: Barmer Bankverein, Hinsberg Fischer & Co.

Figure IA5: Sample page from the Berlin Stock Exchange Newspaper

This figure shows a sample page from the Berlin Stock Exchange Newspaper.



Kurszettel der „Berliner Börsen-Zeitung" vom 30. Juni 1920. 3

Aktien von Industriellen und Bergwerks-Ges.

Figure IA6: Sample page from The Coupon

This figure shows a sample page from The Coupon.

Mi 677

4099. **Mitteldeutsche Boden-Credit-Anstalt in Greiz-Frankfurt.** Dezember. M. 7,5 Mill.

für **1918** 4% = M. 40,—. 28. April 1919.
„ **1919** = 0.
„ **1920** 4½% = M. 45,—. 2. April 1921.
„ **1921** 4% = M. 40,—. 27. April 1922.
„ **1922**

Berlin, Bank für Handel und Industrie; Deutsche Bank; Berliner Handels-Gesellschaft; Commerz- und Privatbank. **Dresden,** Gebr. Arnhold; Philipp Elimeyer. **Düsseldorf,** Deutsche Bank Filiale **Frankfurt a. M.,** Deutsche Effekten- und Wechselbank; Diskonto-Gesellschaft. **Breslau,** Schlesischer Bankverein, Fil. der Deutschen Bank. **Hannover,** A. Spiegelberg. **Leipzig,** Allg. Dt. Credit-Anstalt.

4100. **Mitteldeutsche Creditbank.** (V. Z. 4 A.) Dezember. M. 170 Mill.

für **1918** 7% = M. 21,— bezw. M. 84,—. 12. April 1919.
„ **1919** 8% = M. 24,— bezw. M. 96,—. 15. Juni 1920.
„ **1920** 10% = M. 30,— bezw. M. 120,—. 11. Mai 1921.
„ **1921** 12½% = M. 37,50 bezw. M. 150,—. 3. Mai 1922.
„ **1922**

Berlin, Frankfurt a. M., Augsburg, Baden-Baden, Essen, Fürth, Gießen, Göttingen, Hamburg, Hanau, Hannover, Hildesheim, Karlsruhe, Köln, Königsberg i. Pr., Leipzig, Magdeburg, Mainz, Marburg a. L., Memmingen, München, Nürnberg und **Wiesbaden,** Niederlassungen; sowie Depositenkassen und Wechselstuben in **Alsfeld i. H., Biebrich a. Rh.. Büdingen, Butzbach i. H., Friedberg i. H., Höchst a. M., Lauterbach i. H., Limburg a. L., Neu Isenburg i. H., Nienburg a. W., Offenbach a. M., Schotten i. H., Uelzen (Provinz Hannover), Wetzlar. Meiningen,** Bank für Thüringen vorm. B. M Strupp. **Stuttgart,** Doertenbach & Co. **München,** H. Aufhäuser. **Tübingen, Hechingen,** Bankcommandite Siegmund Weil. **Koblenz, Köln,** Leopold Seligmann.

4101. **Mitteldeutsche Flanschenfabrik A.-G., Unterpeissen jetzt Lebendorf.** Juni. M. 6 Mill.

für **1918/19** No. 9, 25% = M. 250,—. 29. Oktober 1919.
„ **1919/20** No. 10, 25% = M. 250,—. 29. Oktober 1920.
„ **1920/21**
„ **1921/22** No. 12, 40% = M. 400,—. 29. Oktober 1922.
„ **1922/23**

Dessau, Anhalt-Dessauische Landesbank. **Lebendorf,** Eigene Kasse.

4102. **Mitteldeutsche Gas-Gesellschaft A.-G., Bremen.** März. M. 2 Mill.

für **1918/19** No. 12, 5% = M. 50,—. 5. August 1919.
„ **1919/20** No. 13, 5% = M. 50,—. 28. Juli 1920.
„ **1920/21** No. 14, 7% = M. 70,—. 25. August 1921.
„ **1921/22** No. 15, 10% = M. 100,—; jge. Akt. No. 1001—2000 = M. 25,—. 2. August 1922.
„ **1922/23**

Bremen, Darmst. u. Nationalbank; Ges.-Kasse.

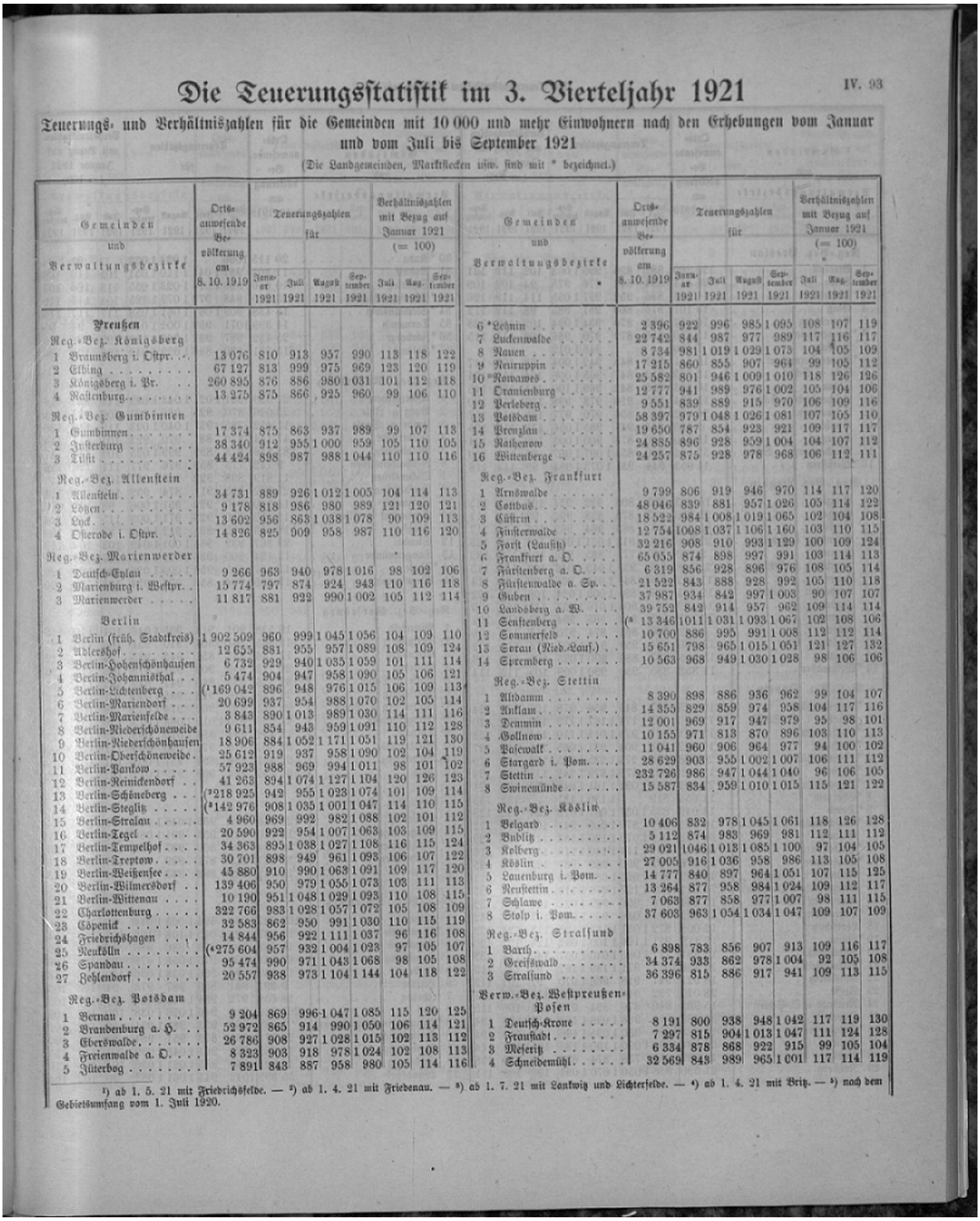
4103. **Mitteldeutsche Gerberei und Riemenfabrik, Wetzlar.** Juli. M. 1 Mill.

für **1916/17** 10% = M. 100,—. 20. November 1917.
„ **1917/18** 6% = M. 60,—. November 1918.
„ **1918/19** 6% = M. 60,—. 2. September 1919.
„ **1919/20** 10% = M. 100,—. September 1920.
„ **1920/21**

Ges.-Kasse.

Figure IA7: Sample page from the Quarterly Issue of the German Statistical Office

This figure shows a sample page from the Quarterly Issue of the German Statistical Office.



Die Teuerungsstatistik im 3. Vierteljahr 1921

IV. 93

Teuerungs- und Verhältniszahlen für die Gemeinden mit 10 000 und mehr Einwohnern nach den Erhebungen vom Januar und vom Juli bis September 1921

(Die Landgemeinden, Marktflecken usw. sind mit * bezeichnet.)

Gemeinden und Verwaltungsbezirke	Ortsanwesende Bevölkerung am 8. 10. 1919	Teuerungszahlen für Januar 1921	Juli 1921	August 1921	September 1921	Verhältniszahlen mit Bezug auf Januar 1921 (= 100) Juli 1921	Aug. 1921	September 1921
Preußen								
Reg.-Bez. Königsberg								
1 Braunsberg i. Ostpr.	13 076	810	913	957	990	113	118	122
2 Elbing	67 127	813	999	975	969	123	120	119
3 Königsberg i. Pr.	260 895	876	886	980	1 031	101	112	118
4 Rastenburg	13 275	875	866	925	960	99	106	110
Reg.-Bez. Gumbinnen								
1 Gumbinnen	17 374	875	863	937	989	99	107	113
2 Insterburg	38 340	912	955	1 000	959	105	110	105
3 Tilsit	44 424	898	987	988	1 044	110	110	116
Reg.-Bez. Allenstein								
1 Allenstein	34 731	889	926	1 012	1 005	104	114	113
2 Lötzen	9 178	818	986	980	989	121	120	121
3 Lyck	13 602	956	863	1 038	1 078	90	109	113
4 Osterode i. Ostpr.	14 826	825	909	958	987	110	116	120
Reg.-Bez. Marienwerder								
1 Deutsch-Eylau	9 266	963	940	978	1 016	98	102	106
2 Marienburg i. Westpr.	15 774	797	874	924	943	110	116	118
3 Marienwerder	11 817	881	922	990	1 002	105	112	114
Berlin								
1 Berlin (früh. Stadtkreis)	1 902 509	960	999	1 045	1 056	104	109	110
2 Adlershof	12 655	881	955	957	1 089	108	109	124
3 Berlin-Hohenschönhausen	6 732	929	940	1 035	1 059	101	111	114
4 Berlin-Johannisthal	5 474	904	947	958	1 090	105	106	121
5 Berlin-Lichtenberg	([1] 169 042	896	948	976	1 015	106	109	113
6 Berlin-Mariendorf	20 699	937	954	988	1 070	102	105	114
7 Berlin-Marienfelde	3 843	890	1 013	989	1 030	114	111	116
8 Berlin-Niederschöneweide	9 611	854	943	959	1 091	110	112	128
9 Berlin-Niederschönhausen	18 906	884	1 052	1 171	1 051	119	121	130
10 Berlin-Oberschöneweide	25 612	919	937	958	1 090	102	104	119
11 Berlin-Pankow	57 923	988	969	994	1 011	98	101	102
12 Berlin-Reinickendorf	41 263	894	1 074	1 127	1 104	120	126	123
13 Berlin-Schöneberg	([2] 218 925	942	955	1 023	1 074	101	109	114
14 Berlin-Steglitz	([3] 142 976	908	1 035	1 001	1 047	114	110	115
15 Berlin-Stralau	4 960	969	992	982	1 088	102	101	112
16 Berlin-Tegel	20 590	922	954	1 007	1 063	103	109	115
17 Berlin-Tempelhof	34 363	895	1 038	1 027	1 108	116	115	124
18 Berlin-Treptow	30 701	898	949	961	1 093	106	107	122
19 Berlin-Weißensee	45 880	910	990	1 063	1 091	109	117	120
20 Berlin-Wilmersdorf	139 406	950	979	1 055	1 073	103	111	113
21 Berlin-Wittenau	10 190	951	1 048	1 029	1 093	110	108	115
22 Charlottenburg	322 766	983	1 028	1 057	1 072	105	108	109
23 Cöpenick	32 583	862	950	991	1 030	110	115	119
24 Friedrichshagen	14 844	956	922	1 111	1 037	96	116	108
25 Neukölln	([4] 275 604	957	932	1 004	1 023	97	105	107
26 Spandau	95 474	990	971	1 043	1 068	98	105	108
27 Zehlendorf	20 557	938	973	1 104	1 144	104	118	122
Reg.-Bez. Potsdam								
1 Bernau	9 204	869	996	1 047	1 085	115	120	125
2 Brandenburg a. H.	52 972	865	914	990	1 050	106	114	121
3 Eberswalde	26 786	908	927	1 028	1 015	102	113	112
4 Freienwalde a. O.	8 323	903	918	978	1 024	102	108	113
5 Jüterbog	7 891	843	887	958	980	105	114	116
6 *Lehnin	2 396	922	996	985	1 095	108	107	119
7 Luckenwalde	22 742	844	987	977	989	117	116	117
8 Nauen	8 734	981	1 019	1 029	1 073	104	105	109
9 Neuruppin	17 215	860	855	907	964	99	105	112
10 *Nowawes	25 582	801	946	1 009	1 010	118	126	126
11 Oranienburg	12 777	941	989	976	1 002	105	104	106
12 Perleberg	9 551	839	889	915	970	106	109	116
13 Potsdam	58 397	979	1 048	1 026	1 081	107	105	110
14 Prenzlau	19 650	787	854	923	921	109	117	117
15 Rathenow	24 885	896	928	959	1 004	104	107	112
16 Wittenberge	24 257	875	928	978	968	106	112	111
Reg.-Bez. Frankfurt								
1 Arnswalde	9 799	806	919	946	970	114	117	120
2 Cottbus	48 046	839	881	957	1 026	105	114	122
3 Cüstrin	18 522	984	1 008	1 019	1 065	102	104	108
4 Finsterwalde	12 754	1008	1 037	1 106	1 160	103	110	115
5 Forst (Lausitz)	32 216	908	910	993	1 129	100	109	124
6 Frankfurt a. O.	65 055	874	898	997	991	103	114	113
7 Fürstenberg a. O.	6 319	856	928	896	976	108	105	114
8 Fürstenwalde a. Sp.	21 522	843	888	928	992	105	110	118
9 Guben	37 987	934	842	997	1 003	90	107	107
10 Landsberg a. W.	39 752	842	914	957	962	109	114	114
11 Senftenberg	([5] 13 346	1011	1 031	1 093	1 067	102	108	106
12 Sommerfeld	10 700	886	995	991	1 008	112	112	114
13 Sorau (Nied.-Laus.)	15 651	798	965	1 015	1 051	121	127	132
14 Spremberg	10 563	968	949	1 030	1 028	98	106	106
Reg.-Bez. Stettin								
1 Altdamm	8 390	898	886	936	962	99	104	107
2 Anklam	14 355	829	859	974	958	104	117	116
3 Demmin	12 001	969	917	947	979	95	98	101
4 Gollnow	10 155	971	813	870	896	103	110	113
5 Pasewalk	11 041	960	906	964	977	94	100	102
6 Stargard i. Pom.	28 629	903	955	1 002	1 007	106	111	112
7 Stettin	232 726	986	947	1 044	1 040	96	106	105
8 Swinemünde	15 587	834	959	1 010	1 015	115	121	122
Reg.-Bez. Köslin								
1 Belgard	10 406	832	978	1 045	1 061	118	126	128
2 Bublitz	5 112	874	983	969	981	112	111	112
3 Kolberg	29 021	1046	1 013	1 085	1 100	97	104	105
4 Köslin	27 005	916	1 036	958	986	113	105	108
5 Lauenburg i. Pom.	14 777	840	897	964	1 051	107	115	125
6 Neustettin	13 264	877	958	984	1 024	109	112	117
7 Schlawe	7 063	877	858	977	1 007	98	111	115
8 Stolp i. Pom.	37 603	963	1 054	1 034	1 047	109	107	109
Reg.-Bez. Stralsund								
1 Barth	6 898	783	856	907	913	109	116	117
2 Greifswald	34 374	933	862	978	1 004	92	105	108
3 Stralsund	36 396	815	886	917	941	109	113	115
Verw.-Bez. Westpreußen-Posen								
1 Deutsch-Krone	8 191	800	938	948	1 042	117	119	130
2 Fraustadt	7 297	815	904	1 013	1 047	111	124	128
3 Meseritz	6 334	878	868	922	915	99	105	104
4 Schneidemühl	32 569	843	989	965	1 001	117	114	119

[1]) ab 1. 5. 21 mit Friedrichsfelde. — [2]) ab 1. 4. 21 mit Friedenau. — [3]) ab 1. 7. 21 mit Lankwitz und Lichterfelde. — [4]) ab 1. 4. 21 mit Britz. — [5]) nach dem Gebietsumfang vom 1. Juli 1920.

Figure IA8: Locations of clients and firms

This figure shows the locations of the towns where at least one client lives (dots) or where at least one firm is headquartered (crosses). We assign clients and firms to the closest town for which we have inflation data within a 25 km radius based on the place of residence and the location of headquarters, respectively. The map shows Germany as of 1920, the area occupied by France and Belgium (shaded), and Germany as of today (grey). The map of Germany from 1920 is from the Max Planck Institute for Demographic Research (MPIDR, 2011) and the map of contemporary Germany from the Federal Agency for Cartography and Geodesy (FACG, 2011).

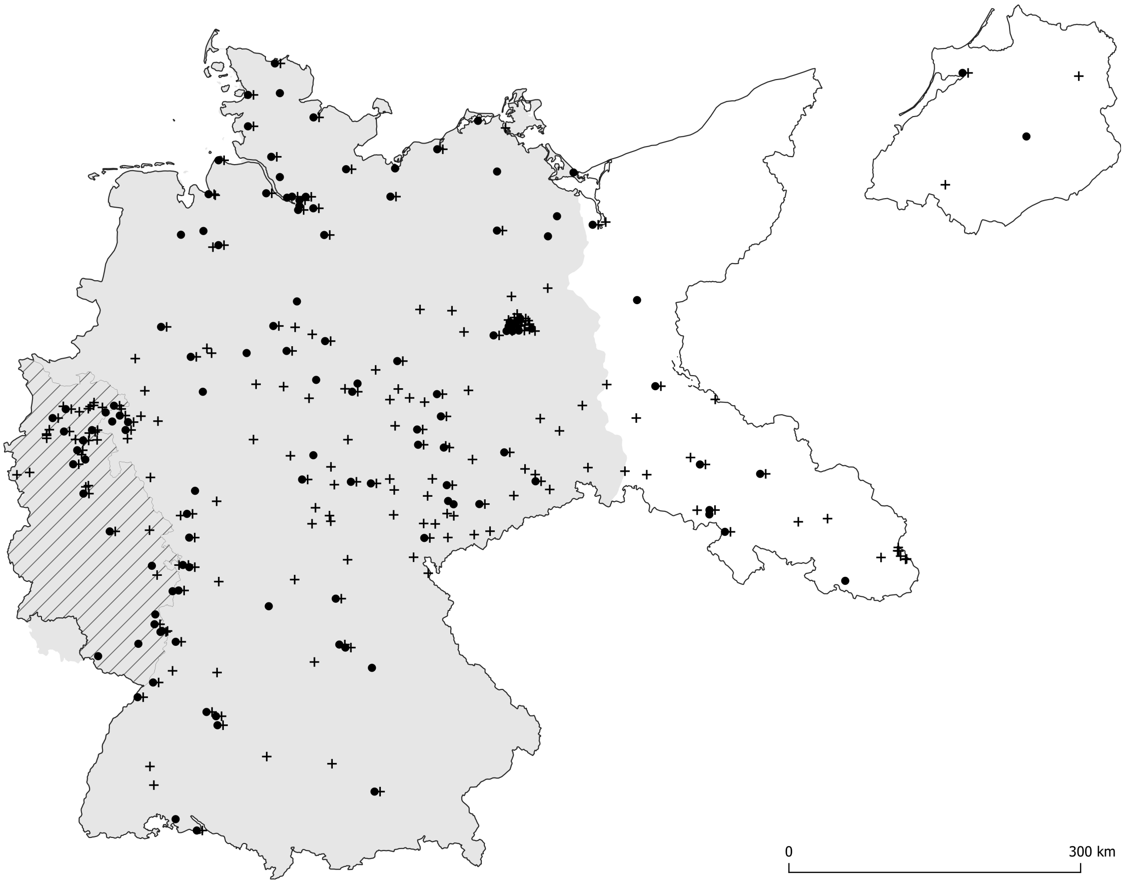


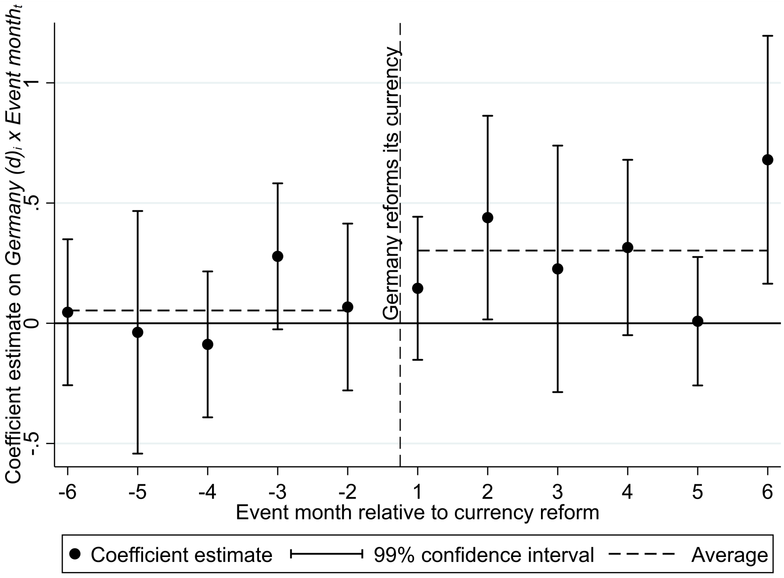
Figure IA9: Unemployment

This figure shows the monthly number of applicants per 100 open positions between January 1920 and December 1924.

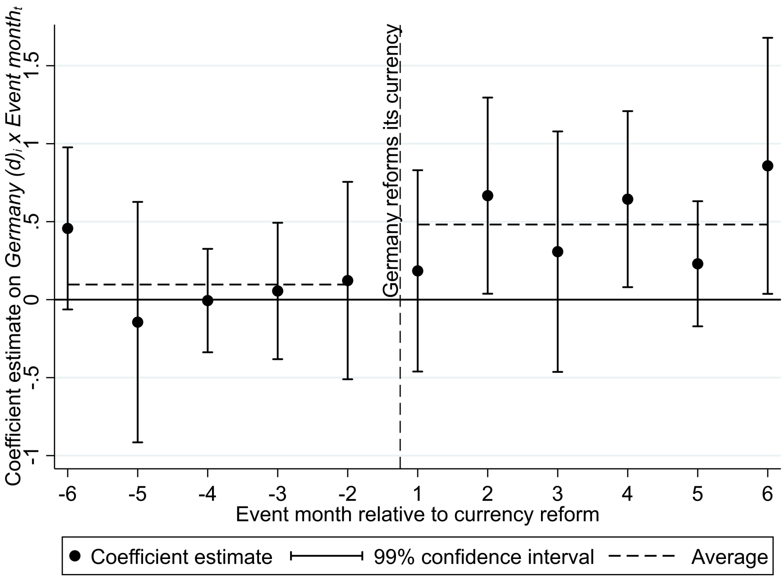
Figure IA10: Local inflation and stock trades around the currency reform

This figure shows coefficient estimates from regressing the monthly buy-sell imbalance for stocks on a dummy variable that equals one for clients who live in Germany, dummy variables that equal one for different event months, and interaction terms between the dummy variable that equals one for clients who live in Germany and the dummy variables that equal one for different event months. In Panel A, we estimate the regression without client fixed effects. In Panel B, we estimate the regression with client fixed effects. We focus on the time period starting six months prior to the currency reform and ending six months after the currency reform. The omitted month is September 1923 (event month –1). The sample includes all clients who live in Germany and all clients who live in neighboring countries. Internet Appendix A provides detailed descriptions of all variables used throughout the study. Standard errors are double-clustered at the client and month level. The figures show point estimates together with 99% confidence intervals.

Panel A: Without client fixed effects



Panel B: With client fixed effects



Internet Appendix C: Robustness tests

In the robustness tests presented in Table IA1, we replicate our baseline regression from Column 2 of Table 3 in the main paper using alternative measures for local inflation and clients' stock trading activities as well as an extended sample. We first employ different inflation measures as explanatory variables to address the potential concern that our results are an artifact of the inverse hyperbolic sine transformation. In Column 1, we therefore use monthly raw local inflation and winsorize it at the 1% level and the 99% level to account for potential outliers. In Column 2, we use the natural logarithm of monthly local inflation and set observations with negative inflation to zero to retain the same sample. In Column 3, we use inflation deciles formed on a monthly basis, as used in Figure 1 in the main paper. Across all these inflation measures, we document a significantly negative relation between local inflation and buy-sell imbalances for stock trades, suggesting that the inverse hyperbolic sine transformation of local inflation is not driving our results.

We also change the dependent variable and use alternative measures of clients' investment behavior in stocks to assure that our findings are not driven by the choice of the buy-sell imbalance measure. When computing our baseline measure of buy-sell imbalances, we follow the existing literature and only consider months in which clients trade (e.g., Barber and Odean, 2008; Barber et al., 2019). In Column 4 of Table IA1, we additionally include months in which clients do not trade by setting the buy-sell imbalance for these months to zero. In Column 5, we compute buy-sell imbalances based on the face value of stock trades rather than the number of stock trades. More specifically, the buy-sell imbalance measure is defined as the difference between the face value of stocks bought and the face value of stocks sold divided by the sum of the face value of stocks bought and stocks sold. In Column 6, instead of using buy-sell imbalance measures, we use the natural logarithm of the face value of client's stock holdings as dependent variable. Across all specifications, we find a negative and statistically significant association between monthly local inflation and the different dependent variables, suggesting that our results are also robust to alternative measures of investment behavior.

Finally, we test whether the filtering of our sample affects results. When constructing our sample, we drop accounts for which we cannot be reasonably certain who is responsible for the investment decisions. In Column 7 of Table IA1, we rerun our main analysis including such accounts. To do so, we collected security portfolio data for an additional 263 accounts who execute 5,450 stock trades between January 1920 and September 1923. The coefficient estimate obtained when rerunning our baseline regression on this extended sample is again negative and statistically significant, suggesting that the filtering does not materially impact our findings.

Internet Appendix D: Instrumental variables regressions

To address the concern that local inflation may be correlated with unobservable determinants of investors' behavior, we run instrumental variables regressions that exploit quasi-exogenous variation in local inflation. A distinctive feature of our investigation period is that money usually took the form of bank notes, which had to be printed and brought into circulation. Because of limited production capacity of the German Central Bank and transportation constraints, a major share of bank notes was produced and brought into circulation locally (e.g., Reichsbank, 1924a, 1924b). Thus, we instrument local inflation with the fraction of local employees working in the paper industry at the beginning of the sample period.

A valid instrument must satisfy the relevance condition and the exclusion restriction. The relevance condition requires that the fraction of employees working in the paper industry is significantly correlated with local inflation. In Table 2, we documented that this relationship is positive and significant, pointing towards the instrument's relevance. The exclusion restriction is fulfilled if the fraction of employees working in the paper industry does not affect clients' equity investment through a channel other than local inflation.[1] This is unlikely to be the case because the location of the paper industry was primarily determined by environmental factors: access to spruce and clean river water.[2] Hence, it can be reasonably assumed that instrumented local inflation is exogeneous to other determinants of stockholdings.

We estimate instrumental variables regressions with two-stage least squares. Results of the first stage are reported at the bottom of Table IA8. We regress local inflation on the instrument, region fixed effects, and town-level characteristics. In Columns 2 and 4, we

[1] To examine whether the local availability of paper is correlated with local economic conditions, we analyze the relation between the fraction of local employees working in the paper industry and the local unemployment rate. However, we find this correlation to be close to zero, indicating that the paper industry does not cluster in areas of economic prosperity or economic hardship.

[2] To this day, raw paper is made from wood pulp and requires two inputs: grinded wood from conifers and clean water (e.g., Mutz, 2009, p. 46; Torunen, 2012, pp. 84-91). The preferred conifer is spruce because it has the longest cellulose fibers (e.g., Bartels, 2011, pp. 173-177). As a result, the spatial structure of Germany's paper industry was dictated by the location of spruce forest (e.g., Mutz, 2009, p. 50). Moreover, plenty of water was needed for the dissolution of wood fiber into wood pulp, in Germany in 1912 between 650 to 1,050 liters for one kilogram of paper (e.g., Tschudin, 2007, p. 159). However, water quality and not quantity has been the decisive factor, because dirty water resulted in discolored paper (e.g., Bayerl, 1987, p. 419). Hence, paper producers chose to locate near clean rivers, as shown by the histories of many Germany paper producers, which often evolve around access to clean water (e.g., Bartels, 2011, pp. 221-297).

include client characteristics as additional controls. In Columns 3 and 4, we use a dummy variable indicating an above-median share of the local labor force employed in the paper industry rather than the continuous variable. Across all columns, we obtain positive and significant coefficients on the variable capturing the local supply of paper. Moreover, the F-statistic of the excluded instrument exceeds the often-used threshold of 10 in all specifications (e.g., Staiger and Stock, 1997). These results confirm the instrument's relevance.

Results of the second stage are reported at the top of Table IA8. We regress clients' buy-sell imbalances for stocks on instrumented local inflation and the control variables from the first stage. The coefficient estimate on local inflation is negative and statistically significant across all specifications, confirming that investors buy less (sell more) stocks when facing higher local inflation. Moreover, these results suggest that individual investors respond to inflation and not to other factors correlated with inflation, lending support to a causal interpretation of our results.

Internet Appendix E: The second money illusion hypothesis

According to Modigliani and Cohn (1979), investors suffering from money illusion commit a second valuation error besides the one discussed in the paper. Such investors do not understand that the decrease in accounting profits due to the inflation premium paid by firms on newly issued debt is offset by an increase in shareholders' market value of equity resulting from the depreciation in the real value of nominal liabilities. To formalize this, consider a firm's net income at time t, defined as

$$Net\,Income_t = EBI_t - Interest_t - Inflation\,Premium_t, \tag{IA1}$$

where EBI_t is nominal earnings before interest at time t, $Interest_t$ is the real interest paid by the firm, and $Inflation\,Premium_t$ is the difference between nominal interest payments and real interest payments. $Inflation\,Premium_t$ compensates debtholders for the real depreciation of their nominal claims expected at issuance. When inflation increases and a firm issues new debt, both EBI_t and $Inflation\,Premium_t$ rise. However, increases in inflation tend to have a disproportionate effect on nominal interest payments.[3] Since accounting principles consider the inflation premium as a cost, higher inflation results in shareholders observing a lower net income for firms that issue substantial amounts of new debt. However, the decline in net income does not correspond to a reduction of the market value of equity. To illustrate this, we can write next period's market value of equity at time $t + 1$ as

$$Equity_{t+1} = Enterprise\,Value_t - Debt_t + EBI_t \tag{IA2}$$
$$-Interest_t - Inflation\,Premium_t + Debt\,Depreciation_t,$$

where $Enterprise\,Value_t$ is the market value of the firm's assets in period t, $Debt_t$ is the market value of debt, and $Debt\,Depreciation_t$ is the gain accruing to shareholders as a result of the inflation-induced depreciation of the nominal value of debt. Under perfect foresight,

[3] For example, a rise in inflation from 3% to 9% causes EBI_t to rise by an additional 6%, assuming all items in the income statement before EBI_t grow proportionally with inflation. In contrast, if nominal interest rates increase from 3% to 9%, nominal interest expenses triple, assuming that existing debt is completely replaced by new debt.

the inflation premium equals the depreciation of debt. Hence, inflation leaves the market value of equity unaffected. Investors suffering from money illusion, however, base their valuation of a firm's equity only on accounting profits and thus interpret the higher nominal interest payments as an additional cost, ignoring gains accruing to them as a result of the real depreciation in nominal debt. Hence, they reduce their demand for stocks of firms that issue substantial amounts of new debt when these firms face increasing inflation.

To test the second form of money illusion of Modigliani and Cohn (1979), we analyze the relationship between local inflation at a firm's headquarters, the annual change in the firm's net leverage, and clients' investment behavior in shares of that firm using the following equation:

$$Buy - sell\, imbalance_{i,j,t} = \alpha_{i,t} + \alpha_j + \gamma Local\, inflation_{j,t} + \delta \Delta Net\, leverage_{j,t} \quad \text{(IA3)}$$
$$+\beta Local\, inflation_{j,t} \times \Delta Net\, leverage_{j,t} + Controls_{j,t} + \epsilon_{i,j,t,},$$

where $Buy - sell\, imbalance_{i,j,t}$ is the buy-sell imbalance of investor i for shares of firm j in month t. $\alpha_{i,t}$ are client-year-month fixed effects that absorb both time-invariant and time-varying investor characteristics, such as faith in the German economy, changing risk aversion, and liquidity needs.[4] α_j are firm fixed effects that control for firm characteristics that remain constant over time, such as the firm's industry. $Local\, inflation_{j,t}$ is the inflation rate in month t of the town where firm j is located. We use the inflation at the firm's headquarters because it is the figure creditors likely use to form their inflation expectations and calculate the inflation premium on the firm's debt, for example, if debt is provided by local banks. $\Delta Net\, leverage_{j,t}$ is the annual change in the net leverage of firm j at time t. To test the second form on money illusion, we would ideally use newly issued debt, as this is the main determinant of nominal interest payments in times of rising prices. Since we do not have detailed information on newly issued debt of firms, we take the annual change in net leverage as a proxy for newly issued debt. When inflation rises, firms that increase their net leverage are likely to experience a stronger reduction in net income, due to higher nominal interest

[4] The inflation rate experienced by the investor in a given month is captured by client-year-month fixed effects. Hence, client-year-month fixed effects also control for the first form of money illusion.

payments on the new debt. Hence, the coefficient of interest in Equation (IA3) is the β on the interaction term $Local\ inflation_{j,t} \times \Delta Net\ leverage_{j,t}$. The second form of Modigliani and Cohn's (1979) money illusion hypothesis predicts a negative β, i.e., investors reduce their demand for stocks of firms that experience increasing inflation and increasing net leverage.

Results are reported in Table IA9. In all specifications, we find a negative coefficient on the interaction term between local inflation and a firm's change in net leverage. The coefficient estimate is statistically significant at the 5% level in three out of four specifications and statistically significant at the 10% level in Column 3. The results presented in this section are consistent with the second form of money illusion of Modigliani and Cohn (1979). Investors reduce their demand for stocks of firms that issue greater amounts of new debt when these firms face increasing inflation.

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