

Swiss Finance Institute
Research Paper Series N°15-65

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This Version: 5 September 2016

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How Do Investors and Firms React to an Unexpected Currency Appreciation Shock?

Abstract

We examine the impact of a sudden home currency appreciation on the valuation and behavior of corporations in a developed economy. The Swiss National Bank surprisingly repealed the minimum exchange rate of 1.2 Swiss francs per Euro on January 15, 2015. On that day the franc appreciated by 15% and the main stock market index dropped by 8.7%. The impact was largest for export oriented firms with high domestic costs. These firms experienced 5% lower announcement returns, subsequently faced economically sizeable reductions in sales and profitability, and responded by reducing investment by 8.1% while only slightly reducing employment.

1. Introduction

A number of unprecedentedly sharp currency movements shook markets in recent times. The US Dollar saw single day, permanent appreciations of 12% against the British Pound in June 2016, 4.5% against the Turkish Lira in July 2016, and 3% against the Chinese Yuan in August 2015.¹ These episodes share three distinct features: They were unanticipated, sudden, and economically large. Some commentators have argued that the occurrence of such large and surprising exchange rate movements could increase because of central banks' quantitative easing policies and so called "currency wars".² While prior research has focused on how currency depreciations (see, for instance, Desai, Foley, and Forbes, 2008) or general exchange rate exposure (see Bartram, Brown, and Minton, 2010) affect firm and investor behavior, we provide novel insights by examining whether extreme currency appreciations affect the real economy. We study whether a recent and particularly large currency appreciation—the Swiss Franc's sudden and unexpected 15% appreciation in January 2015—had any real effects on investors and firms.

On January 15, 2015 the Swiss National Bank (SNB) announced that it would no longer hold the Swiss franc at a minimum exchange rate of 1.20 Swiss francs per Euro. Immediately following the announcement, the Swiss franc appreciated strongly against the Euro and other currencies. After several days with high trading volume, the Swiss currency stabilized at approximately 1.02 Swiss francs per Euro, having appreciated by 15%. Nick Hayek, CEO of watch manufacturer Swatch Group, remarked: "Today's Swiss National Bank action is a tsunami; for the export industry and for tourism, and finally for the entire country." This statement reflects the widely held belief that the Swiss economy, with exports of goods and services making up over 50% of GDP, would be severely affected by the currency appreciation.

Using this unanticipated exchange rate shock, we identify the magnitudes of the effects for the marginal firm and investor. We find that firms with large foreign currency risk exposure, which we define as Swiss firms that sell most of their goods and services abroad but have high production costs

¹ Similar one day events occurred against various currencies during the financial- and Asian crises during the last two decades.

² For a critical review of the debate surrounding the notion of "currency war", see Eichengreen (2013).

domestically, experience 5% lower announcement returns on January 15, 2015 than otherwise similar firms. We show that during the six months following the currency shock, firms with large currency risk exposure are subject to considerable reductions in revenues, margins, and profitability and react mainly by reducing capital expenditures: compared to otherwise similar firms, the most affected firms had an 8.1 percentage points lower investment rate in the first half of 2015. We also find evidence that employment decreased in 2015, though the effects are substantially weaker than those for capital investment.

Our setting offers two unique advantages when compared to other studies that have examined investor and firm reactions to currency shocks. First, we analyze a significant appreciation of the currency of a developed country in an economically stable environment whereas most other studies typically study currency depreciations that are preceded by economic turmoil. Second, the sudden repeal of the minimum exchange rate came as a surprise to market participants. When the minimum exchange rate had officially been introduced on September 6th, 2011, the SNB had argued that the strong appreciation of the Swiss franc was an “acute threat to the Swiss economy” and that it would be prepared to buy foreign currency in unlimited quantities to defend the minimum exchange rate of 1.20 Swiss francs per Euro “with the utmost determination”.³ Three years later and just weeks before the repeal, key representatives of the SNB still emphasized that the minimum exchange rate was and would remain a cornerstone of SNB policy. In a survey of 22 economists conducted by Bloomberg News in the week prior to the announcement of the repeal, not a single economist predicted the SNB to lift the minimum exchange rate anytime during the next year.⁴ In addition, Mirkov, Pozdeev, and Söderlind (2016) provide evidence using high-frequency data from option markets that market participants did not expect the minimum exchange rate to be abandoned until the very moment it was.

³ http://www.snb.ch/en/mmr/reference/pre_20110906/source/pre_20110906.en.pdf. We note that the announcement of the minimum exchange rate was credible as the Swiss National Bank could always print and sell more francs to prevent its currency from appreciating. By contrast, most central banks announce a currency peg to prevent their domestic currencies from depreciating in which case the success of the peg depends on the amount of foreign currency reserves that the central bank can sell to buy back the home currency.

⁴ See <http://www.bloomberg.com/news/articles/2015-01-15/snb-unexpectedly-gives-up-cap-on-franc-lowers-deposit-rate>.

We start our analysis by documenting the shareholder wealth effects of the currency shock. First, we show that Swiss publicly listed firms indeed lost a significant fraction of their market capitalization on the day the minimum exchange rate was abandoned. The one-day announcement return for the Swiss Market Index (SMI), which consists of the 20 largest Swiss firms, was approximately minus 8.7%, and more than 100 billion Swiss francs of shareholder wealth were lost in a single day across all Swiss publicly listed stocks. We then test the theoretical prediction that firms that sell most of their products abroad but have high domestic production costs have particularly high currency risk exposures (e.g., Shapiro, 1975; Adler and Dumas, 1984; Bodnar, Dumas, and Marston, 2002; Marston, 1990; or Bartram, Brown, and Minton, 2010). We identify exposed firms as companies that both generate a large fraction of their sales outside Switzerland and have a high ratio of Swiss fixed assets to total fixed assets. Indeed these firms experienced 5% lower announcement returns on January 15, 2015. In an additional test, we verify whether financial hedging through debt issued in foreign currency helped exporters mitigate the impact of the appreciation shock. This is indeed the case: Exporters with Euro denominated debt experience significantly less negative announcement returns relative to other exporters.

After the analysis of the stock market reaction we turn to the real effects of the exchange rate shock. We test the prediction that the franc's sudden and large appreciation reduces the competitiveness of export oriented Swiss firms as their domestic production costs in Switzerland increase compared to those of their competitors in export markets (see, e.g., Allayannis and Ihrig, 2001; Forbes, 2002; or Desai, Foley, and Forbes, 2008). There may also be an indirect effect on Swiss firms that cater to the domestic market in that a decrease of import prices may have led customers to switch to foreign products (e.g., Campa and Goldberg, 1999; Williamson, 2001; Desai, Foley, and Forbes, 2008). The relative importance of these two channels depends, above all, on the exposure of firms to the foreign market as well as on other aspects such as the industrial structure and the form of competition.⁵

⁵ There is a large economics literature on how exchange-rate movements affect output prices. The literature includes the work on pass-through and pricing-to-market. Exchange rate pass-through is defined as the percentage change in local currency import prices resulting from a one percent change in the exchange rate between the exporting and importing countries. The term pricing-to-market has been coined by Krugman (1987) and describes the phenomenon

We show that the exchange rate shock indeed had a strong and immediate effect on the profitability and competitiveness of firms that sell most of their products abroad but have their cost basis in Switzerland. The sales of these treated firms decreased significantly more in 2015 than the sales of other Swiss companies that produce and sell in the same markets. The reduction in sales can be, at least in part, explained by an incomplete "pass-through" of the exchange rate shock to customers abroad. We find a significant negative effect of the Swiss franc's appreciation on the profit margins of Swiss exporters. The result suggests that the markups in export prices did not adjust perfectly to the higher value of the Swiss franc (Allayanis and Ihrig, 2001).⁶ In addition, Swiss exporters with a high fraction of fixed assets in Switzerland experienced a significantly larger reduction of their return on assets than other Swiss firms.

Finally, we investigate how firms responded to the shock to their competitiveness and profitability. We find that treated firms reduced overall capital expenditures significantly during 2015. This reduction is not limited to the first half of 2015, but carries over almost equally into the second half of the year.

Our finding of economically large negative announcement returns for firms with significant currency exposures contributes to a large empirical literature on the measurement and consequences of exchange rate exposure of corporations. The majority of these studies follow the methodology outlined in Adler and Dumas (1984) and measure exchange-rate exposure as the beta coefficient resulting from a regression of stock returns on concurrent exchange rate changes. Somewhat surprisingly, these studies find that exchange rate movements explain a much lower proportion of the variation in stock returns than theory would predict. Jorion (1990) focuses on multinational firms and finds some evidence of an economically small exchange rate exposure for his sample firms. Bartov and Bodnar (1994) do not find a

of exchange rate induced price discrimination in international markets. The review article of Goldberg and Knetter (1997) summarizes the main findings of this literature as follows: Local currency prices of foreign products do not respond fully to exchange rates, i.e. there is incomplete pass-through. A price response equal to one-half the exchange rate change is typical for shipments to the U.S. A significant portion of the muted price response is driven by destination-specific changes in markups on exports. Increased reliance on foreign suppliers reduces the share of costs incurred in the home currency, which can further mute the pass-through relationship. Price discrimination in international markets requires market segmentation and market power.

⁶ Bonadia, Fischer, and Sauré (2016) examine transaction-level trade data and find that the speed of the exchange rate pass-through occurs within days after the exchange rate shock.

significant correlation between stock returns and concurrent exchange rates. Dominguez and Tesar (2006) examine a sample of international firms and find that exposure is correlated with firm size, multinational status, and foreign sales. Griffin and Stulz (2001) find that common shocks to an industry across countries are more important than exchange rate shocks that lead one country's industry to benefit at the expense of another country's industry. According to Dewenter, Higgins, and Simin (2005), this exchange rate "puzzle" might be due to several economic and econometric challenges in interpreting the results from stock return regressions. Potential challenges include that the firms with the largest exposures might hedge, investors have difficulties assessing the currency exposure of firms, or that the signal to noise ratio in the stock market regressions is too low given the available data. Indeed, Bartram, Brown, and Minton (2010) show that firms reduce their exchange rate exposure through operational hedges, FX derivatives, and FX debt. Dominguez and Tesar (2006) suggest that firms dynamically adjust their exposure. Bartov and Bodnar (1994) argue that the inclusion of firms with limited foreign activities, firms with exposures of opposite signs, or firms that can react to changes in international conditions at very low cost introduces noise into the analysis. The Swiss franc's sudden, large and unexpected appreciation after a long period of stability helps overcome or at least alleviate most of these obstacles. Our unique setting enables us to identify statistically and economically large currency risk exposures consistent with theoretical predictions.

We also contribute to the literature on the real effects of exchange rate fluctuations. Most of the existing evidence on firm-level reactions comes from currency devaluations. Aguiar (2005) documents that exporting Mexican firms outperformed non-exporting firms in both sales and profits in the year following the devaluation of the Peso in 1994. Forbes (2002) shows that firms with greater foreign sales exposure are more likely to have higher growth in sales, net income, market capitalization, and assets after depreciations. Unlike our study, both papers study currency depreciations in developing countries which are possibly confounded by negative macroeconomic conditions.

An additional related strand of the literature examines what happens to currency exposures of firms after the move from flexible to fixed or fixed to flexible exchange rates. For example, Bartov,

Bodnar, and Kaul (1996) examine the impact of the breakdown of the Bretton Woods system with its associated movement from fixed to flexible exchange rates on firms' currency exposure, and Bartram and Karolyi (2006) examine the impact of the introduction of the Euro on currency exposures of firms. Contrary to these studies, our analysis of the move of the SNB from a quasi-fixed exchange rate to a free-floating rate deals with an unexpected event in one country only.

The remainder of our paper is organized as follows. In Section 2, we describe our data, identify the firms with the highest exchange rate exposure, and offer summary statistics. In Section 3, we document the stock market reaction of Swiss firms to the announcement of the repeal of the minimum exchange rate by the SNB on January 15, 2015. In Section 4 we address the issue of financial hedging. In Section 5, we empirically analyze how Swiss firms react to the currency appreciation. Section 6 concludes.

2. Data sources, currency exposure, and summary statistics

2.1. Data sources

Our paper requires the construction of three datasets. First, we analyze the stock market reaction to the repeal of the CHF/EUR minimum exchange rate on January 15, 2015. To this end, we create a sample of all publicly listed Swiss firms in January 2015 that fulfill the following criteria. We start with a sample of all firms with Nation Code 756 (Switzerland) in Worldscope. We do not include cross-listed foreign firms. We further exclude mutual funds or real estate investment trusts, and observations that have assets less than CHF 25 million at the end of fiscal-year 2014. These sample selection criteria leave us with a sample of 209 firms. Worldscope is the source of accounting information for the sample. We obtain stock returns from Datastream. CapitalIQ provides detailed information on geographic segment data. We also collect capital structure data on foreign currency denominated debt issuance from CapitalIQ.

Second, we analyze sales, profitability, and real investment decisions of Swiss firms during the period of 2009 to 2015. The analysis requires a panel of Swiss publicly listed firms. We start with all Swiss publicly listed firms in Worldscope that have data on total assets, net cash flow, the market-to-book

ratio, and industry code for at least one of the years between 2009 and 2015. We again drop mutual funds, real estate investment trusts, firms with total assets less than CHF 25 million, as well as firms whose accounting statements were originally expressed in foreign currency.⁷ Since sales, profitability, and capital expenditures are typically reported in interim financial statements (e.g., at the quarterly or semi-annual frequency), we analyze these variables at the semi-annual frequency. The final semi-annual panel sample consist of 163 firms for which we can obtain semi-annual accounting (e.g., capital expenditures, sales, return on assets) data from Worldscope. Following the same filtering rules, we also construct a third dataset to study firm employment data which are available at the annual frequency.

Table 1 shows the industry composition of our final event return regression sample at the end of calendar year 2014. The industry composition of the panel regression samples is similar. The industry classification is based on the Industry Classification Benchmark (ICB) owned by the Financial Times Stock Exchange (FTSE). It is evident that two industries are dominant in our sample – financials and industrials. Those industries make up 30.6% and 26.8% of the sample, respectively. Consumer goods, consumer services, and health care are the next largest industries with each industry representing roughly 10% of the sample.

2.2. Currency exposure

The following subsection shows how we define and measure the currency exposure of Swiss firms.⁸

In our empirical implementation, we use the following proxies to measure the currency risk exposure of Swiss firms. First, we follow Bartram, Brown, and Minton (2010) and derive proxies for revenues and costs by geographical area. Under Swiss GAAP, firms listed on the Swiss stock exchange are required to report segment results on the same level as used by management to steer the company. The

⁷ Worldscope automatically converts values in foreign currency into Swiss franc for firms whose accounting statements are originally published in foreign currency. Still we drop these firms from the panel as the automatic currency conversion could introduce a mechanical effect on sales, cash flow, assets, and capital expenditure.

⁸ For readers less familiar with the currency exposure literature, we provide a stylized example in Appendix A. Appendix A shows the reactions of revenues, costs, and profits for four hypothetical Swiss firms, each with 144 CHF in revenues and 120 CHF in costs, to a sudden currency appreciation from 1.20 CHF/EUR to 1.00 CHF/EUR.

majority of Swiss firms report segment data by geographical segments. The typical Swiss firm reports revenues in Switzerland and revenues in other geographic areas. We use the fraction of foreign sales over total sales as a proxy for the export-dependency of Swiss firms. While Swiss firms do not report their costs of goods sold by geographic area, they typically break up their non-current identifiable assets by geographical area. We use, as do Bartram, Brown, and Minton (2010), the fraction of non-current identifiable assets in Switzerland as a proxy for the fraction of costs that are incurred in Switzerland. For our main tests, we define indicator variables equal to one if a firm has foreign to total sales or non-current identifiable Swiss assets to total non-current identifiable assets larger than the sample median, and zero otherwise. We use the product of the two indicator variables to establish a treatment group of firms most affected by the currency shock.⁹ Our measure captures many of the firms that have publicly announced that they were affected by the repeal of the minimum exchange rate. For example, one of the firms we define as treated is Komax Holding AG, a Swiss manufacturer of solutions for the wire processing industry and of systems for self-medication. Komax realizes 97 % of its sales abroad and incurs 76 % of its cost in Switzerland. In March 2015, the company described that it was indeed strongly affected by the Swiss franc appreciation:

„The majority of Komax Systems' customers are in the euro zone, and the company's position has grown more acute since the minimum Swiss franc-Euro exchange rate was abandoned by the Swiss National Bank in January. These developments jeopardize the success of the steps that have been taken in the past three years to improve efficiency and stabilize earnings.“¹⁰

We wish to however point out possible limitations of our main currency exposure measure based on Swiss identifiable fixed assets. For example, for firms that have high distribution and marketing costs, identifiable assets are an imperfect proxy for costs in Switzerland. For full transparency, we list in

⁹ Some firms lack data on revenues or assets in Switzerland. The most common reason for missing information is that a firm does not report domestic revenues separately but pools Switzerland and the rest of Europe in one geographic segment. Some firms also do not report geographic segment data at all. We exclude firms with missing segment data from the regression analysis.

¹⁰ See press release at <http://goo.gl/KZNIKF>

Appendix B all sample firms with complete segment data and show the ratios of foreign to total sales and non-current identifiable Swiss assets to total non-current identifiable assets for each firm. However, such potential measurement error in the treatment variable should bias our results against finding evidence of a treatment effect.

As a second proxy for currency exposure, we implement the method of Jorion (1990) and estimate the Euro currency exposure of Swiss firms from stock market data. More precisely, we estimate the following time-series regression for each firm i :

$$R_{it} = \beta_{0i} + \beta_{1i}R_{st} + \beta_{2i}R_{mt} + \varepsilon_{it}, \quad (1)$$

where R_{it} is equal to the weekly rate of return on firm i 's common stock, R_{mt} denotes the weekly rate of return of the Swiss market index SMI, and R_{st} is equal to the rate of change in the CHF/EUR exchange rate. The exchange rate is measured in CHF so that a negative value for R_{st} corresponds to a currency appreciation. The coefficient of interest in this model is β_{1i} . Compared to the 20 firms in the SMI, firms with a positive β_{1i} coefficient benefit from currency depreciations and are hurt by appreciations. Note that we cannot use the period between September 2011 and January 2015 to estimate Jorion's model because given the minimum exchange rate, the CHF/EUR rate did not fluctuate during that time. Instead, we estimate the currency beta of Jorion (1990) during the period January 3, 2005 to December 31, 2008 using weekly stock market data and weekly changes in the CHF/EUR currency exchange rate. We require firms to have at least 104 weeks of data between 2005 and 2008. The currency beta as a proxy for currency exposure has the advantage that it accounts for financial hedging known to the market and that it does not require segment data and is thus available for all listed firms and not just those for which we obtain segment data. In addition, we can isolate the exposure to the Euro, which was the reference currency for the SNB. It has the disadvantage that we can only calculate the currency beta for firms that were already listed in 2005. In addition, possible changes in firms' business models or currency exposures between 2009 and 2014 will not be reflected in our exchange rate beta estimated before 2009.

Finally, we also consider the extent to which firms use financial hedges to reduce currency risk exposure. While we cannot directly observe the use of derivatives for hedging, we can obtain data on an alternative financial hedging instrument, the use of foreign currency denominated debt in firms' capital structure (see Bartram, Brown, and Minton, 2010). We therefore collect data on firms' use of CHF and foreign currency denominated debt from Capital IQ and calculate the percentage of assets financed with CHF, foreign currency, and Euro denominated debt.

2.3. Summary statistics

Table 2 displays summary statistics of our main explanatory and dependent variables. Appendix C shows definitions of all variables. Panel A shows summary statistics for the 2015 event return sample (209 firms). Panels B and C show summary statistics for the semi-annual and annual panel data sets we use in Section 5 to study the real effects following the appreciation. The first four columns of Panel A show the number of observations, mean, standard deviation, and median for all 209 firms where available. Columns 5 to 8 show the same information for the sample of 127 firms for which we have complete geographic segment data to carry out the main event return regressions. The fraction of firms with available segment data to calculate currency exposures is comparable to the fraction found in other studies (e.g., Bartram, Brown, and Minton, 2010). The two sets of summary statistics allow us to analyze which firms report segment data and whether the use of segment data makes the sample less representative.

We observe geographic segment data on foreign sales for 164 out of 209 sample firms. The average Swiss firm obtains 63% of its revenues from outside Switzerland, and the median Swiss firm obtains 85% of revenues from outside Switzerland. For 141 Swiss firms we observe fixed assets (or identifiable non-current assets) by geographic segment. The average (median) firm has 54% (52%) of its fixed assets in Switzerland. In the international sample of manufacturing firms in Bartram, Brown, and Minton (2010), the average firm reports foreign sales of 34.6% of total sales, and foreign assets average 19.2% of total assets. The average Swiss firm has therefore substantially more foreign exposure than the average manufacturing firm in Bartram, Brown, and Minton (2010), a fact that reflects Switzerland's

status as a small, open economy. The numbers for foreign sales and fixed Swiss assets change very little once we condition on the availability of complete segment data for both revenues and fixed assets. The largest deviation is that the median fraction of fixed assets in Switzerland changes from 0.52 to 0.45, meaning that firms that report complete segment data tend to be more international. In the empirical analysis, we use the median values of foreign to total sales and fixed Swiss assets over total fixed assets reported in Column 8 of Panel A to define the two indicator variables measuring currency exposure. We define a firm to have significant currency exposure if its value for foreign to total sales is larger than the median of 0.88, and if the ratio of its total Swiss to total fixed assets is larger than the median of 0.45.

The average and median currency betas with respect to the CHF/EUR exchange rate are 0.37 and 0.32, respectively. The average (median) absolute t -statistic of the currency beta is 1.55 (1.24). Twenty-five percent of the firms have an absolute t -statistic of the currency beta above 2.25. These numbers illustrate that at least some Swiss firms in our sample have significantly higher exposure to the Eurozone than the 20 firms in the Swiss stock market index SMI.¹¹ In contrast, Swiss firms seem to be far less exposed to the dollar. The mean dollar FX beta is -0.058 and the mean absolute t -statistic of the Dollar currency beta is 0.9. Looking at the whole distribution of the Dollar currency beta and its corresponding t -statistic, it turns out that the 95th percentile of the absolute t -statistic is 2.23, suggesting that as little as 5 % of the sample firms have economically meaningful Dollar currency exposure compared to the SMI. When conditioning on segment data being available (Columns 5-8), average and median Euro exposure increase, while Dollar exposure remains unchanged.

Turning to the capital structure variables, we find that, on average, Swiss firms finance about 16% of their assets using CHF denominated debt. Foreign currency denominated debt seems to play a less important role, but some Swiss firms do issue debt denominated in foreign currency. As such, 2.7 (1.5)

¹¹ If we do not control for the return of the Swiss stock market index (SMI) in Equation (1), we observe much higher CHF/EUR currency beta estimates. The average and median CHF/EUR beta increase to 1.33 and 1.15, respectively, and the absolute t -statistic increases to 7.06. Controlling for the SMI return has a large effect on the beta estimates because the SMI has a very high CHF/EUR beta itself (=1.41), reflecting the high overall exposure of the Swiss economy to the Eurozone. Hence, the multivariate beta estimates reported in Table 2 should be interpreted as measures of relative (not absolute) currency exposure.

percent of assets are financed by foreign currency (Euro) denominated debt. Conditional on having issued Euro-denominated debt, the average fraction of Euro debt / total assets is an economically meaningful 8%. These figures are virtually identical for the sample of firms for which we observe complete segment data (Columns 5-8).

The average stock return on January 15, 2015 was minus 4.9%, and for the sample with complete segment data minus 6.2%. The average cumulative 3-day return from January 15 to January 19, 2015 is minus 8% for the overall sample, and minus 9.5% for the restricted sample. The average sample firm reports total assets of about CHF 22 billion, and the median sample firm has total assets of about CHF 1 billion. The distribution of total assets is skewed because of the two large Swiss banks that have balance sheets of close to CHF 1 trillion. Once we condition on the availability of complete segment data, the median firm has total assets of CHF 1.49 billion. Hence, larger firms are more likely to report segment data. The average and median market to book ratios are 1.64 and 1.22, respectively, and are slightly higher in the restricted sample.

Columns 1 to 4 of Panel B show summary statistics for the panel data of 172 Swiss firms that report data on total assets, net cash flow, the market-to-book ratio, and industry classification at least once between 2009 and 2015. The panel shows summary statistics for variables at the semi-annual frequency. The mean and median foreign to total sales are 0.61 and 0.76, respectively. Swiss fixed to total fixed assets average 0.57. The Euro FX beta has a mean of 0.35 whereas the US dollar FX beta is on average about -0.07. All these figures are quite similar in the sample for which full geographic segment data is available.

Panel B of Table 2 also shows summary statistics for sales over total assets, return on assets, net profit margin, capital expenditures, total assets, cash flow, and the market-to-book ratio. With one Swiss franc of assets the average Swiss firm generates sales worth 0.41 Swiss francs over a period of six months. The average and median ROA are 2.7%. The average net margin is about 5.4%. Total capital expenditures scaled by fixed assets average 8.8%, and the average firm reports a net cash flow of 3.4%. The market-to-book ratio is 1.51 on average.

Panel C of Table 3 reports summary statistics for the panel at the annual frequency. The average (median) Swiss firm has about 6,248 (1,294) employees. Average (median) employment is about 8,660 (2,003) for firms that report geographical data, again reflecting the fact that larger firms are more likely to report complete segment data.

3. Stock market reaction to the introduction and repeal of the CHF/EUR minimum exchange rate

Figure 1 shows the reaction of the Swiss Market Index (SMI) to the introduction (top panel) and repeal (bottom panel) of the CHF/EUR minimum exchange rate. The SNB introduced the minimum exchange rate of 1.20 CHF/EUR on September 6, 2011, and abandoned it on January 15, 2015. The solid blue line shows the evolution of the CHF/EUR exchange rate. The top panel shows that the CHF/EUR exchange rate had almost hit parity in August 2011. After a slight recovery of the exchange rate to about 1.1 CHF/EUR, the SNB officially introduced the minimum exchange rate of 1.20 CHF/EUR on September 6th, 2011. This lower bound was not broken until the repeal of the minimum exchange rate in 2015. The red dotted line illustrates the evolution of the Swiss market index. The SMI moved in lockstep with the exchange rate in the four months prior to the introduction of the minimum exchange rate and declined from about 6,500 points in April 2011 to 5,150 points on September 5, 2011. On the day of the announcement of the minimum exchange rate, the SMI increased by 4.3%.

The bottom panel of Figure 1 shows the stock market reaction to the repeal of the CHF/EUR minimum exchange rate. It is evident from the figure that the reactions both in the currency market as well as in the stock market were much more pronounced than at the introduction of the minimum exchange rate. The Swiss franc dropped from 1.20 CHF/EUR to below parity on January 15, 2015. The SMI lost 8.7% on January 15 and another 6% on January 16 for a total two-day drop of almost 1300 points or more than 14%. Hence, market participants believed that the Swiss economy would be severely affected by the strong Swiss franc. In unreported analysis, we calculate the correlation between the one-day stock market returns of Swiss firms on September 6, 2011 (introduction of the minimum exchange rate) and on January 15, 2015 (repeal of the minimum exchange rate). The correlation is -0.34 and

statistically significant at the 1% level. The result suggests that the firms that benefitted most from the introduction of the minimum exchange rate were also the ones most affected by its repeal.

The bottom panel of Figure 1 seems to imply that the Swiss stock market had fully recovered from the unexpected currency appreciation shock two months later and that the shock may have only been transitory. Figure 2 shows, however, that this is not the case. In Figure 2 we display the evolution of the DAX, Germany's main stock market index comprised of the 30 largest German stocks, and compare it with the evolution of the SMI over the 8 months centered on the announcement of the repeal of the minimum exchange rate. It is clear from Figure 2 that the shock to the Swiss stock market from the repeal of the minimum exchange rate was large and persistent. While the German and Swiss stock markets move largely in parallel before the repeal of the minimum exchange rate, the two indexes diverge sharply on the day of the announcement and stay apart for several months after the repeal.

Figure 3 shows the median cumulative abnormal returns of firms that we define as treated, i.e. that have both high foreign sales and a high fraction of identifiable assets in Switzerland (dashed blue line) relative to all other Swiss firms (solid red line). We would expect that firms with high currency exposure are most affected by the currency appreciation shock. Figure 3 confirms this hypothesis: over the two days around the announcement of the repeal of the minimum exchange rate, stock prices of firms with high currency exposure dropped by almost 20 percentage points, while the control group dropped by only about 15 percentage points. Note that cumulative returns are corrected for variation explained by the Swiss stock market index, firm size, and market to book ratio.

We now turn to a more formal analysis of the event returns and relate the raw January 15, 2015 announcement return to our measures of foreign currency exposure. We start by regressing announcement returns on the ratio of foreign to total sales. We also include several control variables such as firm size, the market-to-book ratio, and industry dummies (δ_j):

$$\text{ret}_i = \beta_0 + \beta_1 \text{Foreign sales}_i + \Gamma \times \text{controls}_i + \delta_j + \varepsilon_i \quad (2)$$

The results are reported in Column 1 of Table 3. The coefficient on *Foreign sales* is -0.048, or -4.8% and strongly significant. Firms that have a one-standard deviation (0.393) higher fraction of foreign sales therefore exhibit a 1.9% lower announcement return. The economic magnitude is large: relative to the sample average announcement return of minus 4.9%, the return is almost 40% lower. Our result is consistent with the existing literature (e.g., Jorion, 1990; Williamson, 2001).

In Column 2 of Table 3, we replace the fraction of foreign sales to total sales by the fraction of Swiss fixed assets to total fixed assets. Interestingly, the coefficient is positive. Firms that have more production facilities in Switzerland did relatively better than other Swiss firms on the day of the announcement. This result is driven by the fact that firms with more production facilities in Switzerland have on average also more sales in Switzerland and are likely to be import oriented. The correlation between Swiss assets and foreign sales is -0.76. The strong, positive coefficient on Swiss assets could thus reflect lower import prices and thus a better competitive position for such import oriented firms. In Column 3, we control for both foreign sales and fixed Swiss assets. The *Foreign sales* variable continues to be strongly negatively significant; its economic magnitude increases by almost forty percent. In contrast, the fixed assets variable becomes indistinguishable from zero.

In Column 4 of Table 3, we estimate the main specification which identifies the treatment effect of the exchange rate shock on firms with both high foreign sales and high Swiss fixed assets. These firms ought to be the most affected by the currency shock. To identify the treatment effect, we interact two indicator variables that are equal to one if a firm has above median foreign sales and above median Swiss fixed assets. The interaction term identifies the firms that have their cost basis in Switzerland, but receive their main revenues from abroad. We estimate:

$$\begin{aligned} \text{ret}_i = & \beta_0 + \beta_1 I_{\text{Foreign sales} > Q50, i} + \beta_2 I_{\text{Fixed assets CH} > Q50, i} + \\ & + \beta_3 I_{\text{Fixed assets CH} > Q50, i} \times I_{\text{Foreign sales} > Q50, i} + \Gamma \times \text{controls}_i + \delta_j + \varepsilon_i \end{aligned} \quad (3)$$

where $I_{x>Q50, i}$ denote indicator variables equal to one if the respective firm-level variable (e.g., fixed assets CH) exceeds the sample median, and zero otherwise. The coefficient of interest in this specification is β_3 , which measures the treatment effect, that is how the value of firms with the highest foreign currency exposure changes due to the exchange rate appreciation shock.

Column 4 of Table 3 shows that the coefficient estimate on the interaction term is negative, strongly significant, and economically large. The stock prices of firms that export a lot but produce mainly in Switzerland fall by an additional 4.9% compared to other Swiss firms. The treatment effect of minus 4.9% is economically large, considering that the average stock price decrease on January 15, 2015 is 4.9%. The positive and significant coefficient of 0.032 on the Swiss fixed assets indicator variable shows that firms that had both Swiss assets and Swiss sales above the median did relatively well on the day the minimum exchange rate was abandoned.

In Column 5, we use the CHF/EUR currency beta as a measure of currency exposure. Note that this variable is available for the most comprehensive set of firms (172/209). Since some of the currency betas are not significant, we code an indicator variable which takes the value of 1 if the variable *FX beta EUR* exceeds the 75th percentile value and 0 otherwise. We find that firms with the highest Euro currency betas and thus the highest exposure to the CHF/EUR exchange rate, have 2.8 % lower returns on the day of the announcement of the repeal of the minimum exchange rate. Relative to the average return of minus 4.9% in the broader sample (see Table 2, Panel A, Column 2), this corresponds to an almost 60% lower announcement return. Note that we also include a firm's currency exposure to the US dollar in the regressions. The reference currency for the minimum exchange rate was the Euro, and the Euro depreciated gradually against the US dollar in the months prior to the repeal of the minimum exchange rate. Hence, Swiss firms who export a significant fraction of sales to the US rather than the Euro zone may have been affected less severely by the Swiss franc's appreciation. The one-day appreciation against the dollar on January 15th would be offset by the depreciation of the Euro against the US Dollar that occurred during the previous months. Indeed, we find that the estimated effect of the US Dollar exposure is both economically and statistically insignificant.

Overall, the evidence across all five columns is robust and consistent with our hypothesis: Swiss firms that had more currency exposure had worse stock market returns on the day of the repeal of the minimum exchange rate. Regarding the control variables, some specifications in Table 3 show that larger firms and firms with higher market-to-book ratios did more poorly on the announcement day.¹²

In Table 4, we repeat our analysis with an extended event window of plus two trading days, because Figure 1 suggests that the market also significantly adjusted downwards after January 15. All estimated coefficients increase substantially in magnitude and retain or increase their statistical significance. For example, we learn from Column 4 of Table 4 that the coefficient of the indicator variable equal to one for firms that export a lot but produce in Switzerland is minus 9.7%. Thus, during the extended event window, the stock prices of treated firms dropped by an additional 9.7% relative to stock prices of control firms. The corresponding coefficient in Table 3 was minus 4.9%. Turning to the specification in Column 5 of Table 4, we find that firms with the highest CHF/EUR exposure as measured by the Euro currency beta are associated with a 3.5% lower cumulative announcement return. Overall, Table 4 shows that the market took several days to incorporate the consequences of the appreciation of the Swiss franc into stock prices, and became more concerned about the currency exposure of Swiss firms as time progressed. The relative value losses of the most exposed firms doubled during the three day interval and amounted to almost 10% of their market capitalization.

4. Financial hedging and the stock market reaction to the repeal of the CHF/EUR minimum exchange rate

Previous studies (e.g., Bartram, Brown, and Minton, 2010) find that firms use financial hedges to reduce their foreign currency exposure. Typically, firms use a combination of FX derivatives and foreign currency denominated debt. Unfortunately, it is difficult to observe the use of FX derivatives at the firm-level. Yet, there is anecdotal evidence that firms in Switzerland stopped, or at least substantially reduced,

¹² In un-tabulated analyses, we also restrict our sample to non-financial firms. The economic magnitude of the regression coefficients for our different currency exposure measures decrease slightly relative to Table 3 but the coefficients on the interaction term remain economically and statistically significant in all specifications.

their financial hedging of foreign currency risk during the period of the minimum exchange rate, when the CHF/EUR rate volatility was in fact close to zero.¹³

We focus on the extent to which firms use foreign currency denominated debt in their capital structure for two reasons. First, data on foreign currency denominated debt issuance is readily available. Second, the observation that many firms stopped using derivatives to hedge currency exposure also allows us to identify and isolate the role of foreign currency denominated debt in hedging exchange rate exposure more cleanly. We expect that firms that were hedged through Euro denominated debt on the day the minimum exchange rate was abandoned suffered less, or perhaps even benefited from the strong appreciation of the Swiss franc against the Euro.

In Column 1 of Table 5, we show the results from a regression of the cumulative three day return on the variable *Leverage EUR*, which is defined as the ratio of Euro denominated debt over total assets. We also include *Leverage CHF* and the same control variables we used in Tables 3 and 4. The coefficient estimate on *Leverage EUR* is economically sizeable and highly statistically significant. A one standard deviation increase in *Leverage EUR* (0.046) is related to a 1.5 percentage points higher three day cumulative return following the repeal of the minimum exchange rate. Compared to the negative 9.5 percent three day cumulative return for all firms, financial hedging through Euro denominated debt allowed absorbing about 15 % of the negative impact of the Swiss franc appreciation. In Column 2, we replace *Leverage EUR* by *Leverage foreign*, the ratio of all foreign currency debt over total assets. The regression produces a slightly smaller but statistically significant coefficient estimate of 0.29. In Column 3, we now verify whether exporters (i.e., firms with above median foreign sales) that used Euro denominated debt suffered less from the exchange rate shock. We find that exporters with above median Euro denominated debt experienced an 8.3 percentage-points higher cumulative three day announcement

¹³ An equity analyst suggested that “No one in Switzerland has hedged their forex exposure” (<http://www.bloomberg.com/news/articles/2015-01-15/swiss-exporters-face-tsunami-after-snb-unexpectedly-drops-cap>). A survey among large Swiss firms right after the minimum exchange rate was abandoned shows that only a fifth of firms surveyed had a (partial) financial hedge in place. (see <http://goo.gl/mHI925>). Interestingly, the number of firms that employ financial hedges increased significantly during the following months and reached almost 60% in May 2015.

return. Compared to the average three day cumulative return of -9.5 percent, exporters with Euro hedges in place were able to offset a significant portion of the shock. Column 4 shows that the financial benefits from hedging via other foreign currency denominated debt are somewhat lower, but still economically and statistically significant.

5. How did Swiss firms respond to the unexpected currency appreciation shock?

In its third SNB Quarterly Bulletin for the year 2015, the board of governors of the Swiss National Bank provides suggestive evidence that the currency appreciation has triggered real effects for firms.¹⁴ For instance, data from national accounts show a decrease in capital investment of about 1% in the first quarter of 2015. In addition, exports of goods (services) declined by 8.6 (5.4) percent over the same period, suggesting that the unexpected appreciation had a substantial negative real impact on Swiss firms. Such macro evidence as well as evidence presented in Bonadio, Fischer, and Sauré (2016), who use customs data to study the speed at which the SNB induced exchange rate shock was "passed-through" into Swiss import and export prices, suggest that firms adjusted to the exchange shock rather quickly (i.e., in the immediate months following the announcement). The SNB bulletin also provides corroborating evidence from a survey showing that about 80% of the 182 firms that participated in the SNB survey (both public and private firms) expected a somewhat negative impact from the exchange rate appreciation. Negatively affected survey firms responded that they would take measures such as reductions in staff and investment in Switzerland as responses to the currency appreciation.

In this section, we investigate the real effects of the exchange rate shock on Swiss firms' competitiveness in a systematic way. We first examine how sales responded to the shock. The evidence from the SNB Bulletin highlights substantially lower exports at the macro level, which suggests that we should find a decrease in sales at the micro level, too. We then analyze how profitability, measured by return on assets (ROA) and the net profit margin, was affected. Finally, we examine measures that

¹⁴ See <http://goo.gl/O3a3aK> . The SNB Quarterly Bulletin is published by the board of governors of the SNB and highlights monetary policy and other significant economic developments in Switzerland.

managers could have taken after the appreciation of the Swiss franc to restore competitiveness. In particular, we examine real investment as measured by capital expenditures divided by fixed assets. Finally, firms could have decreased the number of employees and so we also study the employment choices of Swiss firms in the aftermath of the shock.

We begin by analyzing the effect of the exchange rate shock on sales over lagged total assets, ROA, net profit margin, and capital expenditures over total lagged fixed assets. We focus on semi-annual data from interim accounting statements because existing macro evidence suggest that firms responded to the shock rather quickly. We estimate the following specification:

$$\begin{aligned}
y_{it} = & \beta_0 + \beta_1 \times I_{2015} \times I_{\text{Fixed assets CH} > \text{Q50}, it} \times I_{\text{Foreign sales} > \text{Q50}, it} \\
& + \beta_2 \times I_{2015} \times I_{\text{Fixed assets CH} > \text{Q50}, it} + \beta_3 \times I_{2015} \times I_{\text{Foreign sales} > \text{Q50}, it} \\
& + \beta_4 \times I_{\text{Fixed assets CH} > \text{Q50}, it} \times I_{\text{Foreign sales} > \text{Q50}, it} + \beta_5 \times I_{\text{Fixed assets CH} > \text{Q50}, it} \\
& + \beta_6 \times I_{\text{Foreign sales} > \text{Q50}, it} + \beta_7 \times I_{2015} + \Gamma \times \text{controls}_{it} + \eta_t + \delta_j + \varepsilon_{it}, \quad (4)
\end{aligned}$$

where I_{2015} is an indicator variable equal to one if the firm-half year observation is from 2015. As in Section 3, exposed firms are identified through the interaction term $I_{\text{Fixed assets CH} > \text{Q50}, it} \times I_{\text{Foreign sales} > \text{Q50}, it}$.¹⁵ The vector η_t comprises calendar half-year fixed effects as well as an indicator variable equal to one if the observation is in the second fiscal half-year of the firm. δ_j are industry-fixed effects. We also include time-varying control variables that are standard in the respective regressions (e.g., the market-to-book ratio). The control and currency exposure variables are defined as in the event study and are measured at the end of the preceding fiscal year. For example, a firm-half year observation in 2015 is associated with the fraction of foreign sales and Swiss fixed assets as of fiscal year-end 2014.

¹⁵ Note that we are using the sample medians for foreign sales and fixed Swiss assets in 2014 to define what currency exposure means. We use constant thresholds instead of using year-by-year medians to keep our definition of what it means to be an exposed firm constant, and to use the same exposed firms as in the event return sample used in Tables 3 and 4. Having said this, the median of these two variables is quite stable in the time series, and using year-by-year medians to define the variable (and thus measure exposed firms *relative* to control firms in each year) leads to quantitatively and qualitatively similar results.

The key coefficient of interest in the above Equation (4) is β_1 , which measures how Swiss firms with significant foreign sales and significant domestic costs reacted in 2015. We estimate these specifications using samples running from 2009 until June 2015 (December 2015).

Table 6 shows the results for the ratio of sales over total assets. In Columns 1 to 5 the regression sample ends in June 2015, whereas Columns 6 and 7 present results for samples that end in December 2015. In Column 1, we relate the sales to assets ratio to the fraction of foreign sales measured at year-end 2014. The coefficient is negative, albeit not significant. The same is true for the interaction effect $2015 \times Sales\ Foreign$. In Column 2, we replace the fraction of foreign sales by the fraction of Swiss fixed assets. The interaction term between the 2015 dummy and *Fixed assets CH* is positive and significant, showing that firms with more Swiss fixed assets had higher sales in 2015 than other Swiss firms. We simultaneously include the ratio of foreign sales and the ratio of Swiss fixed assets, both interacted with the 2015 dummy, in Column 3. Firms with high fixed assets in Switzerland did better in terms of sales in 2015, potentially due to lower import prices. In Column 4 of Table 5 we show the treatment effect on firms that sell mainly abroad but incur most of their costs in Switzerland as identified by high shares of foreign sales and domestic fixed assets. The regression shows a significant regression coefficient of -0.144 for the triple interaction term $2015 \times Fixed\ assets\ CH > Q50 \times Sales\ foreign > Q50$. During the first half of 2015, each Swiss franc of assets generates 0.14 francs lower sales for firms that sell mostly abroad but have most of their costs in Switzerland. Column 4 therefore provides evidence that firms with significant foreign currency exposure suffered a sharp decline in sales in the first half of 2015. In Column 5, we interact the 2015 indicator with both the high euro and high dollar FX beta indicator variables. While the interaction effect between the 2015 dummy and the high dollar FX beta is indistinguishable from zero, we find that firms with high Euro exposure (measured by being in the top quartile of the distribution of estimated CHF/EUR currency betas) generate 0.047 francs lower sales per franc of assets than otherwise similar firms. In Columns 6 and 7 we re-estimate the regressions of Columns 4 and 5 but include the second half-year of 2015 in the regression sample. Consistent with the intuition that firms adapted in the first half of 2015, the coefficient estimates are somewhat smaller than in Columns 4 and 5.

In the case of our high domestic and cost high foreign sales identification strategy (Column 6), the treatment effect is about 15 percent lower, while the treatment effect based on the CHF/EUR currency beta decreases by about 6 percent. It is interesting that the reduction in sales did not continue in the second half of 2015. One possibility is that Swiss firms adapted their pricing and cost structure, and reduced margins to stabilize sales. We therefore analyze next what happens to profitability.

Table 7 shows results for return on assets, which we measure as earnings before interest and taxes divided by lagged total assets. Column 1 shows that firms with a significant fraction of foreign sales had a somewhat lower ROA in 2015. The effect is marginally significant. In terms of economic significance, a one standard deviation higher fraction of foreign sales (0.381) is associated with 0.4 percentage points lower ROA. Relative to the sample mean of 2.7%, the decrease corresponds to a 15% lower ROA. Column 4 shows the specification in which we estimate the β_1 coefficient from Equation (4) above. The coefficient is economically large and statistically significant at the 5% level. Firms most exposed to the currency appreciation experienced a decrease in ROA of 4.2 percentage points. In Column 5, we measure currency exposure with the Euro and Dollar FX betas. The coefficients on the interaction of the 2015 indicator and currency exposure measured by the currency betas are negative, but not statistically significant. When we include the second half of 2015 in estimating the specification based on the interaction between high foreign sales and high Swiss fixed assets (see Column 6), we obtain a more negative treatment effect: including the second half of the year, the treatment decreases by 26 percent from -0.042 to -0.053, suggesting that the measures taken in the first half of 2015 might have reduced profitability.

The currency appreciation shock should exert considerable pressure on profit margins of export-oriented firms. This is because the evidence in Bonadio, Fischer, and Sauré (2016) suggests that firms have responded by lowering the prices at which they sell their goods and services abroad to counteract the currency-induced price increase. While the evidence on ROA already points in this direction, we now look directly at the impact of the currency appreciation on net profit margin, which we define as net income before preferred dividends divided by net sales.

Column 4 of Table 8 shows that treated firms, i.e. firms with high foreign sales and high domestic fixed assets, experienced a large reduction in margins. The coefficient on the triple interaction $2015 \times \text{Fixed assets } CH > Q50 \times \text{Sales foreign} > Q50$ is -0.152 and significant at the 5 percent level, which is a substantial treatment effect (of minus 15.2 percentage points) when compared to the average net profit margin of 5.4 percent. The estimation in Column 4 does not include the second half of 2015, but when we include the second half-year of 2015 in Column 6, the coefficient estimate on the triple interaction decreases to -0.194, suggesting that the reduction in margins was at least as strong in the second as in the first half of 2015. The coefficients on the treatment effects based on the CHF/EUR beta (see Columns 5 and 7) are not statistically significant.

We now turn to investigating how exposed firms reacted to the documented drops in revenues, profitability, and margins. First, we examine whether there was a reduction in real investment during the first half of 2015. Table 9 reports how Swiss firms changed their capital expenditures (standardized by lagged property, plant, and equipment) in 2015. We observe statistically and economically large effects for exposed firms. Column 4 of Table 8 shows that Swiss firms with large foreign sales and a Swiss cost basis had 8.1 percentage points lower real investment than otherwise similar firms in the first half of 2015. We find similar effects when we measure currency exposure with the Euro FX beta (see Column 5). The magnitudes of the treatment effects change little when including the second half of 2015 (see Columns 6 and 7). The evidence in Columns 6 and 7 indicates that the reduction in capital expenditures that we observe in the first half of 2015 is not a temporary effect. Firms could have waited for the uncertainty about the economic situation immediately after the repeal of the minimum exchange rate to resolve, and delay capital expenditures to the second half of 2015. Columns 6 and 7 suggest otherwise.

The control variables in Table 9 tend to have the expected signs: Smaller firms, firms with higher cash flows and more growth options have higher (relative) capital expenditures. Overall, the evidence of Table 9 shows that Swiss firms with significant currency exposure substantially reduced their capital expenditures, echoing the macro data from the SNB's Quarterly Bulletin.

In our final set of results, we investigate whether the currency appreciation shock had an impact on employment. Since employment data are not reported in interim financial statements, we use yearly data. In Table 10, we report results of several regressions of $\ln(\text{employment})$ on the previously introduced measures of currency exposure. In Column 1, we use the interaction of the 2015 indicator and *Foreign sales* as our proxy of foreign currency exposure. While the coefficient on the interaction term is not significant, the base effect on 2015 actually is. It appears as if in fact firms with low foreign sales decreased employment in 2015. When using our combined identification strategy based on both foreign sales and Swiss fixed assets, the triple interaction effect $2015 \times \text{Fixed assets } CH > Q50 \times \text{Sales foreign} > Q50$ is negative (see Column 4) but not statistically significant. In Column 5, however, the treatment effect based on the Euro FX beta produces a marginally significant negative coefficient, suggesting that firms with high Euro exposure were subject to reductions in employment in 2015. In unreported results, we repeat the analysis for employment growth and labor cost per employee, which we define as staff costs divided by total employment. The treatment effects are not statistically significantly different from zero.

It is surprising that we do not find stronger employment effects in our analysis. The absence of strong employment effects might be due to the characteristics of the firms included in our sample and the coarse nature of the employment data. In their annual reports, firms only publish the number of employees worldwide, and do not separate employees by geographic region. Our sample is tilted towards large and internationally diversified firms. Employment in Switzerland might have decreased for these firms and been moved to other production sites, leading to a zero effect. One would expect a stronger effect on employment for Switzerland's many small and medium-size enterprises that do not have the possibility to move employees to production sites abroad.

6. Conclusion

Our paper addresses an unresolved question in the corporate finance literature: What, if any, is the impact of a sudden and strong currency appreciation on a firm's valuation and policies? The question has regained importance in light of the recent series of large unexpected currency swings and increasingly

drastic central bank actions. Yet, despite the large attention that policy makers and economists devote to exchange rates, the empirical micro evidence on the impact of sudden exchange rate movements on companies is scarce, especially for developed economies.

We exploit the surprise January 2015 announcement by the Swiss National Bank to abandon the Swiss franc's minimum exchange rate to the Euro as a laboratory setting. The appreciation of the Swiss franc by 15% in one day constitutes an unprecedentedly large shock to the currency of a stable and developed economy. Our analysis shows that the sudden and unexpected home currency appreciation had a significant impact on domestic firms. Companies with high currency exposure experienced 5% lower announcement returns than other Swiss firms on the day the minimum exchange rate was removed. During the following six month, these exposed firms experience an immediate and economically sizeable reduction in their sales, net profit margins, and profitability compared to other less exposed firms. They respond to the adverse currency shock mainly by reducing their capital expenditures by 8.1%. Surprisingly, we do not find strong negative employment effects, which is likely to be due to the fact that our sample consists only of large and publicly listed firms.

In summary, our setting allows us to quantify both the real and financial effects of a large adverse currency shock on exposed firms without contaminating macro effects. Our analysis of the Swiss franc appreciation offers important lessons for other developed economies that are subject to large currency movements.

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Appendix A: Which Swiss firms are affected by the sudden appreciation of the Swiss franc?

We use the following stylized example to show which Swiss firms are most affected by the currency appreciation. For simplicity, we separate the universe of Swiss firms into four groups along two sorting variables: Revenues and costs. Firms can either have all revenues in Euro or all revenues in CHF, and they can have either all cost of production in Euros or all cost of production in CHF. The table analyzes what happens after a currency appreciation to revenues (R), costs (C), and profits (P).

| | Revenue in Switzerland | | Revenue in Eurozone | |
|---------------------|--|--|--|--|
| Cost in Switzerland | Domestic Players | | Exporters | |
| | CHF/EUR = 1.20 R = 144 CHF C = 120 CHF P = 24 CHF | CHF/EUR = 1.00 R = 144 CHF C = 120 CHF P = 24 CHF | CHF/EUR = 1.20 R = 144 CHF C = 120 CHF P = 24 CHF | CHF/EUR = 1.00 R = 120 CHF C = 120 CHF P = 0 CHF |
| Cost in Eurozone | Importers | | Internationals | |
| | CHF/EUR = 1.20 R = 144 CHF C = 120 CHF P = 24 CHF | CHF/EUR = 1.00 R = 144 CHF C = 100 CHF P = 44 CHF | CHF/EUR = 1.20 R = 144 CHF C = 120 CHF P = 24 CHF | CHF/EUR = 1.00 R = 120 CHF C = 100 CHF P = 20 CHF |

We make the simplifying assumptions that all four hypothetical Swiss firms denominate their balance sheet in CHF, cannot pass price increases on to their customers, and that none of these firms is affected by any indirect effects such as lower aggregate demand or higher competition from imports. The upper left bin of the table illustrates the situation of domestic players. Firms that produce and sell in Switzerland should not experience a direct effect after the currency appreciation. A good example from our sample is Swisscom AG, a provider of telecommunication and cable television services to Swiss residents. Swisscom obtains some minor revenues from Italy (17.5%), but its main revenue and cost base is located in Switzerland (77% cost in CH, 82% revenues in CH). The top right bin covers exporters, the firms that are most affected by the currency appreciation. Those are the firms that produce in Switzerland and mainly sell their goods to the Eurozone. If they want to maintain the quantity sold, they have to adjust

prices, with a direct effect on the profit margin. A good Swiss example would be watch manufacturer Swatch Group (72% cost in CH, 11% revenues in CH).

The bottom right bin shows a firm that has its headquarters in Switzerland, but conducts most of its business abroad. With both revenue and cost of production located abroad, these internationals have large operational hedges. Interestingly, they are also affected by the currency appreciation via a translation effect: Profits are constant in Euros but drop by 20% because of the CHF/EUR currency appreciation. Good examples from our sample for such multinational firms include Nestle (6% cost in CH, 2% revenues in CH), Roche Pharmaceuticals (16% cost in CH, 2% revenues in CH) or Logitech (2% cost in CH, 2% revenues in CH).

The bottom left bin corresponds to an importer headquartered in Switzerland that sells its products to the Swiss markets, but has all of its cost abroad. The firm would significantly benefit from a currency appreciation. There are relatively few of those importers in our sample, but an example that approximates this scenario would be battery producer Leclanche SA (4% cost in CH, 53% revenues in CH).

Appendix B: Foreign sales and Swiss fixed (non-current identifiable) assets of sample firms

| Name | Foreign sales / total sales 2014 | Fixed assets CH / total assets 2014 |
|-------------------------------|----------------------------------|-------------------------------------|
| ABB LTD N | 0.980 | 0.160 |
| ACTELION LTD. | 0.990 | 0.900 |
| ADECCO SA | 0.980 | 0.070 |
| AEVIS HOLDING SA | 0.000 | 1.000 |
| AFG ARBONIA FRST. HLDG. AG | 0.600 | 0.390 |
| ALLREAL HOLDING AG | 0.000 | 1.000 |
| ALPIQ HOLDING AG | 0.680 | 0.800 |
| ALSO HOLDING AG | 0.890 | 0.250 |
| ART & FRAGRANCE SA | 0.980 | 0.280 |
| ARYZTA AG | 0.950 | 0.070 |
| ASCOM HOLDING AG | 0.920 | 0.020 |
| AUTONEUM HOLDING AG | 1.000 | 0.100 |
| BACHEM HOLDING AG | 0.860 | 0.830 |
| BALOISE-HOLDING AG | 0.450 | 0.540 |
| BANQUE CANTON. DE GENEVE | 0.040 | 0.840 |
| BANQUE CANTON. VAUDOISE | 0.020 | 0.920 |
| BARRY CALLEBAUT AG | 1.000 | 0.000 |
| BASILEA PHARMACEUTICA AG | 1.000 | 0.840 |
| BELIMO HOLDING AG | 0.960 | 0.560 |
| BELLEVUE GROUP AG | 0.000 | 1.000 |
| BFW LIEGENSCHAFTEN | 0.000 | 1.000 |
| BKW FMB ENERGIE AG | 0.460 | 0.660 |
| BOBST GROUP SA | 0.980 | 0.530 |
| BRGBH.ENGELB TRUEB TITLI | 0.000 | 1.000 |
| BUCHER INDUSTRIES AG | 0.950 | 0.140 |
| BURCKHARDT CMPSN.HLDG.AG | 0.970 | 0.830 |
| BURKHALTER HOLDING AG | 0.000 | 1.000 |
| BVZ HOLDING AG | 0.000 | 1.000 |
| CALIDA HOLDING AG | 0.850 | 0.090 |
| CARLO GAVAZZI HOLDING AG | 0.980 | 0.020 |
| CICOR TECHNOLOGIES | 0.610 | 0.740 |
| CLARIANT AG | 0.990 | 0.110 |
| COLTENE HOLDING AG | 0.920 | 0.380 |
| COMET HOLDING AG | 0.990 | 0.520 |
| COMPAGNIE FINANC.TRADITION SA | 0.990 | 0.300 |
| CREDIT SUISSE GROUP AG | 0.690 | 0.230 |
| DKSH HOLDING AG | 0.990 | 0.400 |
| EFG INTERNATIONAL AG | 0.660 | 0.300 |
| EMS-CHEMIE HOLDING AG | 0.550 | 0.410 |
| ENERGIEDIENST HOLDING AG | 0.870 | 0.380 |
| EVOLVA HOLDING SA | 0.030 | 0.170 |
| FEINTOOL INTL.HOLDING AG | 0.980 | 0.150 |
| FLUGHAFEN ZURICH AG | 0.000 | 1.000 |
| FORBO HOLDING AG | 0.980 | 0.040 |
| FUNDAMENTA REAL EST. AG | 0.000 | 1.000 |
| GALENICA AG | 0.150 | 0.810 |

| Name | Foreign sales / total sales 2014 | Fixed assets CH / total assets 2014 |
|--------------------------------|-------------------------------------|--|
| GAM HOLDING AG | 0.670 | 0.990 |
| GATEGROUP HOLDING AG | 0.890 | 0.170 |
| GEORG FISCHER AG | 0.950 | 0.220 |
| GIVAUDAN SA | 0.990 | 0.190 |
| GROUPE MINOTERIES SA | 0.000 | 1.000 |
| HELVETIA HOLDING AG | 0.410 | 0.740 |
| HIAG IMMOBILIEN AG | 0.000 | 1.000 |
| HIGHLIGHT COMMUNICATIONS AG | 0.720 | 0.110 |
| HUBER & SUHNER AG | 0.920 | 0.480 |
| IMMOMENTUM AG | 0.000 | 1.000 |
| IMPLENIA AG | 0.260 | 0.820 |
| INTERROLL HOLDING AG | 0.990 | 0.270 |
| INTERSHOP HOLDING ag | 0.000 | 1.000 |
| INTERSPORT PSC HOLIDING AG | 0.000 | 1.000 |
| JULIUS BAR GRUPPE AG | 0.310 | 0.870 |
| KABA HOLDING AG | 0.860 | 0.120 |
| KOMAX HOLDING AG | 0.970 | 0.760 |
| KUDELSKI SA | 0.960 | 0.290 |
| KUEHNE & NAGEL INTL.G | 0.980 | 0.000 |
| KUONI REISEN HOLDING AG | 0.880 | 0.270 |
| LAFARGEHOLCIM LTD | 0.970 | 0.030 |
| LECLANCHE SA | 0.530 | 0.040 |
| LEM HOLDING SA | 0.990 | 0.380 |
| LEONTEQ AG | 0.560 | 0.860 |
| LIFEWATCH AG | 0.990 | 0.000 |
| LOGITECH INTL. SA | 0.980 | 0.020 |
| LONZA GROUP AG | 0.880 | 0.700 |
| LOOSER HOLDING AG | 0.820 | 0.570 |
| MICRONAS SEMICONDUCT. HLDG. AG | 1.000 | 0.000 |
| MOBILEZONE HLDG. AG | 0.000 | 1.000 |
| MOBIMO HOLDING AG | 0.000 | 1.000 |
| MYRIAD GROUP AG | 1.000 | 0.990 |
| NESTLE AG | 0.980 | 0.060 |
| NORINVEST HOLDING SA | 0.220 | 0.640 |
| NOVARTIS AG | 0.990 | 0.440 |
| OC OERLIKON CORP. AG | 0.960 | 0.530 |
| ORASCOM DEVEL. HOLDING AG | 1.000 | 0.000 |
| ORIOR AG | 0.040 | 1.000 |
| PANALPINA WELTTRANSPORT | 0.950 | 0.070 |
| PARGESA HOLDING SA | 0.990 | 0.010 |
| PEACH PROPERTY GROUP AG | 0.820 | 0.560 |
| PHOENIX MECANO AG | 0.950 | 0.040 |
| PSP SWISS PROPERTY AG | 0.000 | 1.000 |
| REPOWER AG | 0.670 | 0.670 |
| RICHEMONT N SA | 0.950 | 0.450 |
| RIETER HOLDING AG | 0.970 | 0.280 |
| ROCHE HOLDING AG | 0.990 | 0.240 |
| ROMANDE ENERGIE HLDG. SA | 0.000 | 1.000 |

| Name | Foreign sales / total sales 2014 | Fixed assets CH / total assets 2014 |
|--------------------------------|-------------------------------------|--|
| ROTHSCHILD SA | 0.560 | 0.330 |
| SCHAFFNER HOLDING AG | 0.980 | 0.090 |
| SCHINDLER HOLDING AG | 0.900 | 0.220 |
| SCHMOLZ & BICKENBACH AG | 0.980 | 0.160 |
| SE SWISS ESTATES AG | 0.000 | 1.000 |
| SFS GROUP AG | 0.770 | 0.210 |
| SGS SA | 0.960 | 0.050 |
| SIKA AG | 0.950 | 0.250 |
| SONOVA HOLDING AG | 0.990 | 0.170 |
| STARRAG GROUP HOLDING AG | 0.720 | 0.340 |
| STRAUMANN HLDG.AG | 0.960 | 0.140 |
| SULZER AG | 0.990 | 0.100 |
| SWISS FIN. & PROP. INVESTM. AG | 0.000 | 1.000 |
| SWISS LIFE HOLDING AG | 0.350 | 0.780 |
| SWISS PRIME SITE | 0.000 | 1.000 |
| SWISSCOM | 0.180 | 0.770 |
| SWISSLOG HOLDING AG | 0.930 | 0.450 |
| SYNGENTA AG | 1.000 | 0.390 |
| TAMEDIA AG | 0.000 | 1.000 |
| TECAN GROUP AG | 0.970 | 0.540 |
| TEMENOS GROUP AG | 0.960 | 0.230 |
| THE SWATCH GROUP AG | 0.890 | 0.720 |
| THERA METRICS AG | 0.910 | 0.910 |
| TORNOS HOLDING AG | 0.800 | 0.910 |
| U-BLOX HOLDING AG | 1.000 | 0.400 |
| UBS GROUP | 0.760 | 0.390 |
| VALIANT HOLDING AG | 0.000 | 0.980 |
| VALORA HOLDING AG | 0.340 | 0.440 |
| VILLARS HOLDING SA | 0.000 | 1.000 |
| VONTOBEL HOLDING AG | 0.480 | 0.680 |
| VSG VANGE SOFTW. GROUP AG | 1.000 | 0.000 |
| ZUG ESTATES HOLDINGS AG | 0.000 | 1.000 |
| ZWAHLEN & MAYR SA | 0.640 | 1.000 |

Appendix C: Variable definitions

| Variable name | Source | Definition |
|------------------------------------|------------------------------------|---|
| Currency exposure variables | | |
| Sales foreign | Capital IQ, geogr. segment data | Foreign sales over total sales |
| Fixed assets CH | Capital IQ, geogr. segment data | Swiss non-current identifiable assets |
| Leverage CHF | Capital IQ | Firm debt denoted in CHF divided by total assets |
| Leverage EUR | Capital IQ | Firm debt denoted in EUR divided by total assets |
| Leverage foreign | Capital IQ | Firm debt denoted in foreign currency divided by total assets |
| FX beta EUR | Thomson Reuters | Sensitivity of stock return to CHF/EUR exchange rate changes estimated over the years 2005 to 2008 using weekly returns data |
| <i>t</i> -stat FX beta EUR | Thomson Reuters | Absolute value of the <i>t</i> -statistics of the elasticity of the firm's stock return to CHF/EUR exchange rate |
| FX beta USD | Thomson Reuters | Sensitivity of stock return to CHF/USD exchange rate changes estimated over the years 2005 to 2008 using weekly returns data |
| <i>t</i> -stat FX beta USD | Thomson Reuters | Absolute value of the <i>t</i> -statistics of the elasticity of the firm's stock return to CHF/USD exchange rate |
| Dependent variables | | |
| Stock return Jan 15, 2015 | Thomson Reuters | Total return to holding the stock including capital gains and dividends |
| Cum. ret. Jan 15-19, 2015 | Thomson Reuters | Cumulative return to holding the stock including capital gains and dividends on Jan 15, Jan 16, and Jan 19. |
| Sales | Thomson Reuters | Net sales over total assets |
| Net margin | Thomson Reuters | Net income before preferred dividends divided by net sales |
| ROA | Thomson Reuters | Earnings before interest and taxes over lagged total assets |
| Capital expenditures | Thomson Reuters | Capital expenditures over lagged fixed assets |
| Employment | Thomson Reuters | Total employment |
| Control variables | | |
| Total assets | Thomson Reuters | Total assets in thousand CHF |
| Market-to-book | Thomson Reuters | Market capitalization and total liabilities over equity and total liabilities |
| Cash flow | Thomson Reuters | Net cash flow (net cash receipts and disbursements resulting from the operations of the company) divided by lagged total assets |
| EBIT / total assets | Thomson Reuters | Earnings before interest and taxes divided by total assets |
| 2nd Halfyear | Thomson Reuters | Indicator variable equal to one if observation is reported for second fiscal halfyear |

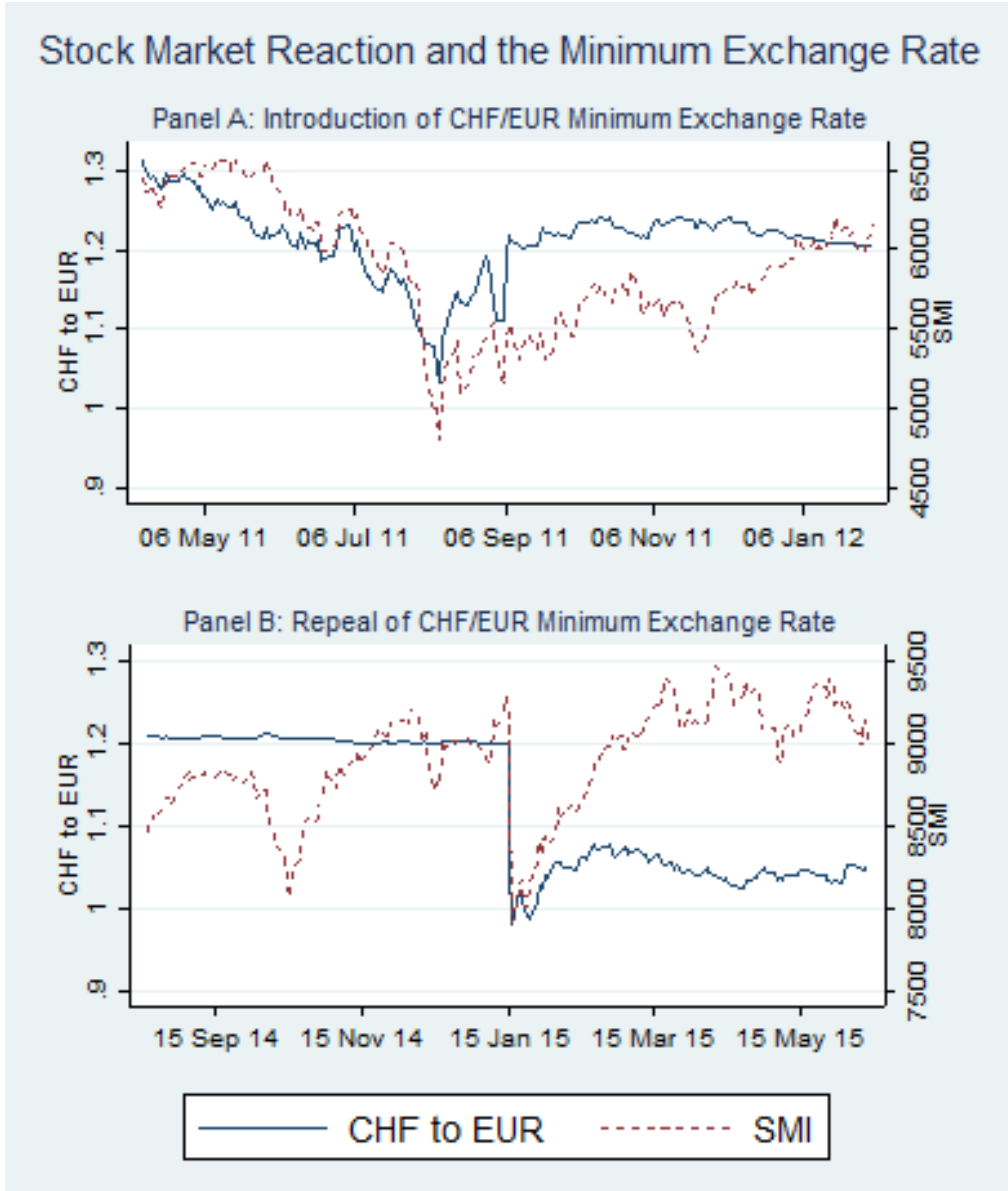


Figure 1. The figure shows the reaction of the Swiss Market Index (SMI) to the introduction (Panel A) and repeal (Panel B) of the CHF/EUR minimum exchange rate. The SMI comprises the 20 largest and most liquid Swiss stocks. The Swiss National Bank introduced the minimum exchange rate of 1.20 CHF/EUR on September 6, 2011, and abandoned it in a surprise announcement on January 6, 2015. The red dashed line shows the evolution of the SMI, and the solid blue line shows the evolution of the CHF/EUR exchange rate. The left-hand y-axis in both panels shows the CHF/EUR exchange rate, and the right-hand y-axis shows the level of the SMI.

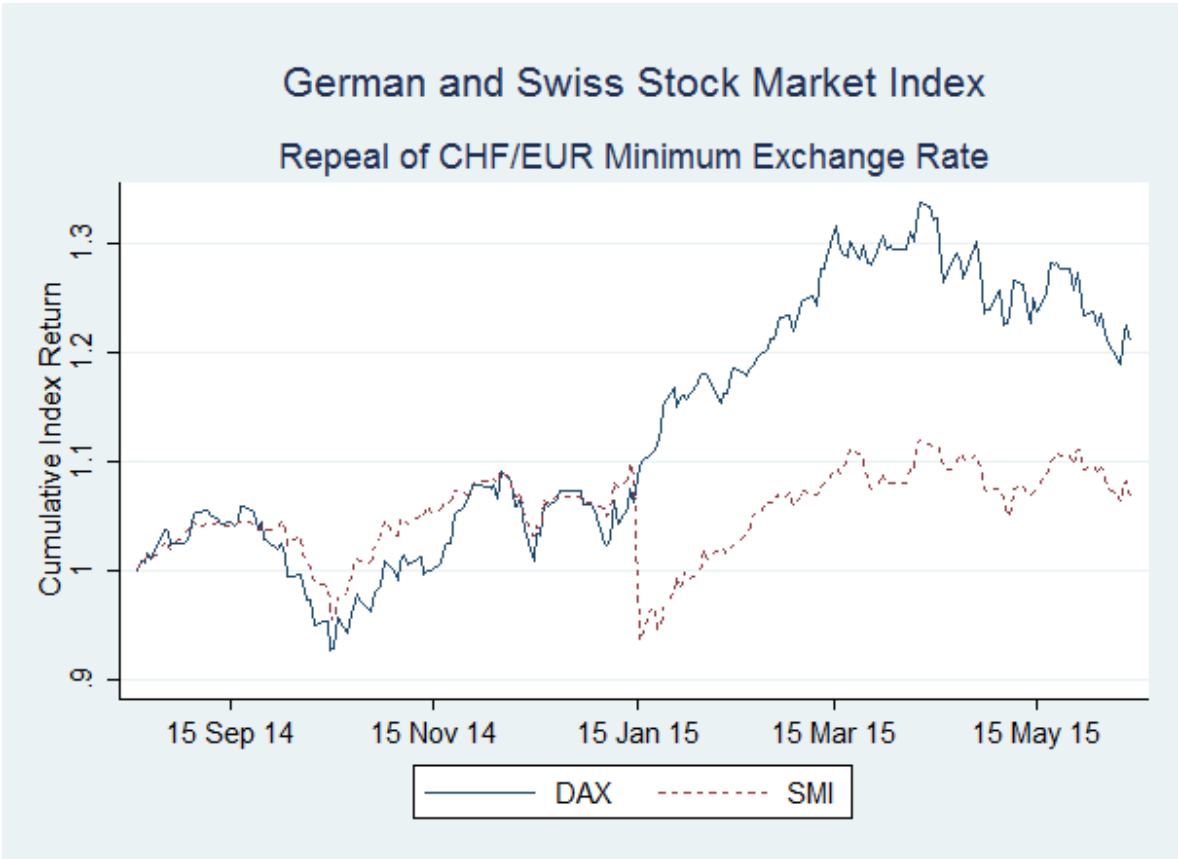


Figure 2. The figure compares the level of the German stock market index DAX (blue solid line) with the level of the Swiss stock market index SMI (red dashed line) between August 15, 2014 and June 15, 2015. Index values are standardized by their respective base level.

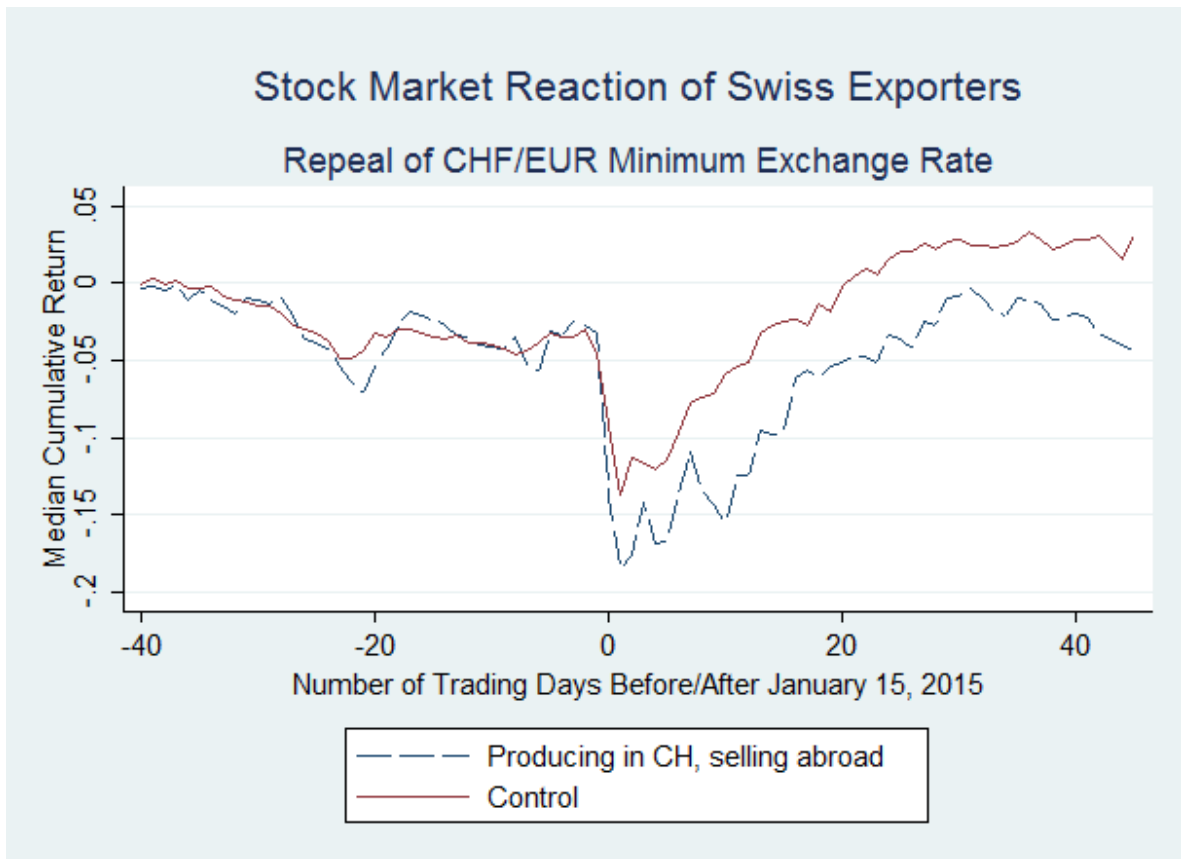


Figure 3. The figure shows the median cumulative abnormal returns from 40 days before to 40 days after the repeal of the CHF/EUR minimum exchange rate on January 15, 2015. The blue dashed line shows cumulative abnormal stock returns for the group of firms that have Swiss fixed assets above the sample median of 0.45 and also have foreign sales over total sales above the sample median of 0.88. This group comprises 16 out of 127 sample firms with complete geographic segment data. The stock returns are corrected for variation explained by the Swiss stock market index, size, and market to book. The control group consists of all other Swiss firms. The solid red line shows the cumulative abnormal returns for the control group.

Table 1. Sample firms by industry

The table reports the industry breakdown of our sample as of the end of 2014. The industry classification is based on the Industry Classification Benchmark (ICB) owned by the Financial Times Stock Exchange (FTSE).

| | Number of observations | Percent of sample |
|--------------------|------------------------|-------------------|
| Basic materials | 11 | 5.26 |
| Industrials | 56 | 26.79 |
| Consumer goods | 20 | 9.57 |
| Health care | 18 | 8.61 |
| Consumer services | 17 | 8.13 |
| Telecommunications | 1 | 0.48 |
| Utilities | 7 | 3.35 |
| Financials | 64 | 30.62 |
| Technology | 15 | 7.18 |
| Total | 209 | 100.00 |

Table 2. Summary statistics

The table shows summary statistics for the three samples employed in our study. Panel A shows summary statistics for the sample of Swiss publicly listed firms on 12/31/2014. This sample is used in the event study. Columns 1 through 4 show the number of observations, mean, standard deviation, and median for the entire sample of 209 firms. Columns 5 through 8 show the same information for the sample of 127 firms for which we have complete segment data. In Panel B, Columns 1 through 4 show summary statistics for the semi-annual sample of 172 Swiss publicly listed firms that report data on total assets, net cash flow, the market-to-book ratio, and industry code at least once between 2009 and 2015. Columns 5 through 8 show the same information for the 127 firms for which we have hand collected (Capital IQ) data on foreign sales and Swiss fixed assets in at least one year. Panel C shows summary statistics of employment and control variables for the annual sample.

Panel A: Event return sample

| Variable | obs. (1) | mean (2) | std dev (3) | median (4) | obs. (5) | mean (6) | std dev (7) | median (8) |
|------------------------------------|-------------|-------------|----------------|---------------|-------------|-------------|----------------|---------------|
| Currency exposure variables | | | | | | | | |
| Sales foreign | 164 | 0.633 | 0.393 | 0.850 | 127 | 0.644 | 0.400 | 0.880 |
| Fixed assets CH | 141 | 0.535 | 0.370 | 0.520 | 127 | 0.514 | 0.366 | 0.450 |
| FX beta EUR | 172 | 0.373 | 0.715 | 0.315 | 103 | 0.471 | 0.785 | 0.489 |
| t-Stat FX beta EUR | 172 | 1.550 | 1.224 | 1.243 | 103 | 1.854 | 1.253 | 1.680 |
| FX beta USD | 172 | -0.058 | 0.224 | -0.036 | 103 | -0.050 | 0.244 | -0.036 |
| t-Stat FX beta USD | 172 | 0.903 | 0.705 | 0.760 | 103 | 0.922 | 0.734 | 0.732 |
| Leverage CHF | 209 | 0.160 | 0.170 | 0.122 | 127 | 0.161 | 0.166 | 0.120 |
| Leverage EUR | 209 | 0.015 | 0.056 | 0.000 | 127 | 0.017 | 0.046 | 0.000 |
| Leverage foreign | 209 | 0.027 | 0.076 | 0.000 | 127 | 0.030 | 0.065 | 0.000 |
| Dependent variables | | | | | | | | |
| Stock return Jan 15, 2015 | 209 | -0.049 | 0.047 | -0.042 | 127 | -0.062 | 0.045 | -0.062 |
| Cum. ret. Jan 15-19, 2015 | 209 | -0.080 | 0.065 | -0.075 | 127 | -0.095 | 0.068 | -0.093 |
| Control variables | | | | | | | | |
| Total assets (CHF billion) | 209 | 22.464 | 108.408 | 1.058 | 127 | 25.464 | 124.744 | 1.491 |
| Market-to-book | 209 | 1.640 | 1.049 | 1.223 | 127 | 1.732 | 1.070 | 1.301 |

Panel B: Real effects sample (semi-annual)

| Variable | obs. (1) | mean (2) | std dev (3) | median (4) | obs. (5) | mean (6) | std dev (7) | median (8) |
|------------------------------------|-------------|-------------|----------------|---------------|-------------|-------------|----------------|---------------|
| Currency exposure variables | | | | | | | | |
| Sales foreign | 1374 | 0.608 | 0.381 | 0.755 | 1139 | 0.607 | 0.394 | 0.790 |
| Fixed assets CH | 1154 | 0.569 | 0.336 | 0.570 | 1139 | 0.569 | 0.337 | 0.570 |
| FX beta EUR | 1479 | 0.348 | 0.781 | 0.342 | 982 | 0.381 | 0.817 | 0.399 |
| t-Stat FX beta EUR | 1479 | 1.626 | 1.234 | 1.343 | 982 | 1.742 | 1.241 | 1.656 |
| FX beta USD | 1479 | -0.070 | 0.238 | -0.075 | 982 | -0.062 | 0.230 | -0.060 |
| t-Stat FX beta USD | 1479 | 0.963 | 0.700 | 0.800 | 982 | 0.880 | 0.675 | 0.720 |
| Dependent variables | | | | | | | | |
| Sales / assets | 1683 | 0.411 | 0.281 | 0.423 | 1116 | 0.416 | 0.278 | 0.427 |
| ROA | 1213 | 0.027 | 0.042 | 0.027 | 802 | 0.031 | 0.041 | 0.032 |
| Net margin | 1670 | 0.054 | 0.177 | 0.053 | 1106 | 0.053 | 0.164 | 0.058 |
| Capex / fixed assets | 1469 | 0.088 | 0.076 | 0.066 | 997 | 0.090 | 0.075 | 0.069 |
| Control variables | | | | | | | | |
| Total assets | 1725 | 6.026 | 20.247 | 0.621 | 1139 | 8.350 | 24.448 | 1.057 |
| Cash flow | 1725 | 0.034 | 0.048 | 0.030 | 1139 | 0.036 | 0.048 | 0.033 |
| Market-to-book | 1725 | 1.507 | 1.122 | 1.173 | 1139 | 1.516 | 0.803 | 1.221 |

Panel C: Real effects sample (annual)

| Variable | obs. (1) | mean (2) | std dev (3) | median (4) | obs. (5) | mean (6) | std dev (7) | median (8) |
|---------------------------|-------------|-------------|----------------|---------------|-------------|-------------|----------------|---------------|
| Dependent variable | | | | | | | | |
| Employment | 1173 | 6,248 | 14,509 | 1,294 | 686 | 8,660 | 17,368 | 2,003 |
| Control variables | | | | | | | | |
| Market-to-book | 1281 | 1.419 | 0.761 | 1.108 | 764 | 1.496 | 0.791 | 1.186 |
| Total assets | 1311 | 18.917 | 113.617 | 0.927 | 764 | 18.352 | 97.868 | 1.212 |
| Cash flow | 1311 | 0.064 | 0.083 | 0.057 | 764 | 0.073 | 0.082 | 0.069 |

Table 3. Stock returns on the announcement day of the repeal of the CHF/EUR minimum exchange rate

The table shows the results from five regressions of the raw January 15, 2015 announcement return to the repeal of the CHF/EUR minimum exchange rate on variables measuring currency exposure and control variables. Columns 1 through 3 measure the currency exposure of Swiss firms by the fraction of sales from abroad over total sales and the fraction of Swiss fixed assets / total fixed assets. In Column 4, we create two indicator variables. The first indicator variable *Fixed assets CH > Q50* is equal to one if the fraction of Swiss fixed assets / total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable *Sales foreign > Q50* is equal to one if the fraction of foreign sales / total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we create two more indicator variables that measure currency exposure by firms' currency betas estimated using weekly data between 2005 and 2008. The first indicator variable *FX beta EUR > Q75* is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The second indicator variable *FX beta USD > Q75* is equal to one if the CHF/USD exchange rate beta is larger than the 75th percentile of 0.064, and zero otherwise. All control variables are defined in Appendix C. The regressions include industry-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Sales foreign | -0.048*** (0.008) | | -0.066*** (0.015) | | |
| Fixed assets CH | | 0.032*** (0.011) | -0.014 (0.017) | | |
| Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.049*** (0.015) | |
| Sales foreign > Q50 | | | | -0.009 (0.008) | |
| Fixed assets CH > Q50 | | | | 0.032*** (0.008) | |
| FX beta EUR > Q75 | | | | | -0.028*** (0.007) |
| FX beta USD > Q75 | | | | | -0.000 (0.007) |
| Ln(total assets) | -0.009*** (0.002) | -0.009*** (0.002) | -0.008*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) |
| Market-to-book | -0.007** (0.003) | -0.008** (0.004) | -0.005 (0.003) | -0.004 (0.004) | -0.012*** (0.004) |
| R-squared | 0.482 | 0.443 | 0.539 | 0.521 | 0.426 |
| Observations | 164 | 141 | 127 | 127 | 172 |

Table 4. Cumulative stock returns during the window [0, 3] around the announcement of the repeal of the CHF/EUR minimum exchange rate

The table shows results from five regressions of the cumulative raw return over the three trading days from January 15, 2015 to January 19, 2015 on variables measuring currency exposure and control variables. Columns 1 through 3 measure the currency exposure of Swiss firms by the fraction of sales from abroad over total sales and the fraction of Swiss fixed assets / total fixed assets. In Column 4, we create two indicator variables. The first indicator variable *Fixed assets CH > Q50* is equal to one if the fraction of Swiss fixed assets / total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable *Sales foreign > Q50* is equal to one if the fraction of foreign sales / total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we create two more indicator variables that measure currency exposure by firms' currency betas estimated using weekly data between 2005 and 2008. The first indicator variable *FX beta EUR > Q75* is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The second indicator variable *FX beta USD > Q75* is equal to one if the CHF/USD exchange rate beta is larger than the 75th percentile of 0.064, and zero otherwise. All control variables are defined in Appendix C. The regressions include industry-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Sales foreign | -0.070*** (0.011) | | -0.119*** (0.025) | | |
| Fixed assets CH | | 0.039** (0.017) | -0.048* (0.027) | | |
| Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.097*** (0.027) | |
| Sales foreign > Q50 | | | | 0.017 (0.016) | |
| Fixed assets CH > Q50 | | | | 0.050*** (0.018) | |
| FX beta EUR > Q75 | | | | | -0.035*** (0.010) |
| FX beta USD > Q75 | | | | | 0.001 (0.010) |
| Ln(total assets) | -0.010*** (0.002) | -0.009*** (0.003) | -0.009*** (0.003) | -0.010*** (0.002) | -0.008*** (0.002) |
| Market-to-book | -0.001 (0.005) | -0.004 (0.006) | 0.001 (0.006) | 0.001 (0.006) | -0.009 (0.006) |
| R-squared | 0.381 | 0.306 | 0.448 | 0.383 | 0.304 |
| Observations | 164 | 141 | 127 | 127 | 172 |

Table 5. Financial hedging and the repeal of the minimum exchange rate

The table shows results from four regressions of the cumulative raw return over the three trading days from January 15, 2015 to January 19, 2015 on variables measuring financial leverage. *Leverage EUR* and *Leverage CHF* are defined as firm debt denoted either in Euro or in CHF divided by total assets. *Leverage foreign* is defined as firm debt denoted in any foreign currency divided by total assets. In Columns 3 and 4, we create indicator variables. *Sales Foreign > Q50* is equal to one if the fraction of foreign sales / total sales is larger than the sample median of 0.88, and zero otherwise. *Leverage CHF > Q50* is equal to one if *Leverage CHF* is larger than the sample median of 0.12, and zero otherwise. *Leverage EUR > Q50* and *Leverage foreign > Q50* are equal to one if they exceed the sample median, which is zero for both variables, and zero otherwise. All control variables are defined in Appendix C. The regressions include industry-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

| | (1) | (2) | (3) | (4) |
|--|----------------------|----------------------|----------------------|----------------------|
| Leverage EUR | 0.321*** (0.102) | | | |
| Leverage foreign | | 0.293*** (0.072) | | |
| Sales foreign > Q50 × Leverage EUR > Q50 | | | 0.083*** (0.028) | |
| Leverage EUR > Q50 | | | -0.025 (0.022) | |
| Sales foreign > Q50 × Leverage foreign > Q50 | | | | 0.050** (0.024) |
| Leverage foreign > Q50 | | | | -0.028 (0.019) |
| Sales foreign > Q50 × Leverage CHF > Q50 | | | -0.016 (0.025) | -0.024 (0.025) |
| Leverage CHF > Q50 | | | 0.009 (0.018) | 0.008 (0.018) |
| Sales foreign > Q50 | | | -0.027 (0.021) | -0.023 (0.023) |
| Leverage CHF | 0.024 (0.036) | 0.023 (0.036) | | |
| Sales foreign | -0.123*** (0.025) | -0.123*** (0.024) | | |
| Fixed assets CH | -0.039 (0.027) | -0.038 (0.025) | 0.016 (0.022) | 0.008 (0.024) |
| Ln(total assets) | -0.009*** (0.003) | -0.011*** (0.003) | -0.014*** (0.003) | -0.012*** (0.003) |
| Market-to-book | 0.004 (0.006) | 0.003 (0.006) | -0.001 (0.006) | -0.003 (0.006) |
| R-squared | 0.481 | 0.499 | 0.370 | 0.336 |
| Observations | 127 | 127 | 127 | 127 |

Table 6. Sales and the repeal of the minimum exchange rate

The table shows results from seven panel regressions of semi-annual sales over total assets on variables measuring currency exposure and control variables. The panel starts in 2009 and ends in June 2015 in Columns 1 through 5 and in December 2015 in Columns 6 and 7. Columns 1 through 3 measure the currency exposure of Swiss firms by the ratio of sales from abroad over total sales and the ratio of Swiss fixed assets over total fixed assets. In Column 4, we create two indicator variables. The first indicator variable *Fixed assets CH > Q50* is equal to one if the ratio of Swiss fixed assets over total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable *Sales foreign > Q50* is equal to one if the ratio of foreign sales over total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we measure currency exposure by currency betas estimated using weekly data between 2005 and 2008. The indicator variable *FX beta EUR > Q75* is equal to one if the CHF-EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The indicator variable *FX beta USD > Q75* is equal to one if the CHF/USD exchange rate beta is larger than the 75th percentile of 0.064. All columns include an indicator variable equal to one if the observation is in the second fiscal half year of the firm. All control variables are defined in Appendix C. The regressions include industry- and calendar time-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 2015 × Sales foreign | -0.034 (0.032) | | 0.076 (0.050) | | | | |
| Sales foreign | 0.013 (0.078) | | 0.008 (0.098) | | | | |
| 2015 × Fixed assets CH | | 0.080** (0.035) | 0.142** (0.058) | | | | |
| Fixed assets CH | | -0.084 (0.073) | -0.083 (0.081) | | | | |
| 2015 × Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.144* (0.059) | | -0.123** (0.062) | |
| 2015 × Sales foreign > Q50 | | | | 0.081* (0.043) | | 0.073 (0.044) | |
| 2015 × Fixed assets CH > Q50 | | | | 0.106** (0.042) | | 0.097** (0.045) | |
| Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.104 (0.069) | | -0.104 (0.069) | |
| Sales foreign > Q50 | | | | 0.043 (0.061) | | 0.046 (0.061) | |
| Fixed assets CH > Q50 | | | | -0.002 (0.054) | | -0.002 (0.054) | |
| 2015 × FX beta EUR > Q75 | | | | | -0.047* (0.026) | | -0.044* (0.025) |
| FX beta EUR > Q75 | | | | | -0.021 (0.049) | | -0.020 (0.048) |
| 2015 × FX beta USD > Q75 | | | | | 0.033 (0.022) | | 0.037* (0.022) |
| FX beta USD > Q75 | | | | | -0.077** (0.033) | | -0.077** (0.033) |
| 2015 | -0.008 (0.021) | -0.064** (0.029) | -0.148** (0.064) | -0.093** (0.040) | -0.028 (0.019) | -0.087* (0.044) | -0.029* (0.017) |
| Market-to-book | 0.056*** (0.021) | 0.054*** (0.021) | 0.054*** (0.021) | 0.058*** (0.022) | 0.050*** (0.015) | 0.057*** (0.022) | 0.049*** (0.015) |
| Ln(total assets) | -0.007 (0.012) | -0.018 (0.013) | -0.019 (0.013) | -0.018 (0.011) | -0.015 (0.012) | -0.018* (0.011) | -0.016 (0.012) |
| R-squared | 0.503 | 0.562 | 0.555 | 0.562 | 0.505 | 0.567 | 0.508 |
| Observations | 1244 | 1049 | 1035 | 1035 | 1348 | 1116 | 1447 |

Table 7. Return on assets (ROA) and the repeal of the minimum exchange rate

The table shows results from seven panel regressions of the semi-annual return on assets, defined as earnings before interest and taxes divided by lagged total assets, on variables measuring currency exposure and control variables. The panel starts in 2009 and ends in June 2015 in Columns 1 through 5 and in December 2015 in Columns 6 and 7. Columns 1 through 3 measure the currency exposure of Swiss firms by the ratio of sales from abroad over total sales and the ratio of Swiss fixed assets over total fixed assets. In Column 4, we create two indicator variables. The first indicator variable *Fixed assets CH > Q50* is equal to one if the ratio of Swiss fixed assets over total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable *Sales foreign > Q50* is equal to one if the ratio of foreign sales over total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we measure currency exposure by currency betas estimated using weekly data between 2005 and 2008. The indicator variable *FX beta EUR > Q75* is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The indicator variable *FX beta USD > Q75* is equal to one if the CHF-USD exchange rate beta is larger than the 75th percentile of 0.064. All columns include an indicator variable equal to one if the observation is in the second fiscal half year of the firm. All control variables are defined in Appendix C. The regressions include industry- and calendar time-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|------------------------------|----------|----------|----------|----------|-----------|-----------|-----------|
| 2015 × Sales foreign | -0.011* | | 0.000 | | | | |
| | (0.006) | | (0.012) | | | | |
| Sales foreign | -0.005 | | 0.014 | | | | |
| | (0.008) | | (0.017) | | | | |
| 2015 × Fixed assets CH | | 0.012 | 0.011 | | | | |
| | | (0.008) | (0.015) | | | | |
| Fixed assets CH | | 0.008 | 0.018 | | | | |
| | | (0.011) | (0.020) | | | | |
| 2015 × Fixed assets CH > Q50 | | | | -0.042** | | -0.053*** | |
| × Sales foreign > Q50 | | | | (0.017) | | (0.019) | |
| 2015 × Sales foreign > Q50 | | | | 0.029** | | 0.031** | |
| | | | | (0.013) | | (0.013) | |
| 2015 × Fixed assets CH > Q50 | | | | 0.034** | | 0.038*** | |
| | | | | (0.013) | | (0.013) | |
| Fixed assets CH > Q50 × | | | | -0.012 | | -0.012 | |
| Sales foreign > Q50 | | | | (0.016) | | (0.016) | |
| Sales foreign > Q50 | | | | 0.020 | | 0.020 | |
| | | | | (0.016) | | (0.016) | |
| Fixed assets CH > Q50 | | | | 0.011 | | 0.011 | |
| | | | | (0.013) | | (0.013) | |
| 2015 × FX beta EUR > Q75 | | | | | -0.001 | | -0.006 |
| | | | | | (0.006) | | (0.006) |
| FX beta EUR > Q75 | | | | | -0.015* | | -0.015* |
| | | | | | (0.008) | | (0.008) |
| 2015 × FX beta USD > Q75 | | | | | -0.003 | | -0.004 |
| | | | | | (0.008) | | (0.007) |
| FX beta USD > Q75 | | | | | -0.016*** | | -0.016*** |
| | | | | | (0.006) | | (0.006) |
| 2015 | 0.006 | -0.010 | -0.010 | -0.027* | -0.002 | -0.029* | -0.001 |
| | (0.007) | (0.009) | (0.019) | (0.015) | (0.007) | (0.015) | (0.007) |
| Market-to-book | 0.024*** | 0.024*** | 0.024*** | 0.023*** | 0.021*** | 0.023*** | 0.021*** |
| | (0.006) | (0.007) | (0.007) | (0.007) | (0.004) | (0.006) | (0.004) |
| Ln(total assets) | 0.004* | 0.004 | 0.004 | 0.003 | 0.006*** | 0.003 | 0.006*** |
| | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) |
| R-squared | 0.266 | 0.300 | 0.306 | 0.325 | 0.315 | 0.325 | 0.311 |
| Observations | 879 | 743 | 731 | 731 | 952 | 802 | 1036 |

Table 8. Net margin and the repeal of the minimum exchange rate

The table shows results from seven panel regressions of net profit margin, defined as net income before preferred dividends divided by net sales, on variables measuring currency exposure and control variables. The panel starts in 2009 and ends in June 2015 in Columns 1 through 5 and in December 2015 in Columns 6 and 7. Columns 1 through 3 measure the currency exposure of Swiss firms by the ratio of sales from abroad over total sales and the ratio of Swiss fixed assets over total fixed assets. In Column 4, we create two indicator variables. The first indicator variable *Fixed assets CH > Q50* is equal to one if the ratio of Swiss fixed assets over total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable *Sales foreign > Q50* is equal to one if the ratio of foreign sales over total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we measure currency exposure by currency betas estimated using weekly data between 2005 and 2008. The indicator variable *FX beta EUR > Q75* is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The indicator variable *FX beta USD > Q75* is equal to one if the CHF-USD exchange rate beta is larger than the 75th percentile of 0.064. All columns include an indicator variable equal to one if the observation is in the second fiscal half year. All control variables are defined in Appendix C. The regressions include industry- and calendar time-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|------------------------------|---------|-----------|---------|----------|----------|-----------|----------|
| 2015 × Sales foreign | -0.055* | | -0.026 | | | | |
| | (0.030) | | (0.053) | | | | |
| Sales foreign | -0.053* | | 0.038 | | | | |
| | (0.032) | | (0.054) | | | | |
| 2015 × Fixed assets CH | | 0.082** | 0.045 | | | | |
| | | (0.036) | (0.053) | | | | |
| Fixed assets CH | | 0.098** | 0.120* | | | | |
| | | (0.038) | (0.061) | | | | |
| 2015 × Fixed assets CH > Q50 | | | | -0.152** | | -0.194*** | |
| × Sales foreign > Q50 | | | | (0.059) | | (0.064) | |
| 2015 × Sales foreign > Q50 | | | | 0.072* | | 0.068* | |
| | | | | (0.039) | | (0.038) | |
| 2015 × Fixed assets CH > Q50 | | | | 0.124*** | | 0.131*** | |
| | | | | (0.044) | | (0.042) | |
| Fixed assets CH > Q50 × | | | | -0.027 | | -0.028 | |
| Sales foreign > Q50 | | | | (0.042) | | (0.041) | |
| Sales foreign > Q50 | | | | 0.061 | | 0.063 | |
| | | | | (0.045) | | (0.045) | |
| Fixed assets CH > Q50 | | | | 0.052 | | 0.052 | |
| | | | | (0.036) | | (0.036) | |
| 2015 × FX beta EUR > Q75 | | | | | 0.011 | | -0.012 |
| | | | | | (0.023) | | (0.022) |
| FX beta EUR > Q75 | | | | | -0.054* | | -0.054* |
| | | | | | (0.032) | | (0.032) |
| 2015 × FX beta USD > Q75 | | | | | -0.019 | | 0.004 |
| | | | | | (0.029) | | (0.021) |
| FX beta USD > Q75 | | | | | -0.052* | | -0.053* |
| | | | | | (0.028) | | (0.028) |
| 2015 | 0.039 | -0.061*** | -0.015 | -0.080** | -0.003 | -0.076* | -0.003 |
| | (0.028) | (0.021) | (0.065) | (0.038) | (0.018) | (0.039) | (0.019) |
| Market-to-book | 0.039** | 0.038** | 0.036** | 0.033* | 0.043*** | 0.031* | 0.041*** |
| | (0.015) | (0.017) | (0.017) | (0.018) | (0.012) | (0.018) | (0.012) |
| Ln(total assets) | 0.018** | 0.021** | 0.019** | 0.013 | 0.016* | 0.013 | 0.016* |
| | (0.008) | (0.010) | (0.009) | (0.009) | (0.010) | (0.009) | (0.010) |
| R-squared | 0.168 | 0.183 | 0.191 | 0.180 | 0.191 | 0.189 | 0.188 |
| Observations | 1234 | 1039 | 1025 | 1025 | 1340 | 1106 | 1440 |

Table 9. Capital expenditures and the repeal of the minimum exchange rate

The table shows results from seven panel regressions of semi-annual capital expenditures divided by total fixed assets on variables measuring currency exposure and control variables. The panel starts in 2009 and ends in June 2015 in Columns 1 through 5 and in December 2015 in Columns 6 and 7. Columns 1 through 3 measure the currency exposure of Swiss firms by the ratio of sales from abroad over total sales and the ratio of Swiss fixed assets over total fixed assets. In Column 4, we create two indicator variables. The indicator variable *Fixed assets CH > Q50* (*Sales foreign > Q50*) is equal to one if the ratio of Swiss fixed assets over total fixed assets (foreign sales over total sales) is larger than the sample median of 0.45 (0.88), and zero otherwise. In Column 5, we measure currency exposure by currency betas estimated using weekly data between 2005 and 2008. The indicator variable *FX beta EUR > Q75* (*FX beta USD > Q75*) is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797 (0.064). All columns include an indicator variable equal to one if the observation is in the second fiscal half year. All control variables are defined in Appendix C. The regressions include industry- and calendar time-fixed effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|------------------------------|-----------|-----------|-----------|-----------|----------|-----------|----------|
| 2015 × Sales foreign | -0.035* | | -0.041 | | | | |
| | (0.018) | | (0.031) | | | | |
| Sales foreign | 0.012 | | 0.006 | | | | |
| | (0.013) | | (0.020) | | | | |
| 2015 × Fixed assets CH | | 0.031 | -0.005 | | | | |
| | | (0.023) | (0.035) | | | | |
| Fixed assets CH | | -0.021 | -0.011 | | | | |
| | | (0.013) | (0.018) | | | | |
| 2015 × Fixed assets CH > Q50 | | | | -0.081** | | -0.079** | |
| × Sales foreign > Q50 | | | | (0.033) | | (0.033) | |
| 2015 × Sales foreign > Q50 | | | | 0.007 | | 0.020 | |
| | | | | (0.026) | | (0.027) | |
| 2015 × Fixed assets CH > Q50 | | | | 0.028 | | 0.025 | |
| | | | | (0.027) | | (0.028) | |
| Fixed assets CH > Q50 × | | | | 0.016 | | 0.017 | |
| Sales foreign > Q50 | | | | (0.020) | | (0.020) | |
| Sales foreign > Q50 | | | | 0.002 | | 0.002 | |
| | | | | (0.011) | | (0.011) | |
| Fixed assets CH > Q50 | | | | -0.011 | | -0.012 | |
| | | | | (0.010) | | (0.010) | |
| 2015 × FX beta EUR > Q75 | | | | | -0.027* | | -0.029** |
| | | | | | (0.014) | | (0.013) |
| FX beta EUR > Q75 | | | | | 0.014* | | 0.014* |
| | | | | | (0.008) | | (0.008) |
| 2015 × FX beta USD > Q75 | | | | | -0.019* | | -0.015 |
| | | | | | (0.010) | | (0.010) |
| FX beta USD > Q75 | | | | | -0.001 | | -0.001 |
| | | | | | (0.008) | | (0.008) |
| 2015 | -0.000 | -0.046*** | 0.003 | -0.034 | -0.019* | -0.039 | -0.019* |
| | (0.014) | (0.015) | (0.037) | (0.023) | (0.010) | (0.025) | (0.010) |
| Market-to-book | 0.023*** | 0.024*** | 0.024*** | 0.024*** | 0.023*** | 0.023*** | 0.022*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.005) | (0.007) | (0.005) |
| Ln(total assets) | -0.006*** | -0.009*** | -0.008*** | -0.008*** | -0.004** | -0.007*** | -0.004** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Cash flow | 0.078 | 0.098 | 0.104 | 0.097 | 0.011 | 0.115 | 0.040 |
| | (0.079) | (0.086) | (0.086) | (0.086) | (0.070) | (0.078) | (0.065) |
| R-squared | 0.213 | 0.227 | 0.237 | 0.242 | 0.189 | 0.233 | 0.184 |
| Observations | 1123 | 939 | 930 | 930 | 1189 | 997 | 1274 |

Table 10. Total employment and the repeal of the minimum exchange rate

The table shows results from five panel regressions of the $\ln(\text{employment})$ on variables measuring currency exposure and control variables. The frequency of observation is annual. The panel starts in 2009 and ends in 2015. In columns 1 through 3 currency exposure of Swiss firms is measured by the ratio of sales from abroad over total sales and the ratio of Swiss fixed assets over total fixed assets. In Column 4, we create two indicator variables. The first indicator variable Fixed assets CH > Q50 is equal to one if the ratio of Swiss fixed assets over total fixed assets is larger than the sample median of 0.45, and zero otherwise. The second indicator variable Sales foreign > Q50 is equal to one if the ratio of foreign sales over total sales is larger than the sample median of 0.88, and zero otherwise. In Column 5, we measure currency exposure by currency betas estimated using weekly data between 2005 and 2008. The indicator variable FX beta EUR > Q75 is equal to one if the CHF/EUR exchange rate beta is larger than the 75th percentile of 0.797, and zero otherwise. The indicator variable FX beta USD > Q75 is equal to one if the CHF/USD exchange rate beta is larger than the 75th percentile of 0.064. All control variables are defined in Appendix C. The regressions include industry and year effects. Numbers in parentheses are robust standard errors, and ***, **, and * indicate statistical significance at the 1, 5, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|---------------------|----------------------|----------------------|---------------------|---------------------|
| 2015 × Sales foreign | 0.176 (0.124) | | 0.289 (0.201) | | |
| Sales foreign | 1.027*** (0.337) | | 0.565* (0.327) | | |
| 2015 × Fixed assets CH | | 0.081 (0.147) | 0.296 (0.203) | | |
| Fixed assets CH | | -1.250*** (0.311) | -0.851*** (0.275) | | |
| 2015 × Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.071 (0.227) | |
| 2015 × Sales foreign > Q50 | | | | 0.192 (0.154) | |
| 2015 × Fixed assets CH > Q50 | | | | 0.081 (0.149) | |
| Fixed assets CH > Q50 × Sales foreign > Q50 | | | | -0.190 (0.250) | |
| Sales foreign > Q50 | | | | 0.332 (0.285) | |
| Fixed assets CH > Q50 | | | | -0.518** (0.204) | |
| 2015 × FX beta EUR > Q75 | | | | | -0.107* (0.058) |
| FX beta EUR > Q75 | | | | | 0.315*** (0.119) |
| 2015 × FX beta USD > Q75 | | | | | 0.012 (0.082) |
| FX beta USD > Q75 | | | | | 0.055 (0.113) |
| 2015 | -0.160** (0.077) | -0.091 (0.095) | -0.418* (0.220) | -0.182* (0.109) | 0.070 (0.076) |
| Ln(Total assets) | 0.813*** (0.050) | 0.793*** (0.045) | 0.782*** (0.050) | 0.815*** (0.049) | 0.867*** (0.037) |
| Market-to-book | 0.096 (0.077) | 0.105 (0.075) | 0.091 (0.083) | 0.098 (0.079) | 0.221*** (0.084) |
| Cash flow | 0.883 (0.604) | 0.938 (0.754) | 0.719 (0.777) | 0.655 (0.722) | 1.702*** (0.515) |
| R-squared | 0.823 | 0.856 | 0.847 | 0.832 | 0.828 |
| Observations | 866 | 758 | 686 | 686 | 1028 |

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