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# Macroeconomic Determinants of Foreign Exchange Rate Exposure

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# Macroeconomic Determinants of Foreign Exchange Rate Exposure

**Abstract**

This paper examines the foreign exchange rate exposures of US companies and how they are linked to foreign macroeconomic determinants. I use US trade-weighted macroeconomic indices of foreign countries to explain the variation in foreign exchange rate exposures, measured as the sensitivities of stock returns to exchange rate returns of US non-financial companies over the period 1995 to 2017. I find strong evidence that the after-hedging exposures of potential exporters are affected by their expectations of foreign market gross domestic products, current account balances, consumer price indices, term spreads, unit labor costs as well as government expenditures.

**Keywords:** Exchange rate exposure; macroeconomic expectations; selective hedging

**JEL classification:** F31; G1; E44

# 1 Introduction

Hedging activities are often less influenced by theoretical considerations of an optimal hedge ratio than by managers' expectations about future market developments (see e.g. Faulkender, 2005; Adam and Fernando, 2006; Antoniou et al., 2009). Dolde (1993) observes that 90% of the 244 Fortune 500 companies surveyed include their market view in their decision-making. Bodnar et al. (1998) and Glaum (2002) investigate risk management activities and the use of derivatives by non-financial companies. They find that the majority of companies adjust their hedging strategy to future market expectations and engage in selective hedging; they thus only partially hedge existing exposure.

In the context of currency risk, changes in exchange rates represent a significant source of risk for companies, as exchange rates affect their cash flows and thus their market value if they are not completely hedged (see e.g. Chang et al., 2013; Boudt et al., 2017). Moreover, macroeconomic determinants of companies' foreign export and import markets influence their specific currency risk. If e.g. the foreign economic growth of a foreign export market increases, the respective currency is likely to appreciate (see Andersen et al., 2003; Evans and Lyons, 2008; Neely and Dey, 2010).

The contribution of this paper is to analyze the relation between specific foreign macroeconomic determinants and the currency exposure of US companies. In order to determine the impact of foreign macroeconomic determinants on the currency exposure of US companies, I use their foreign exchange rate exposure, which measures the sensitivities of companies' stock returns to exchange rate returns with an included market factor (e.g. see Jorion, 1991).

In a first step, I retrieved weekly stock returns on public US non-financial corporations listed from 1995 to 2017, controlling for missing data and infrequently traded companies. For the 2,038 remaining companies in my sample, I calculate over 33,000 yearly exchange rate sensitivities using a yearly US export- and import-weighted exchange rate basket in direct quotation that covers 39 of the main US trading countries.

Secondly, to be able to evaluate how well US companies assess foreign markets, I retrieve yearly forecasted and actual values of foreign macroeconomic variables, i.e. the foreign gross domestic product (GDP), the current account balance, the consumer price index (CPI), the term spread, the unit labor costs (ULC) and the government expenditures, as well as standard corporate data to control for company-specific effects. I use the macroeconomic data of the considered 39 countries to form yearly US trade-weighted macroeconomic indices based on the forecasted values. Furthermore, I form indices based on actual data as well as the deviation of the actual from the forecasted values.

There is empirical evidence that companies adjust their hedge ratio and thus their financial risk strategy to expected exchange rates. Beber and Fabbri (2012) as well as Entrop and Merkel (2018) show that managers take active views with regard to the dynamics of the foreign exchange rate and Brown (2001) indicates that managerial views are key factors for managing the foreign exchange rate exposure. Note that while it may be possible that companies indeed evaluate foreign macroeconomic determinants in order to adjust their hedge ratio, the influence of macroeconomic variables on exchange rate exposure of companies could be caused by the forecasts of expected macroeconomic variables, which in turn predetermine expected exchange rates. I therefore investigate the effect of foreign macroeconomic determinants on the exchange rate exposure of US companies, fully aware that the link between the macroeconomic forecasts and exchange rates could cause this effect.

Furthermore, I use the effect of foreign macroeconomic forecasts on the expected exchange rates to formulate hypotheses regarding the direction of the effect on the foreign exchange rate exposures for each of the foreign forecasted macroeconomic indices. To derive the hypotheses, I use the literature of macroeconomic news affecting exchange rates (e.g. Simpson et al., 2005; Rime et al., 2010; Mun, 2012). For example, an (unexpected) increase in a country's GDP causes its currency to appreciate (see Andersen et al., 2003; Evans and Lyons, 2008; Neely and Dey, 2010). Applied to the foreign market, an increase in a foreign GDP index that causes a foreign currency to appreciate will have opposing effects on US companies, depending on whether they are importers or exporters. For US exporters, stronger foreign currencies are good news. It would be advantageous to reduce their hedge ratio and thus increase their foreign exchange rate exposures. The opposite should apply for US importers. For this reason, I formulate separate hypotheses for US exporters and importers.

I apply different panel regression approaches and explain the variations in the estimated exposures by the foreign macroeconomic indices and US company-specific control variables applied previously in the literature. Consistent with the hypotheses, I do this for all exposures and separately for positive exposures that stand for potential US (net) exporters and for negative exposures that stand for potential US (net) importers (see e.g. Allayannis and Ofek, 2001; Bartram and Karolyi, 2006; Bartram et al., 2010). I find strong evidence for the hypotheses for potential (net) US exporting companies.

Lastly, further robustness checks show that my results are stable for the exposure estimation without an included market factor according to Adler and Dumas (1984). Also, my findings are not altered by leaving out the control variables (e.g. Patro et al., 2002) or using a feasible generalized least square (FGLS) panel approach to account for autocorrelation in the estimated exposures (e.g. Chang et al., 2013).

The remainder of this paper is organized as follows. Section 2 gives an overview of the relevant literature. Section 3 introduces the data used in this study. Section 4 compares the two frequently used models to measure US company-specific exchange rate exposures and displays corresponding summary statistics. Section 5 introduces the construction of the foreign macroeconomic indices, summary statistics and hypotheses formulation for each of the foreign macroeconomic variables as well as the panel approach of the foreign macroeconomic indices and US company-specific control variables explaining the variation in their foreign exchange rate exposures. Section 6 presents the empirical findings. Section 7 presents further robustness checks. Finally, Section 8 offers some concluding comments.

## 2 Related Literature

One of the main reasons why the literature on foreign exchange rate exposure does not generally produce more significant results is that such studies seek to identify exchange rate sensitivities after hedging activities of companies. With the use of financial derivatives and other hedging instruments, companies reduce their exposure to currency changes (e.g. Allayannis and Ofek, 2001). Bartram et al. (2010) show that companies use three forms of hedging in the context of currency risk: firstly, financial hedging, e.g. purchasing financial derivatives that secure foreign denominated cash-flows or issuing foreign currency debt; secondly, operational hedging, e.g. establishing production facilities in foreign currency areas and thirdly, pass-through of input costs to customers that occur due to exchange rate changes, which depends on a company's market power. Thus, the literature typically finds significant sensitivities for 10 to 25% of all companies considered (Bartram and Bodnar, 2007).

To name just a view studies, Jorion (1990) observes significant exchange rate exposure for 15 out of 287 multinational US companies investigated between 1971 and 1987 and states that exposures increase with the foreign involvement of companies. Jorion (1991) shows that exposures differ between industrial portfolios. Bodnar and Gentry (1993) establish that 23% of the examined industry portfolios in the US show significant exposure. Choi and Prasad (1995) find significant exposure for 14.9% of US multinational companies and 10% using industry portfolios. Dumas and Solnik (1995) and de Santis and Gérard (1998) report risk premia for exchange rate exposure in international stock returns. Dominguez and Tesar (2006) substantiate significant exchange rate exposure for eight non-US countries based on firm- and industry-level stock returns as well as different exchange rates specifications.

There are also a number of studies that use macroeconomic variables to explain foreign exchange rate exposures. Patro et al. (2002) used weekly equity returns of 16 OECD countries to estimate exposures for the years 1980 to 1997. They explain the exposures of each country by the country's macroeconomic aggregates using all exposures at once in different generalized least square panel regressions. For each of their chosen countries Patro et al. (2002) retrieve the exports and imports to GDP ratio, the CPI, the government surplus to GDP ratio, the tax revenues to GDP ratio and the change of the country's credit ratings. They exclude the current account to GDP ratio as it is highly correlated with exports and imports and refrain from using further company-specific control variables.

Francis et al. (2008) use expected US industry returns. They find that the cross-industry and time variation of the currency risk can be explained by industry characteristics and macroeconomic variables, respectively. They use macroeconomic variables such as the price-to-earnings ratio, the US export and import ratio as well as dummies for a tighter monetary policy, economic recession and currency crisis.

Inter alia, Chaieb and Mazzotta (2013) analyze the time variation in foreign exchange rate exposure and link the variation to macroeconomic state variables, such as the default premium and the term premium, as well as company characteristics, such as leverage and liquidity. In an extended robustness check, they also use GDP, industrial production, money supply, trade and inflation variables. They find that the exposure's dynamics are mainly driven by the macroeconomic variables.

Boudt et al. (2017) use intra-day data of US multinationals to examine the influence of US macroeconomic news on the average estimated daily exposures. They test the impact of different GDP announcements, non-farm payrolls, different price announcements, the trade balance, federal fund target rate and 10-year yield. They distinguish between short-lived and persistent effects. They, e.g. find that a lower-than-expected value of the federal funds target increases exposure, as it signals a weaker U.S. economy and lower domestic demand.

In contrast to the studies that use macroeconomic variables to explain foreign exchange rate exposures, I focus on the macroeconomic impact of US trade-weighted foreign macroeconomic indices on exposures of US corporations. Furthermore, I form hypotheses on the direction of the effects of forecasted macroeconomic indices and test these hypotheses in different panel approaches.

## 3 Data

I retrieve weekly stock returns and yearly corporate data of public US corporations that have been listed between 1995 and 2017 and are available in Datastream. As is common practice in this line of study, I exclude financial companies, because those enterprises have different business objectives with regard to taking financial risk. Furthermore, I omit companies that have zero returns for more than ten percent of their return observations, to limit the impact of infrequent trading (see Khoo, 1994). I consider both multinational and domestic companies. While changes in exchange rates typically affect multinational companies directly by affecting the value of their foreign-denominated assets, liabilities and cash flows, Aggarwal and Harper (2010) show that domestic companies are also exposed to exchange rate risk, because of the effects of competition. Thus altogether 2,038 companies remain in my survivorship bias free dataset. I also retrieve the Standard Industrial Classification (SIC) codes and group the companies into 17 industrial sectors according to the OECD.

Like Muller and Verschoor (2006), I use Datastream's total US market capitalization index as the market factor. The risk free rate is the one-month US Treasury Bill rate. I retrieved the US Fama French factors from the Kenneth R. French's homepage. The exchange rates are provided by Datastream. The annual macroeconomic forecast data stems from the OECD Economic Outlook and covers 39 OECD and non-OECD countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey and United Kingdom. The euro area countries Estonia, Latvia, Lithuania, Slovakia and Slovenia are not included as there are no spot exchange rates available in Datastream before the introduction of the euro. I retrieved the current macroeconomic data from the Annual National Accounts and Main Economic Indicator database of the OECD for comparability to the OECD forecast data. The yearly US export and import data stems from the IMF Trade Statistics.

I use the weekly spot exchange rates of the 39 countries mentioned above to build a dataset-specific trade-weighted exchange rate in direct quotation. For this, I take the nominal exports and imports shares of the US as yearly-adjusted currency weights and calculate chain-linked weekly returns. The exports to these 39 countries account for 80.83% of the total US exports, while the imports equal 81.57% of all US imports.[1] I use nominal exchange rates to estimate the company-specific exchange rate exposures (e.g. Jorion, 1991; Allayannis and Ofek, 2001; El-Masry et al., 2007), because selecting real exchange rates would require the other variables

[1]I also used the trade-weighted exchange rate of the Federal Reserve, which does not alter my findings. I refrain from using third-market competitive weights, as the bilateral trade weights correspond better to the macroeconomic variable construction that I discuss in Section 5.2 in more detail.

to be measured in real terms as well (Khoo, 1994), which typically produces similar results (e.g. Jorion, 1990; Bodnar and Gentry, 1993; Griffin and Stulz, 2001).

# 4 Measuring company-specific exchange rate exposures

## 4.1 One-factor and multi-factor model

Adler and Dumas (1984) were the first to establish a linear one-factor model that measures foreign exchange rate exposures from equity returns of companies. Assuming that the present value of a company's future cash flows corresponds to its market value, they define the exchange rate exposure $\gamma_i$ of a company $i$ as the sensitivity of its stock return to the exchange rate returns in $t$:

$$R_{i,t} = \alpha_i + \gamma_i R_{FX,t} + \varepsilon_{i,t}. \tag{1}$$

$R_{i,t}$ is the total excess stock return of company $i$ over period $t$. $R_{FX,t}$ represents the return of a trade-weighted exchange rate index against the currencies of a large group of major trading partners over period $t$.

Since Jorion (1990) most studies add a market factor to the exposure estimation of Adler and Dumas (1984). The "residual" $\gamma_i$ now measure the impact of a change in the exchange rate return on company stocks after taking into account the market-wide impact, thus reducing the estimated exposures' standard error. This model is also amended by the Fama and French (1993) factors small minus big ($SMB$) and high minus low ($HML$) to avoid potential biases from return differences between small versus large ($R_{SMB,t}$) and value versus growth stocks ($R_{HML,t}$) in period $t$ (see Huffman et al., 2010; Aggarwal and Harper, 2010; Chang et al., 2013). $R_{m,t}$ is the total excess return of the market index. Thus, the model with an included market factor looks as follows:

$$R_{i,t} = \alpha_i + \beta_{i,m} R_{m,t} + \beta_{i,SMB} R_{SMB,t} + \beta_{i,HML} R_{HML,t} + \gamma_i R_{FX,t} + \varepsilon_{i,t}. \tag{2}$$

Liu et al. (2015) criticize the common practice of including a market factor in the exposure estimation process, as the market factor proxies for the currency effect and therefore increases the chances of finding stock-specific currency exposure that is low or indistinguishable from zero. They suggest leaving out the market factor for exposure estimations that are not part of an asset-pricing test. This of course has a downside, i.e. that the signs and the values of the exposures become more volatile.[2] The model selection will be discussed in Section 4.3 in more detail.

I apply a standard OLS estimator with a correction of the standard errors according to Newey and West (1987), whereby the number of lags is set according to an autocorrelation test. To obtain yearly exposures $\gamma_i$ for each company $i$, I use weekly return observations. While on the one hand choosing weekly over monthly observations reduces the amount of potential significant exposure (e.g. Dominguez and Tesar, 2006), on the other it removes the need to use overlapping moving windows (e.g. Chang et al., 2013), which would induce autocorrelation in the estimated exposures. Whereas Boudt et al. (2017) use intra-day data to construct daily exposures, I chose weekly over intra-day data, as my aim is to determine whether companies adjust their strategic hedging behavior, which is more easily observable on a quarterly (see Brown, 2001) rather than on a daily basis. I collect at least 40 weekly observations in one year to generate adequate econometric inference. To account for outliners, I winsorize 0.5% of both the estimated positive and negative currency exposures.

[2] I do not use an orthogonalized market factor as it produces inconsistent standard errors. See Liu et al. (2015) for further discussion.

## 4.2 Descriptive statistics on the exchange rate exposures

Table 1 presents the average yearly exchange rate exposures estimated by Equation (2) with an included market factor. I estimate a total of 33,597 exchange rates exposures for the years 1995 to 2017. For the majority of the years I find negative average exposures varying between −0.38 and 0.31. The average of all exposures is −0.09, which corresponds to a marginally negative effect of a stronger US Dollar on the stock returns of all US companies in my sample. The average standard deviation over the years is 1.84. Fifteen percent of the exposures are significant on the 10% level. The average $R^2$ is 27% and varies from 13% to 43%.

[Table 1 about here.]

Table A.1 displays the foreign exchange rate exposures of Equation (1) without a market factor and can be found in the Appendix A. The average exposure over the whole sample becomes more negative with −1.04, whereas the positive exposures largely stay the same and the negative exposures increase in absolute terms, especially between 2004 and 2013. This goes along with an increased standard deviation and at 34%, a much higher amount of 10%-significant exposures. As Liu et al. (2015) state, leaving out the market factor increases the probability of identifying currency exposure different from zero. The $R^2$ in the estimation without a market factor decreases to 6%.

Figure 1 depicts the cross-sectional distribution of the exposures per year and compares the exposure estimation results of Equation (1) and (2). For the model with an included market factor, the mean and the median stay close to about zero. The 10/90% quantiles show similar symmetric variation, which stabilizes after 2003. This is not the case for the model of Adler and Dumas (1984). Here, the mean and median vary from slightly positive to strongly negative values under two. Between the years 2008 and 2012, the 90% quantile becomes negative, and for the year 2008, only 35 of the 1590 estimated exposures are positive.

[Figure 1 about here.]

### 4.3 Model selection

If the models with and without a market factor only measure the effect of currency on stock returns, a depreciation of the US dollar against the trade-weighted currencies in $R_{FX,t}$ will negatively affect the stock returns of a potential (net) importing company and positively affect the stock returns of a potential (net) exporting company (provided that the companies are not completely hedged). This corresponds to a negative exposure for potential importers and a positive exposure for potential importers (see e.g. Allayannis and Ofek, 2001; Bartram and Karolyi, 2006; Bartram et al., 2010). Thus, one would expect a relatively stable amount of positive and negative exposures, as the companies do not change their business objective regularly. Such an opposing reaction of the exposures to currency changes – that I expect for, e.g. exporting and importing companies – cannot be seen in the exposures estimated without a market factor in Figure 1, as nearly all exposures became negative for the years 2008 to 2012.

This shows that while being able to identify more significant exposures, the model without a market factor comes with a downside, namely not proxying market movements that can not solely be attributed to the effect of mere currency changes on stock returns of US companies. As Priestley and Ødegaard (2007) state, an omitted variable bias could arise if e.g. lower US interest rates cause the stock returns in our sample to rise, while simultaneously reducing the exchange rate. This effect can however not be attributed to a direct relationship between stock returns and exchange rates and should affect all companies alike (importing and exporting). Consequently, the link weakens between changes in the estimated exposures and currency hedging decisions of companies. Furthermore, Bodnar and Wong (2003) and Dominguez and Tesar (2006) argue that the exposure estimated without a market factor also captures value effects of macroeconomic shocks. The model with a market factor controls for such (potential) influences, though on the downside it also (potentially) captures some of the stock's exchange rate sensitivity (see Bodnar and Wong, 2003).

Overall, each of the two models has its merits. I use the more commonly applied model of Equation (2) to explain exposures with respect to foreign macroeconomic determinants. To show that adding a market factor does not alter my findings, I will reproduce my results with exposures of Equation (1) in the robustness checks.

# 5 Explaining exposures with foreign macroeconomic determinants

## 5.1 Empirical design

In the next step, I use the estimated exposures $\hat{\gamma}_{i,j}$ of company $i$ and year $j$ and explain its variations by as set of yearly foreign macroeconomic determinants and control variables that are commonly used in the exchange rate exposure literature.[3] I estimate the following equation and use a fixed-effects panel regression with robust and clustered standard errors on the company or industry level:

$$\begin{aligned}\hat{\gamma}_{i,j} = \omega_i + &\phi_1\, GDP_{i,j} + \phi_2\, CAB_{i,j-1} + \phi_3\, CPI_{i,j} + \phi_4\, TS_{i,j} + \phi_5\, ULC_{i,j} \\ &+ \phi_6\, Gov.exp._{i,j} + \phi_{7-15}\, Controls_{i,j} + \eta_{i,j}.\end{aligned} \tag{3}$$

As stated above, the sign of the exposure can be used to identify potential (net) exporters and importers. For positive exposures or potential (net) exporters, being less exposed corresponds to decreased sensitivities and for negative exposures or potential (net) importers, being less

[3] See e.g. Francis et al. (2017). They also used the estimated exposures to explain the influence of managerial risk-taking as incentive variables and commonly used control variables.

exposed corresponds to increased or less negative sensitivities (decreased in absolute terms).

A variable can either have an unidirectional effect or an opposing direction of effect on positive and negative exposures. For an opposing effect of a variable, e.g. an expected positive effect for exporters and a negative effect for importers, one should find an increasing effect of the variable on $\hat{\gamma}_{i,j} > 0$ and also $\hat{\gamma}_{i,j} < 0$ (being less negative). For an unidirectional effect, e.g. a positive effect on both exporters and importers, one should find a positive effect for $\hat{\gamma}_{i,j} > 0$ and a negative effect for $\hat{\gamma}_{i,j} < 0$. Thus, when analyzing all companies at once, for a given expected opposing effect of a variable for potential (net) exporters and importers, $\hat{\gamma}_{i,j}$ are key to identifying that effect, whereas $|\hat{\gamma}_{i,j}|$ can be interpreted for an unidirectional effect.

## 5.2 Foreign macroeconomic determinants

### 5.2.1 Construction of the indices

The foreign macroeconomic determinants are the yearly percentage changes in the foreign trade-weighted indices of the 39 countries mentioned in Section 3 of the following factors: the gross domestic product (GDP), the current account balance (CAB), the consumer price index (CPI), the term spread (TS) calculated as the long minus the short interest rates based on government bonds maturing in ten years and three-month US Treasury rates respectively, the price indexed unit labor costs (ULC) and the government expenditures (Gov.exp.). To separate the effect of inflation, all variables except the CPI are measured in real terms.[4] I choose these variables, as they are among the most important macroeconomic indicators for the stock and currency market. The unemployment rate is not included in Equation (3) as it is highly correlated with the chosen variables.

To construct the indices I weight the retrieved data points of each country according to the

[4]Otherwise e.g. the correlation of the GDP and the CPI would increase. On top of this, high inflation rates, e.g. of Argentina, could alter the percentage change of the index considerably.

combined US exports and imports to/from that country. I adjust the weights according to the available data so that the sum of the weights for each year equals 100%. Furthermore, I limit the percentage change per country and year. If, for example, the short interest rates change from levels close to zero to negative ones (which is the case for e.g. France, Germany or Switzerland in my sample in 2015 and 2016), the index would be influenced by high percentage changes of single countries. Those outliners are therefore trimmed to +/- 100%.

For each of these foreign macroeconomic variables I construct an index of forecasted data (projections go one year ahead)[5]. To test if effects of the actual values differ from the forecasted data, I also construct indices based on the realized foreign macroeconomic variables. Lastly, I also determine the deviation of the actual from the forecasted values. The deviation is constructed as the difference of the actual minus the forecasted percentage changes of each individual country and year. If both the actual and the forecasted values are available, the difference is weighted with the US export and import share as mentioned above. Thus, a positive deviation stands for, e.g. a higher-than-expected foreign GDP.

Table 2 reports summary statistics and correlations of the forecasted macroeconomic indices.[6] All foreign macroeconomic expectation indices exhibit small but positive changes up to 3%, on average. Only TS shows a negative mean, median and (together with the CAB index) higher standard deviations. GDP shows high positive correlations with CAB (56%). As expected, I find low correlations of CPI with most of the other indices in real terms.

[Table 2 about here.]

Figure 2 displays the percentage changes of the foreign macroeconomic indices with forecasted values in black and with actual values in gray. The two lines follow each other closely. For

[5]For more detailed information about the forecasting methods, see the OECD Economic Outlook website: http://www.oecd.org/eco/outlook/.

[6]For the sake of brevity I only report the summary statistics of the forecasted macroeconomic indices.

example, for GDP, the forecasted values deviate only slightly from the actual values. For ULC and Gov.exp., divergences become more visible, as the percentage changes between the two lines are smaller compared to the other indices. Altogether, all indices calculating the actual minus the forecasted data show a mean, percentile and standard deviation of under 1%.

[Figure 2 about here.]

In the next step, I present the expected effects of the selected forecasted macroeconomic indices on the exchange rate exposures. To do so, I pursue a theoretical link between the macroeconomic determinants of the foreign countries and the exchange rate exposure, using the literature of announcement effects of macroeconomic news on exchange rates (e.g. Andersen et al., 2003; Evans and Lyons, 2008; Neely and Dey, 2010; Mun, 2012).

As previously stated, I also construct indices based on the actual values as well as deviations of actual minus forecasted macroeconomic variables. My aim is to test whether the two index types behave similarly to the hypotheses based on the forecasted macroeconomic indices.[7] Note that these results are not used to examine the validity of the hypotheses.

### 5.2.2 Hypotheses

Increased (unexpected) economic growth strengthens a country's currency relative to others (see Andersen et al., 2003; Evans and Lyons, 2008; Neely and Dey, 2010). More specifically, an increase in the foreign GDP increases the respective wages and prices; the resulting higher inflation will in turn be countered by an expansionary foreign monetary policy. As interest rates increase, there will be an increased foreign demand for the foreign currency, meaning a corresponding appreciation of the latter.

[7] As an increase in the deviation (the difference between the actual minus the forecasted data) stands for a higher-than-expected macroeconomic variable, the direction of the effect does not change for a corresponding effect in the Hypotheses, which are formulated for the forecasted macroeconomic indices.

US exporting companies benefit from a growth in foreign output and thus from an appreciation of foreign currencies, as the prices of their export goods decrease for those foreign buyers. US exporting companies thus also benefit if they set a lower hedge ratio, which corresponds to a higher exposure. The opposite applies for US importers. They benefit from a higher hedge ratio, which corresponds to their negative exposure being closer to zero.

**Hypothesis 1.** *A higher foreign GDP increases the positive exposures of US (net) exporters and negative exposures of US (net) importers. (opposing effect)*

An increased CAB (or decreased deficit) corresponds to an increase in the exports and/or decrease in the imports of a country. An increase in the foreign CAB implies an appreciation of the foreign currency (Neely and Dey, 2010). I therefore expect a higher exposure for US exporters and a higher negative exposure for US importers, as US exporters would benefit from a lower hedge ratio and US importers from a higher hedge ratio.

**Hypothesis 2.** *A higher foreign CAB increases the positive exposures of (net) exporters and negative exposures of (net) importers. (opposing effect)*

The effect of an increase in inflation depends on the monetary authority's reaction to it (Neely and Dey, 2010). Higher foreign inflation could on the one hand increase foreign commodity prices, which would reduce the competitiveness on international markets. As foreign exports decline so would the value of the foreign currency. On the other hand, if expectation rise that the increased foreign inflation will be countered by a tightened monetary policy, the foreign currency should appreciate (Mun, 2012). As my sample consists largely of OECD countries, I expect that the prevalent foreign monetary policy will be to counter a rise in inflation with higher foreign interest rates (see e.g. Simpson et al., 2005), but this has to be shown empirically. I therefore expect a higher exposure for US exporters and a higher negative exposure for US importers, as US exporters would benefit from a lower hedge ratio and US importers from a higher hedge ratio.

**Hypothesis 3.** *A higher foreign CPI increases the positive exposures of US (net) exporters and negative exposures of US (net) importers. (opposing effect)*

An increase in the foreign TS (difference between the long-term and short-term interest rates) forecasts future GDP growth (Hamilton and Kim, 2002; Ang et al., 2006). Thus, an expansionary foreign monetary policy deceases short-term interest rates more than long-term interest rates and increases the term spread. As stated before, higher future GDP growth will appreciate the foreign currency. I therefore expect a higher exposure for US exporters and a less negative exposure for US importers, as US exporters would benefit from a lower hedge ratio and US importers from a higher hedge ratio.

**Hypothesis 4.** *A higher foreign TS increases the positive exposures of US (net) exporters and negative exposures of US (net) importers. (opposing effect)*

It is ex-ante unknown if an increase in foreign ULC is due to an increase in wages or a decrease in productivity.[8] For US exporters, an increase in foreign wages would enable them to sell more goods. In addition, increased foreign wages will spur foreign inflation. Increased foreign interest rates will then appreciate foreign currencies. Whereas if foreign wages are stable and the increase in foreign ULC is due to a decreased productivity, foreign GDP is likely to decrease, which would depreciate foreign currencies.

A loss in foreign price competitiveness could be bad news for a US importer that is faced with higher prices of its imported goods due to higher foreign production costs or good news if the foreign currency depreciates. I therefore expect to find increased exposures for US exporters

[8] Variables such as a competitiveness indicator or labor productivity are either not available for my chosen time-frame or for both forecasted and actual data. Note that e.g. Lee and Tang (2007) find that higher labor productivity tends to cause the real exchange rate of a country to appreciate.

and increased negative exposures for US importers if the effect of increased ULC is due to an increase in real wages, but this has to be proven empirically.

**Hypothesis 5.** *A higher foreign ULC increases the positive exposures of US (net) exporters and negative exposures of US (net) importers. (opposing effect)*

Government expenditure increases the overall consumption of a country. An increase in foreign government expenditure therefore triggers foreign economic growth. As all favorable growth news of a country, it appreciates its currency (Andersen et al., 2003; Rime et al., 2010), which affects the countries it trades with. I therefore expect a higher exposure for US exporters and a higher negative exposure for US importers, as US exporters would benefit from a lower hedge ratio and US importers from a higher hedge ratio.

**Hypothesis 6.** *A higher foreign government expenditure increases the positive exposures of US (net) exporters and negative exposures of US (net) importers. (opposing effect)*

### 5.3 Control variables

The yearly control variables commonly used in the literature to assess foreign exchange rate exposure include company characteristics such as the natural log of the total assets (Size), the foreign assets to total assets ratio (F.Ass.), the foreign sales to total sales ratio (F.Sal.), the ratio of international operating income to total income (Int.Inc.), the leverage ratio defined as total debt to common equity (Lev.), the quick ratio (Quick), the dividends per earnings ratio (Div.p.E.), the research and development expenditures to total sales (R&D) and the market to book ratio of the equity (M./B.).

Most studies find a negative relation for larger companies with regard to absolute exchange rate exposures (e.g. Nance et al., 1993; Dominguez and Tesar, 2006). Due to economies of scale or diversification, larger companies are able to reduce hedging costs (He and Ng, 1998). However

He and Ng (1998) find a positive impact for company size, which could, e.g. be caused by smaller firms facing higher distress costs or larger companies reacting more to exchange rate changes as they are more engaged in international activities. Jorion (1990) showed that the exposures depend on the foreign activity of a company. Like El-Masry et al. (2007), I use F.Ass., F.Sal. and Int.Inc. to measure different specifications of foreign involvement. Whether the companies in my sample react with adequate hedging activities to potentially higher exposures has to be empirically established.[9]

Higher distress costs could be an incentive for companies to hedge more. Thus, I expect a higher Lev. to reduce exposures (see He and Ng, 1998; Muller and Verschoor, 2006). Note that a reaction to LEV. could also be caused by the fact that higher leveraged companies have riskier equity. A higher short-term liquidity cushion – in the form of a higher quick ratio or lower Div.p.E. – reduces the need to hedge (see Nance et al., 1993). R&D and M./B. reflect the growth opportunities of a company. According to Froot et al. (1993) companies with higher growth opportunities are more likely to hedge, as they aim to reduce the cost of external financing caused by a higher cash-flow volatility.

Table 3 shows descriptive statistics on the control variables. The average US foreign assets ratio of 9% is on the same level as the international income ratio (10%), whereas 22% of the sales are, on average, generated abroad. The three foreign involvement variables have similar standard deviations and correlations of about 50%. The 10% quantiles are zero, as I include, e.g. domestic companies and go up to 62% for the 90% quantile of the foreign sales. 59% of the companies in my sample report foreign sales above zero. For the other control variables, I find low pairwise correlations with the exception of Size and Div.p.E. of 36% and Lev. and M./B. of 46%. Some of the 2,038 companies in the sample are highly leveraged, have a high market to

[9]Keep in mind that the influence of some variables might differ for positive and negative exposures identifying potential exporters and importers. See Allayannis and Ofek (2001) for a more detailed discussion.

book ratio and spend much on research and development compared to their total sales.

[Table 3 about here.]

Overall, I expect an opposing positive effect of all forecasted macroeconomic indices of the foreign countries on the exchange rate exposures and an unidirectional effect for the control variables. Thus, to analyze the validity of the hypotheses I need to use $\hat{\gamma}_{i,j}$ and to test the control variables I need to use $|\hat{\gamma}_{i,j}|$.

# 6 Empirical results

This section presents the effects of the foreign macroeconomic determinants and the company-specific control variables that I use to explain the estimated foreign exchange rate exposures with a fixed-effects regression (robust and company clustered standard errors). I show the results for the foreign macroeconomic expectation indices that I construct with yearly forecast data, the foreign macroeconomic indices based on yearly actual values and the deviations between the actual and the forecasted data.

Firstly, I use exposures with and without the control variables as well as absolute exposures in Table 4 to analyze all companies at once. Secondly, I show the results for positive and negative exposures, that represent potential (net) exporters in Table 5 and importers in Table 6, respectively.[10] Lastly, in Table 8 I use an industry-specific fixed-effects regression to test for variations across industries as well as a fixed-effects regression for each industry to find exposures

[10]In each of the first regressions (1) in Tables 5 and 6, I use all positive and negative exposures. In the second regressions (2), I use only the exposures that showed the same sign in the previous year and in the third regressions (3), I use the exposures that did not change signs for the two prior years. As I have established the hypotheses for exporters and importers separately, I ensure – by controlling for more stable positive or negative exposures over the years – that I apply the hypotheses for companies that qualify as potential (net) exporters or importers for a longer period of time. Note that using exposures that do not change signs for up to two years is somewhat arbitrary. I also used exposures that do not change signs for more than three years in a row. This further reduces the sample size, but the reduction slows down and the results do not change for exposures that do not change signs for more than two prior years. I do not report these results for brevity reasons.

that did not change signs for the two prior years.

### 6.1 All exposures

In Table 4, I analyze all exposures together. In the first columns of the forecasted, actual and deviation indices, I use all exposures without the control variables. In the second columns, I add the control variables. In the third columns of each foreign macroeconomic index specification, I use absolute exposures for comparability reasons to other foreign exchange rate exposure studies and to control for unidirectional effects of the US company-specific variables.[11]

For the foreign macroeconomic indices based on the forecasted values in the first column, I find the expected positive and significant effect for GDP, CAP, TS and ULC of the respective hypotheses. CPI is not significant. Gov.exp. shows a significant but negative effect, which contradicts Hypothesis 6. However, the significant impact of GDP and Gov.exp. vanish in the second column due to the control variables. In the third column for absolute exposures, I find a negative effect for larger companies and companies with a higher dividend per earnings ratio, which is consistent with the literature on foreign exchange rate exposure. In addition, a higher foreign asset ratio increases absolute exposures. Furthermore, note that in the first two columns, the adjusted $R^2$ is almost zero. The adjusted $R^2$ only increases for absolute exposures.

For the actual values, I observe a positive and significant effect for CAP, CPI and TS with and without the control variables. The significant effect of Gov.exp. again vanishes if the control variables are added.

For deviations between the actual and forecasted foreign CPI, I find a negative impact on the exposures, which is in line with Boudt et al. (2017), who report a persistent effect of US CPI news on average exposures. Apparently, a higher-than-expected foreign CPI reduces exposures.

[11] Note that the direction of effect of absolute exposures cannot be interpreted for expected opposing effects of potential (net) exporters and importers, although I find a significant influence for nearly all foreign macroeconomic indices specifications.

[Table 4 about here.]

### 6.2 Positive exposures: potential (net) exporters

In Table 5, I find confirmation for all six of my hypotheses for potential (net) exporters when using forecasted values in the first column. For example, as in Hypothesis 1 a higher foreign GDP forecast increases the positive exposures. Consistent with the results of Patro et al. (2002), I also find a positive impact for foreign inflation, confirming Hypothesis 3 for potential (net) exporters.[12] A higher expectation of a country's inflation leads to an appreciation of its currency due to its likely monetary policy, which will increase foreign interest rates to counter the increased inflation. These results are unchanged if I only use the exposures that are positive for one or two prior years in the second and third column, even though the sample is reduced to about half and one-third of its original size, respectively. The adjusted $R^2$ increases from 6% to 8% from the first to the third column.

I find similar results for the foreign macroeconomic indices that are based on actual values, with the exception that CAB no longer shows a significant positive impact on the positive exposures. Furthermore, CPI no longer shows a significant impact for exposures that are positive for the two previous years.

For the deviations between the actual and the forecasted data, a higher-than-expected TS, ULC and Gov.exp. increase the positive exposures. Consistent with the results of Boudt et al. (2017), I do not find a significant impact of GDP deviations on the exposures. However, for CPI deviations, I do find a significant negative impact on positive exposures that is not significant for companies that show positive exposures for the two prior years.

[Table 5 about here.]

[12] Patro et al. (2002) finds a negative impact for inflation in a GLS regression with country and year dummies, but focuses on the impact of macroeconomic variables in the home markets of 16 countries, whereas I examine the foreign market influence.

### 6.3 Negative exposures: potential (net) importers

The results of negative exposures that represent potential (net) importers are displayed in Table 6. In the first column, nearly all foreign macroeconomic expectation indices are significant, but the direction of effect contradicts my prediction, with the exception of GDP. By moving to negative exposures that did not change signs for two prior years in the third column, only Gov.exp. still shows a significant negative effect. I therefore do not find support for Hypothesis 6 regarding negative exposures. The sample decreases in size, similarly to the positive exposures from regression (1) to (3). Apparently, the significance of the effect of foreign macroeconomic indices vanishes for more stable negative exposures of potential (net) importers.

For the actual values I find a positive effect of CAB and for CPI for negative exposures that did not change signs for two prior years. GDP, ULC and Gov.exp. are negative, even if I only consider the negative exposures in the sixth column. Potential (net) importers apparently see, for example, an increase in actual ULC as downward pressure on the foreign currency, perhaps because they will be more affected by a loss in foreign productivity than by the prospect of increased wages.

For the deviation indices, I find positive and significant effects of CAB and CPI. For example, for a positive deviation in CAB, a higher-than-expected increase in foreign exports or a decrease in foreign imports causes the foreign currency to appreciate. A potential (net) US importer of goods from that country should thus hedge more of its currency risk, increasing the negative exposures closer to zero. Gov.exp. again shows a continuous negative effect.

[Table 6 about here.]

### 6.4 Industry-specific effects of foreign macroeconomic determinants

In the next step, I intend to test whether the influence US expectations of foreign macroeconomic indices vary across industries. I use the first two SIC-code digits of each company to sort them into 17 industry sectors as suggested by the OECD. Table 7 reports the industry classification, the number of companies and estimated exposure as well as the average exposure per sector. I do not include Sector 1, i.e. the agriculture, hunting, forestry and fishing sector, due to the lack of observations. The number of companies range from 21 companies with 392 estimated exposures in the textiles, textile products, leather and footwear (TLF) sector to 371 companies with 6,676 estimated exposures in the electrical and optical equipment (EOQ) sector. The average number of years of estimated exposures per industry ranges from 12.96 in the other services (OSE) sector to 19.53 in the manufacturing n.e.c. and recycling (MNR) sector. The average estimated exposures are negative with the exception of the TLF and the wholesale and retail trade and the hotels and restaurants (WRH) sector. For the mining and quarrying (MQA) sector, I find much lower exposures on average, with −1.181.

[Table 7 about here.]

The results of the industry fixed-effects regression of the forecasted macroeconomic indices on exposures that did not change signs for two prior years are displayed in Table 8 in the first column. I find the expected positive and significant effect for CAB, CPI and TS.

Turning to fixed-effects estimation per industry in the following columns of Table 8, the number of exposures that did not change signs for two prior years varies between 77 and 1266 observations with an adjusted $R^2$ from close to zero and up to 24%. Like Boudt et al. (2017) for persistent and transitory US CPI news, I observe a significant influence of foreign CPI and like Chaieb and Mazzotta (2013), I find a significant effect of TS across the majority of the industries. As stated in Hypotheses 3 and 4, foreign CPI and the foreign TS have a positive significant impact on the exposures that did not change signs for two prior years of potential (net) exporters and importers. Nearly all industry sectors react to foreign inflation and changes in TS. The only notable industry that contradicts my prediction is basic metals and fabricated metal products (BFP), with a significant negative effect for GDP, ULC and Gov.exp.. For the rest of the industries, I find the expected positive effect of GDP, CAB and ULC given that they are significant.[13]

[Table 8 about here.]

# 7 Robustness checks

In this section, I first test whether the estimation of the exposures without a market factor alters my findings in Table 9. Furthermore, Patro et al. (2002) exclude US company-specific control variables and only focus on the foreign macroeconomic variables, as they find that the financial variables have little effect on the coefficients of foreign macroeconomic variables. Secondly, I also exclude the US company-specific control variables and compare the results to my previous findings in Table 10. Lastly, I estimate a FGLS regression to correct for autocorrelation across years and heteroscedasticity between the companies' residuals to account for the time varying estimation in Table 11. For all three robustness checks, I display the results using all positive and negative exposures that did not change signs for two prior years separately for each foreign macroeconomic index specification. The results congruent with the tables in Section 6 can be found in Appendix A, B and C, respectively.

In Table 9, I display the results of the forecasted macroeconomic indices on all constant exposures ($\hat{\gamma}_{i,t}$-cons.) estimated without a market factor in the first column. I find the expected

[13] For Gov.exp. I find mixed results: In the MQA and wood, paper, paper products, printing and publishing (WPP) industry, foreign Gov.exp. has a significant negative effect, and in the business services (BUS), transport equipment (TRQ) and WRH sectors it has a significant positive effect.

positive and significant effect for GDP, CPI and TS. Compared to the exposures estimated with a market factor, ULC has now a negative impact.

As already displayed in Figure 1, the number of positive exposures reduces for the model without a market factor in the second column to about one-fourth of all estimated exposures. By considering only the positive exposures that did not change signs for two prior years ($\hat{\gamma}^{+}_{i,t}$-cons.), the number of positive exposures further decreases to 11% of all exposures. All forecasted macroeconomic indices are still positive as expected, but only TS and Gov.exp. show a significant effect. For constant negative exposures ($\hat{\gamma}^{-}_{i,t}$-cons.) in the third column, I again do not find the effect expected in Hypothesis 6. In addition, CAB and CPI show a significant negative effect. The adjusted $R^2$ is higher with 9% for both constant positive and negative exposures.

For the foreign macroeconomic indices based on actual data, I obtain results similar to the indices based on the forecasted data, with the exception that CAB and ULC now show a significant positive effect in the fourth column. The deviation indices GDP, CAB, ULC and Gov.exp. show a positive significant effect, whereas CPI and TS are negative and significant.

[Table 9 about here.]

When I omit the US company-specific control variables from Equation (3) using exposures estimated with Equation (2), the results of the foreign macroeconomic variables are nearly unchanged compared to Section 6. In Table 10 the effect of the forecasted macroeconomic indices for all and positive exposures are in line with Hypotheses 1 to 6. For negative exposures, I again find only a significant but negative effect for the forecasted foreign Gov.exp. index. This effect stays the same for the actual and deviation Gov.exp. indices.

[Table 10 about here.]

Lastly, for the FGLS estimation in Table 11, I obtain the expected positive effects for constant exposures with the exception Gov.exp. in the first column. In the second column, all forecasted macroeconomic variables show a significant positive effect on the constant positive exposures. The same applies for the actual indices on positive exposures with the exception that CAB is now negative. I also find a positive significant impact for deviations of foreign GDP, CAB, TS, ULC and Gov.exp. for constant positive exposures. The same applies for potential (net) importers for deviations of foreign CAB, CPI and TS.

[Table 11 about here.]

## 8 Concluding remarks

In this study, I analyze the impact of foreign macroeconomic determinants on the foreign exchange rate exposure of US companies. Changes in the foreign export or import markets should affect the currency risk of US companies if they are not fully hedged. I use a sample of 2,038 non-financial US companies for the years 1995 to 2017 and estimate 33,597 yearly company exposures. Those sensitivities are then explained by US trade-weighted foreign macroeconomic indices and US company-specific control variables that have been used in this line of literature before. For the foreign macroeconomic indices, I use yearly expectations, actual data and the deviation between the two. I construct percentage changes in the foreign GDP, CAB, CPI, TS, ULC and Gov.exp. of 39 countries using yearly OECD forecasts and actual macroeconomic data. For each of the foreign macroeconomic variables based on the forecasted data, I form separate hypotheses for positive exposures or potential (net) exporters and negative exposures or potential (net) importers. In these hypotheses I assume an effect of the forecasted macroeconomic variables on the expected exchange rate and assume that the companies adjust their hedge ratio to benefit from the change in the expected exchange rates.

As hypothesized, I find a significant impact on the positive exposures for the foreign GDP, CAB, CPI, TS, ULC and Gov.exp. forecasts. In contrast to the positive exposures, I do not observe a significant impact of the foreign macroeconomic variables for more stable negative exposures. I only find a negative effect with regard to foreign Gov.exp. forecasts for potential (net) US importers. Taking positive and negative exposures that qualify as such for a longer period of time together, all forecasted macroeconomic variables show the expected positive impact with a significant effect of CAB, CPI, TS and ULC. Consistent with Chaieb and Mazzotta (2013) and Boudt et al. (2017), I also substantiate a strong influence of especially CPI and TS across industries. Overall, I find strong evidence that foreign macroeconomic determinants influence the foreign exchange rate exposure of US companies.

## Appendix A Exposures estimated without a market factor

[Table A.1 about here.]

[Table A.2 about here.]

[Table A.3 about here.]

[Table A.4 about here.]

[Table A.5 about here.]

## Appendix B Estimation without the company control variables

[Table B.1 about here.]

[Table B.2 about here.]

[Table B.3 about here.]

## Appendix C Feasible generalized least squares regression

[Table C.1 about here.]

[Table C.2 about here.]

[Table C.3 about here.]

[Table C.4 about here.]

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# Tables

**Table 1:** Estimated foreign exchange rate exposures of US companies

| year | Obs. | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t} > 0$ | $\hat{\gamma}_{i,t} < 0$ | SD | $p < 0.1$ | $R^2$ |
|---|---|---|---|---|---|---|---|
| 1995 | 848 | 0.047 | 0.87 | -0.80 | 1.25 | 10% | 0.13 |
| 1996 | 925 | -0.075 | 2.01 | -2.15 | 2.82 | 12% | 0.17 |
| 1997 | 1,005 | -0.053 | 1.47 | -1.50 | 2.05 | 12% | 0.18 |
| 1998 | 1,069 | -0.106 | 1.03 | -1.04 | 1.45 | 16% | 0.26 |
| 1999 | 1,121 | -0.095 | 1.64 | -1.68 | 2.28 | 15% | 0.17 |
| 2000 | 1,214 | 0.307 | 2.14 | -1.75 | 2.63 | 10% | 0.21 |
| 2001 | 1,270 | -0.061 | 1.67 | -1.55 | 2.22 | 12% | 0.27 |
| 2002 | 1,296 | -0.330 | 1.74 | -2.35 | 2.70 | 23% | 0.23 |
| 2003 | 1,318 | -0.071 | 1.12 | -1.26 | 1.71 | 13% | 0.25 |
| 2004 | 1,348 | 0.010 | 0.93 | -0.90 | 1.35 | 12% | 0.25 |
| 2005 | 1,398 | -0.022 | 0.98 | -1.00 | 1.46 | 13% | 0.24 |
| 2006 | 1,455 | -0.106 | 1.12 | -1.31 | 1.73 | 16% | 0.25 |
| 2007 | 1,522 | -0.204 | 1.36 | -1.45 | 1.92 | 18% | 0.27 |
| 2008 | 1,591 | -0.379 | 0.83 | -1.31 | 1.49 | 24% | 0.43 |
| 2009 | 1,607 | -0.155 | 1.22 | -1.61 | 2.05 | 16% | 0.35 |
| 2010 | 1,651 | -0.175 | 0.94 | -1.25 | 1.59 | 15% | 0.37 |
| 2011 | 1,702 | -0.070 | 0.83 | -1.02 | 1.28 | 17% | 0.43 |
| 2012 | 1,759 | -0.015 | 1.40 | -1.40 | 2.01 | 14% | 0.26 |
| 2013 | 1,821 | 0.005 | 0.93 | -1.00 | 1.50 | 12% | 0.24 |
| 2014 | 1,916 | -0.054 | 1.35 | -1.37 | 1.94 | 14% | 0.28 |
| 2015 | 1,978 | -0.152 | 0.89 | -0.95 | 1.41 | 15% | 0.27 |
| 2016 | 1,956 | -0.263 | 0.80 | -1.13 | 1.46 | 20% | 0.31 |
| 2017 | 1,827 | 0.033 | 1.06 | -1.11 | 1.66 | 13% | 0.17 |
| | 33,597 | -0.093 | 1.20 | -1.31 | 1.84 | 15% | 0.27 |

This table shows the results of Equation (2) that includes the market factor with a standard OLS estimation and the Newey and West (1987) correction. Weekly data is used to estimate yearly coefficients, with at least 40 observations. The displayed sensitivities are the average US companies' coefficients of each year. To account for outliners of the companies' sensitivities I winsorize 0.5% of the estimated $\gamma$ factors at each end. I also show standard deviation, the percentage amount of the significant $\gamma$-factors ($p < 0.10$) as well as the average adjusted $R^2$. Significance level: * p<10%.

**Table 2:** Summary statistics and correlations of the forecasted macroeconomic indices

| Summary statistics: | | | | | | |
|---|---|---|---|---|---|---|
| | GDP | CAB | CPI | TS | ULC | Gov.exp. |
| Obs. | 23 | 23 | 23 | 23 | 23 | 23 |
| Mean | 0.03 | 0.00 | 0.03 | -0.11 | 0.01 | 0.02 |
| Median | 0.03 | 0.00 | 0.03 | -0.14 | 0.01 | 0.02 |
| 10% q. | 0.02 | -0.24 | 0.02 | -0.41 | 0.01 | 0.01 |
| 90% q. | 0.05 | 0.20 | 0.05 | 0.38 | 0.02 | 0.03 |
| Std. dev. | 0.01 | 0.18 | 0.01 | 0.30 | 0.01 | 0.01 |
| Correlation: | | | | | | |
| | GDP | CAB | CPI | TS | ULC | Gov.exp. |
| GDP | 1.00 | | | | | |
| CAB | 0.56 | 1.00 | | | | |
| CPI | 0.09 | -0.31 | 1.00 | | | |
| TS | -0.25 | -0.39 | 0.06 | 1.00 | | |
| ULC | -0.43 | -0.16 | -0.03 | -0.37 | 1.00 | |
| Gov.exp. | -0.14 | -0.18 | -0.30 | -0.13 | 0.33 | 1.00 |

This table reports the number of observations (Obs.), the mean, the median, the 10% quantile, the 90% quantile, and the standard deviation of the forecasted explanatory macroeconomic variable returns. The lower panel presents the respective correlations.

**Table 3:** Summary statistics and correlations of control variables

| Summary statistics: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Size | F.Ass. | F.Sal. | Int.Inc. | Lev. | Quick | Div.p.E. | R&D | M./B. |
| Obs. | 36,741 | 29,783 | 32,233 | 37,105 | 36,357 | 36,163 | 33,805 | 36,286 | 34,097 |
| Mean | 12.94 | 0.09 | 0.22 | 0.10 | 1.13 | 2.59 | 0.11 | 1.59 | 4.39 |
| Median | 12.96 | 0.00 | 0.11 | 0.00 | 0.25 | 1.31 | 0.00 | 0.01 | 2.19 |
| 10% q. | 10.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 | 0.00 | 0.00 | 0.73 |
| 90% q. | 15.84 | 0.31 | 0.62 | 0.41 | 1.68 | 4.98 | 0.41 | 0.28 | 6.89 |
| Std. dev. | 2.30 | 0.17 | 0.26 | 0.23 | 10.57 | 8.68 | 0.20 | 22.69 | 17.92 |
| Correlation: | | | | | | | | | |
| | Size | F.Ass. | F.Sal. | Int.Inc. | Lev. | Quick | Div.p.E. | R&D | M./B. |
| Size | 1.00 | | | | | | | | |
| F.Ass. | 0.22 | 1.00 | | | | | | | |
| F.Sal. | 0.33 | 0.54 | 1.00 | | | | | | |
| Int.Inc. | 0.22 | 0.48 | 0.52 | 1.00 | | | | | |
| Lev. | 0.06 | 0.00 | -0.01 | -0.01 | 1.00 | | | | |
| Quick | -0.18 | -0.10 | -0.05 | -0.06 | -0.03 | 1.00 | | | |
| Div.p.E. | 0.36 | 0.12 | 0.08 | 0.07 | 0.02 | -0.11 | 1.00 | | |
| R&D | -0.08 | -0.03 | -0.05 | -0.03 | -0.01 | 0.22 | -0.04 | 1.00 | |
| M./B. | -0.04 | -0.01 | -0.01 | -0.00 | 0.46 | -0.00 | 0.00 | 0.03 | 1.00 |

This table reports the number of observations (Obs.), the mean, the median, the 10% quantile, the 90% quantile, and the standard deviation of the explanatory variables used as control variables. The lower panel presents the respective correlations.

**Table 4:** Foreign exchange rate exposures: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$ | | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | | $\lvert\hat{\gamma}_{i,t}\rvert$ |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 1.92* | 1.24 | 1.48* | 1.12 | 0.74 | 7.40*** | 3.42 | -0.94 | 4.78 |
| | (1.71) | (0.94) | (1.66) | (1.10) | (0.64) | (9.12) | (0.68) | (-0.17) | (1.26) |
| CAP | 0.19** | 0.22** | 0.41*** | 0.21*** | 0.18*** | -0.10** | -0.87 | -1.62 | -3.76*** |
| | (2.44) | (2.32) | (6.34) | (3.44) | (2.65) | (-1.96) | (-0.49) | (-0.77) | (-2.68) |
| CPI | 0.39 | 1.06 | 5.79*** | 1.55** | 1.97* | 1.48** | -8.34** | -14.50*** | -26.20*** |
| | (0.38) | (0.71) | (5.89) | (2.06) | (1.80) | (2.06) | (-2.50) | (-3.09) | (-8.12) |
| TS | 0.12*** | 0.14*** | 0.63*** | 0.09** | 0.10** | 0.56*** | -4.50*** | -4.54** | 10.38*** |
| | (2.82) | (2.77) | (18.20) | (2.34) | (2.21) | (18.50) | (-2.76) | (-2.35) | (8.28) |
| ULC | 2.77** | 3.00* | 5.59*** | 1.23 | 1.36 | 14.52*** | 362.28 | 126.77 | 2303.94*** |
| | (2.08) | (1.88) | (5.11) | (0.82) | (0.78) | (11.78) | (0.97) | (0.31) | (8.50) |
| Gov.exp. | -5.70** | -3.62 | 32.13*** | -3.53* | -1.46 | 24.42*** | -1.08 | -2.38 | 8.26*** |
| | (-2.38) | (-1.24) | (15.93) | (-1.80) | (-0.60) | (14.70) | (-0.66) | (-1.25) | (6.73) |
| Control variables: | | | | | | | | | |
| Size | | 0.06** | -0.19*** | | 0.07*** | -0.20*** | | 0.09*** | -0.20*** |
| | | (2.55) | (-10.92) | | (2.70) | (-11.91) | | (3.65) | (-11.61) |
| F.Ass. | | -0.07 | 0.20** | | -0.07 | 0.20** | | -0.13 | 0.10 |
| | | (-0.64) | (2.46) | | (-0.66) | (2.47) | | (-1.17) | (1.27) |
| F.Sal. | | -0.10 | -0.12 | | -0.09 | -0.14 | | -0.01 | -0.09 |
| | | (-0.83) | (-1.23) | | (-0.75) | (-1.42) | | (-0.07) | (-0.92) |
| Int.Inc. | | -0.10* | -0.04 | | -0.10* | -0.02 | | -0.10* | 0.06 |
| | | (-1.69) | (-0.88) | | (-1.70) | (-0.49) | | (-1.77) | (1.47) |
| Lev. | | -0.00 | 0.00 | | -0.00 | 0.00 | | -0.00 | 0.00 |
| | | (-0.30) | (0.97) | | (-0.29) | (1.04) | | (-0.30) | (0.99) |
| Quick | | -0.00 | 0.01 | | -0.00 | 0.01* | | -0.00 | 0.01* |
| | | (-0.24) | (1.57) | | (-0.24) | (1.69) | | (-0.25) | (1.80) |
| Div.p.E. | | 0.10 | -0.30*** | | 0.10 | -0.31*** | | 0.10 | -0.42*** |
| | | (1.34) | (-5.62) | | (1.35) | (-5.78) | | (1.39) | (-7.78) |
| R&D | | 0.00 | -0.00 | | 0.00 | -0.00 | | 0.00 | -0.00 |
| | | (0.59) | (-0.58) | | (0.60) | (-0.59) | | (0.66) | (-0.64) |
| M./B. | | -0.00 | -0.00 | | -0.00 | -0.00 | | -0.00 | -0.00 |
| | | (-0.17) | (-0.64) | | (-0.17) | (-0.79) | | (-0.16) | (-0.82) |
| Obs. | 33,597 | 24,183 | 24,183 | 33,597 | 24,183 | 24,183 | 33,597 | 24,183 | 24,183 |
| Adj. $R^2$ | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.05 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). In the first and second regressions I use $\hat{\gamma}_{i,t}$. In the third regressions I use $|\hat{\gamma}_{i,t}|$. 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table 5:** Positive estimated foreign exchange rate exposures: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 2.61** | 4.15** | 9.09*** | 8.61*** | 10.12*** | 13.43*** | 0.41 | 6.71 | 5.65 |
| | (2.20) | (2.57) | (4.11) | (8.13) | (7.06) | (7.09) | (0.08) | (1.01) | (0.67) |
| CAB | 0.56*** | 0.62*** | 0.45*** | 0.01 | 0.00 | -0.15 | -1.54 | 0.92 | 6.26** |
| | (6.10) | (4.64) | (2.66) | (0.10) | (0.01) | (-1.26) | (-0.91) | (0.45) | (2.10) |
| CPI | 7.49*** | 6.31*** | 3.91* | 3.30*** | 2.48* | 0.84 | -35.66*** | -16.96*** | -4.84 |
| | (5.47) | (3.53) | (1.67) | (3.27) | (1.96) | (0.52) | (-7.74) | (-2.95) | (-0.61) |
| TS | 0.71*** | 0.80*** | 0.87*** | 0.62*** | 0.68*** | 0.70*** | 7.73*** | 7.78*** | 5.96* |
| | (14.91) | (11.46) | (9.50) | (14.84) | (10.95) | (8.78) | (5.11) | (3.62) | (1.84) |
| ULC | 6.51*** | 9.82*** | 14.11*** | 15.00*** | 18.14*** | 21.26*** | 2205.96*** | 2636.94*** | 3253.13*** |
| | (4.49) | (4.71) | (5.16) | (9.10) | (7.82) | (7.20) | (5.39) | (4.84) | (4.47) |
| Gov.exp. | 32.83*** | 35.70*** | 35.85*** | 26.00*** | 27.48*** | 27.00*** | 7.76*** | 4.22* | 9.36*** |
| | (12.00) | (9.21) | (6.71) | (11.53) | (8.69) | (6.10) | (4.11) | (1.67) | (2.77) |
| Control variables: | | | | | | | | | |
| Size | -0.17*** | -0.13*** | -0.14*** | -0.18*** | -0.15*** | -0.16*** | -0.17*** | -0.15*** | -0.16*** |
| | (-6.80) | (-4.38) | (-3.39) | (-7.38) | (-4.98) | (-3.88) | (-6.78) | (-4.96) | (-3.61) |
| F.Ass. | 0.09 | 0.26* | 0.65*** | 0.09 | 0.27* | 0.66*** | -0.01 | 0.18 | 0.54** |
| | (0.93) | (1.78) | (2.90) | (0.91) | (1.82) | (2.93) | (-0.14) | (1.22) | (2.49) |
| F.Sal. | -0.11 | -0.43** | -0.76*** | -0.12 | -0.46*** | -0.84*** | -0.08 | -0.48*** | -0.84*** |
| | (-0.84) | (-2.55) | (-3.02) | (-0.96) | (-2.73) | (-3.34) | (-0.65) | (-2.61) | (-2.97) |
| Int.Inc. | -0.12** | -0.17** | -0.18 | -0.09 | -0.14* | -0.13 | 0.01 | -0.03 | -0.04 |
| | (-2.05) | (-2.08) | (-1.38) | (-1.65) | (-1.70) | (-1.02) | (0.25) | (-0.33) | (-0.36) |
| Lev. | 0.00 | 0.00* | 0.00** | 0.00* | 0.00* | 0.00*** | 0.00* | 0.00* | 0.00*** |
| | (1.57) | (1.74) | (2.53) | (1.74) | (1.85) | (2.69) | (1.68) | (1.70) | (2.69) |
| Quick | 0.01* | 0.01** | 0.01 | 0.01* | 0.01** | 0.01 | 0.01** | 0.01** | 0.01* |
| | (1.78) | (2.02) | (1.39) | (1.92) | (2.19) | (1.61) | (2.05) | (2.23) | (1.87) |
| Div.p.E. | -0.25*** | -0.25*** | -0.28** | -0.26*** | -0.26*** | -0.29** | -0.35*** | -0.39*** | -0.46*** |
| | (-3.53) | (-2.72) | (-2.02) | (-3.66) | (-2.83) | (-2.10) | (-4.84) | (-3.86) | (-3.19) |
| R&D | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (-0.14) | (-0.29) | (-0.25) | (-0.15) | (-0.25) | (-0.32) | (-0.27) | (-0.40) | (-0.49) |
| M./B. | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (-0.85) | (-0.02) | (-0.19) | (-1.11) | (-0.10) | (-0.17) | (-1.29) | (-0.13) | (-0.35) |
| Obs. | 11,892 | 6,582 | 4,063 | 11,892 | 6,582 | 4,063 | 11,892 | 6,582 | 4,063 |
| Adj. $R^2$ | 0.06 | 0.07 | 0.08 | 0.07 | 0.07 | 0.09 | 0.05 | 0.04 | 0.04 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Positive values of the exposures ($\hat{\gamma}_{i,t} > 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table 6:** Negative estimated foreign exchange rate exposures: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 0.43 | 2.08 | -3.88 | -5.75*** | -3.14 | -10.73*** | -3.43 | -24.19*** | -21.32 |
| | (0.32) | (1.04) | (-1.33) | (-4.52) | (-1.55) | (-3.82) | (-0.59) | (-2.60) | (-1.57) |
| CAB | -0.29*** | -0.09 | 0.08 | 0.21*** | 0.09 | 0.40** | 5.88** | 14.98*** | 10.98** |
| | (-2.92) | (-0.64) | (0.42) | (2.86) | (0.83) | (2.44) | (2.44) | (4.29) | (2.36) |
| CPI | -4.80*** | -10.33*** | 5.07 | -0.12 | -5.57** | 12.51*** | 22.85*** | 51.84*** | 43.06*** |
| | (-3.36) | (-3.91) | (1.21) | (-0.11) | (-2.15) | (3.25) | (5.09) | (6.01) | (2.83) |
| TS | -0.60*** | -0.31*** | -0.06 | -0.55*** | -0.34*** | -0.11 | -14.67*** | -4.03 | 1.12 |
| | (-11.17) | (-3.86) | (-0.56) | (-11.66) | (-4.84) | (-1.09) | (-7.34) | (-1.46) | (0.28) |
| ULC | -3.50** | -1.12 | -2.22 | -13.28*** | -11.84*** | -12.26*** | -2784.27*** | -1825.10*** | -935.46 |
| | (-2.09) | (-0.43) | (-0.53) | (-6.99) | (-3.94) | (-2.66) | (-6.98) | (-3.03) | (-1.04) |
| Gov.exp. | -31.72*** | -27.24*** | -42.04*** | -22.88*** | -20.09*** | -37.49*** | -9.25*** | -22.61*** | -24.42*** |
| | (-10.63) | (-6.11) | (-6.70) | (-9.52) | (-5.41) | (-6.88) | (-5.18) | (-7.64) | (-5.61) |
| Control variables: | | | | | | | | | |
| Size | 0.20*** | 0.21*** | 0.20*** | 0.22*** | 0.21*** | 0.20*** | 0.22*** | 0.23*** | 0.24*** |
| | (8.28) | (5.53) | (3.36) | (9.06) | (5.56) | (3.30) | (9.08) | (6.15) | (4.34) |
| F.Ass. | -0.29*** | -0.27* | -0.31 | -0.29*** | -0.27* | -0.34 | -0.21* | -0.23 | -0.30 |
| | (-2.65) | (-1.77) | (-1.35) | (-2.65) | (-1.78) | (-1.47) | (-1.90) | (-1.48) | (-1.28) |
| F.Sal. | 0.10 | 0.03 | 0.06 | 0.12 | 0.07 | 0.07 | 0.05 | 0.04 | 0.06 |
| | (0.69) | (0.17) | (0.20) | (0.83) | (0.32) | (0.24) | (0.34) | (0.21) | (0.22) |
| Int.Inc. | -0.03 | -0.06 | -0.11 | -0.04 | -0.06 | -0.12 | -0.10 | -0.16 | -0.18 |
| | (-0.44) | (-0.67) | (-0.83) | (-0.60) | (-0.64) | (-0.93) | (-1.53) | (-1.63) | (-1.37) |
| Lev. | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (-0.46) | (-1.39) | (-1.60) | (-0.48) | (-1.36) | (-1.44) | (-0.52) | (-1.01) | (-0.99) |
| Quick | -0.01 | 0.01 | 0.02** | -0.01 | 0.01 | 0.02** | -0.01 | 0.01 | 0.02* |
| | (-1.18) | (1.34) | (2.08) | (-1.29) | (1.32) | (2.10) | (-1.27) | (1.24) | (1.82) |
| Div.p.E. | 0.37*** | 0.34*** | 0.35** | 0.37*** | 0.33*** | 0.35** | 0.50*** | 0.43*** | 0.40*** |
| | (4.58) | (3.11) | (2.48) | (4.63) | (3.03) | (2.53) | (6.33) | (4.01) | (2.78) |
| R&D | 0.00 | -0.00 | -0.00*** | 0.00 | -0.00 | -0.00*** | 0.00 | -0.00 | -0.00*** |
| | (0.77) | (-1.41) | (-12.93) | (0.81) | (-1.37) | (-12.90) | (0.68) | (-1.33) | (-12.56) |
| M./B. | 0.00 | 0.00 | 0.00** | 0.00 | 0.00 | 0.00** | 0.00 | 0.00 | 0.00** |
| | (0.34) | (0.69) | (2.47) | (0.40) | (0.69) | (2.28) | (0.35) | (0.59) | (2.19) |
| Obs. | 12,291 | 6,329 | 3,394 | 12,291 | 6,329 | 3,394 | 12,291 | 6,329 | 3,394 |
| Adj. $R^2$ | 0.06 | 0.05 | 0.05 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Negative values of the exposures ($\hat{\gamma}_{i,t} < 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table 7:** Industry classification of companies

| | Industry sector | Description | SIC Codes | Comp. | Coef. | Avg. $\gamma$ |
|---|---|---|---|---|---|---|
| 2 | BFP | Basic metals and fabricated metal products | 33-34 | 69 | 1,329 | -0.199 |
| 3 | BUS | Business services | 73 | 282 | 3,829 | -0.028 |
| 4 | CMP | Chemicals and non-metallic mineral products | 28-30, 32 | 318 | 5,024 | -0.035 |
| 5 | CON | Construction | 15-17 | 24 | 459 | -0.017 |
| 6 | EGW | Electricity, gas and water supply | 49 | 59 | 875 | -0.308 |
| 7 | EOQ | Electrical and optical equipment | 36, 38 | 371 | 6,676 | -0.076 |
| 8 | FBT | Food products, beverages and tobacco | 20-21 | 60 | 1,081 | -0.009 |
| 9 | MEN | Machinery and equipment, nec | 35 | 122 | 2,269 | -0.214 |
| 10 | MNR | Manufacturing nec; recycling | 25, 39 | 27 | 530 | -0.035 |
| 11 | MQA | Mining and quarrying | 10-14 | 83 | 1,341 | -1.181 |
| 12 | OSE | Other services | 27, 75-89, 91-99 | 164 | 2,126 | -0.016 |
| 13 | TLF | Textiles, textile products, leather and footwear | 22-23, 31 | 21 | 392 | 0.154 |
| 14 | TPT | Transport and storage, post and telecommunication | 40-48 | 92 | 1,471 | -0.091 |
| 15 | TRQ | Transport equipment | 37 | 76 | 1,321 | -0.080 |
| 16 | WPP | Wood, paper, paper products, printing and publishing | 24, 26-27 | 46 | 788 | -0.055 |
| 17 | WRH | Wholesale and retail trade; hotels and restaurants | 50-59, 70 | 224 | 4,086 | 0.134 |
| | | | | 2,038 | 33,597 | -0.093 |

This table displays the industry breakdown according to the OECD into 17 sectors. Included here are only non-financial companies. I also report the corresponding SIC codes, the number of companies in each industry (Comp.) as well as the number of estimated coefficients (Coef.). Furthermore, I added the average coefficients (Avg. $\gamma$) for each industry sector. Not included is Sector 1 (the agriculture, hunting, forestry and fishing sector) due to the lack of observations.

**Table 8:** Industry fixed-effects regression and breakdown of each sector

| | $\hat{\gamma}$-cons. All | 2 BFP | 3 BUS | 4 CMP | 5 CON | 6 EGW | 7 EOQ | 8 FBT | 9 MEN | 10 MNR | 11 MQA | 12 OSE | 13 TLF | 14 TPT | 15 TRQ | 16 WPP | 17 WRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Foreign macroeconomic variables: | | | | | | | | | | | | | | | | | |
| GDP | 0.86 | -13.79** | -10.52 | 5.40 | 5.69 | 3.21 | 2.46 | 8.69 | -12.21 | 5.28 | 3.20 | 7.46 | 49.05** | 12.98* | 13.15 | 23.38** | 0.88 |
| | (0.36) | (-2.16) | (-1.45) | (0.89) | (0.60) | (0.37) | (0.60) | (0.65) | (-1.34) | (0.21) | (0.27) | (0.74) | (2.35) | (1.89) | (1.56) | (2.47) | (0.15) |
| CAB | 0.55*** | -0.74* | 0.99 | 0.61 | 0.62* | -0.05 | 0.54 | 0.51 | 0.29 | 0.52 | 0.76 | -0.27 | -1.90 | -0.31 | 0.70 | 0.47 | 0.89** |
| | (3.30) | (-1.91) | (1.48) | (1.45) | (2.24) | (-0.05) | (1.66) | (0.73) | (0.43) | (0.51) | (1.24) | (-0.42) | (-1.11) | (-0.41) | (1.34) | (0.62) | (2.53) |
| CPI | 24.15*** | -5.76 | 39.13*** | 25.01*** | 16.36 | 2.61 | 30.27*** | 17.82** | 23.67** | 27.76 | 21.55** | 26.42** | 15.22 | 17.50* | 26.34*** | 14.49 | 21.63*** |
| | (8.68) | (-0.89) | (3.01) | (3.48) | (1.13) | (0.25) | (4.24) | (2.45) | (2.66) | (1.27) | (2.59) | (2.18) | (0.45) | (1.85) | (3.37) | (0.94) | (3.61) |
| TS | 0.66*** | -0.28 | 0.84** | 0.80** | -0.01 | 0.67* | 0.62*** | 1.30*** | 0.48* | 0.31 | 1.27 | 0.19 | -0.01 | 0.87* | 1.16*** | 0.39 | 0.42** |
| | (6.70) | (-0.74) | (2.52) | (2.73) | (-0.03) | (2.24) | (3.80) | (3.39) | (1.72) | (0.57) | (1.69) | (0.57) | (-0.00) | (2.06) | (5.00) | (1.16) | (2.03) |
| ULC | 5.17 | -27.01** | -5.01 | 19.07*** | 44.78** | -0.13 | 12.09 | 20.23 | -12.33 | -12.93 | 13.92** | -10.74 | 17.01 | 17.89* | 30.09*** | -0.62 | 2.55 |
| | (1.63) | (-2.59) | (-0.62) | (2.99) | (3.11) | (-0.02) | (1.55) | (1.22) | (-1.07) | (-0.41) | (2.18) | (-0.67) | (0.60) | (1.99) | (3.67) | (-0.04) | (0.34) |
| Gov.exp. | 3.97 | -57.83*** | 43.83** | -9.47 | 5.13 | 21.31 | 10.98 | -7.62 | -18.73 | 16.61 | -44.14** | 1.52 | -29.16 | 33.86 | 44.04* | -36.00* | 22.22* |
| | (0.66) | (-4.68) | (2.65) | (-0.54) | (0.18) | (0.66) | (0.75) | (-0.30) | (-0.96) | (0.45) | (-2.39) | (0.05) | (-0.25) | (1.35) | (2.04) | (-1.77) | (1.84) |
| Control variables: | | | | | | | | | | | | | | | | | |
| Size | 0.05 | -0.61* | 0.12 | 0.13 | -0.39 | -0.46** | 0.36*** | -0.09 | -0.07 | 0.23 | -0.16 | -0.03 | 0.15 | -0.08 | 0.10 | -0.23 | 0.13 |
| | (1.05) | (-1.94) | (0.70) | (1.43) | (-0.87) | (-3.18) | (3.34) | (-0.31) | (-0.41) | (0.35) | (-1.32) | (-0.21) | (0.57) | (-0.63) | (0.70) | (-0.65) | (0.97) |
| F.Ass. | -0.18 | -0.82 | -0.26 | -0.74** | -1.62 | 2.81*** | 0.35 | 0.17 | 0.18 | 2.86 | -0.31 | -1.78 | -0.77 | 1.63 | 0.68 | -1.90 | -0.93*** |
| | (-0.86) | (-1.42) | (-0.30) | (-2.10) | (-0.69) | (5.53) | (0.74) | (0.22) | (0.31) | (0.65) | (-0.54) | (-1.15) | (-0.77) | (1.28) | (1.56) | (-1.61) | (-2.74) |
| F.Sal. | -0.50* | -0.77 | -0.08 | -1.32* | 1.30 | -3.72*** | -1.11*** | -0.12 | 1.74* | -1.34 | 0.46 | -0.82 | -1.37 | -1.27 | -0.53 | 5.23* | -0.47 |
| | (-1.81) | (-0.95) | (-0.09) | (-2.01) | (0.60) | (-3.72) | (-2.99) | (-0.16) | (1.79) | (-1.52) | (0.56) | (-0.77) | (-0.40) | (-1.19) | (-0.50) | (2.07) | (-0.63) |
| Int.Inc. | -0.23** | 0.31 | -0.20 | -1.06*** | -1.09 | 0.52*** | -0.30* | -0.77 | -0.28 | -1.02 | 0.05 | 1.31* | 1.30 | -0.11 | -0.38 | -0.52 | 0.67*** |
| | (-2.29) | (0.73) | (-0.76) | (-3.04) | (-1.70) | (4.54) | (-1.70) | (-1.59) | (-0.64) | (-1.00) | (0.25) | (1.83) | (0.94) | (-0.28) | (-0.84) | (-0.62) | (2.75) |
| Lev. | 0.00 | -0.02 | 0.06 | 0.01*** | 0.15 | 0.04 | -0.09*** | -0.00 | 0.05 | -0.01 | -0.01 | -0.01* | 0.12 | -0.00 | 0.04 | 0.05 | -0.00* |
| | (0.07) | (-0.37) | (1.53) | (7.80) | (1.71) | (1.29) | (-3.03) | (-0.14) | (1.10) | (-0.26) | (-1.05) | (-1.81) | (0.24) | (-0.38) | (1.15) | (1.04) | (-1.86) |
| Quick | 0.02*** | 0.00 | 0.03 | 0.02*** | 0.74*** | 0.01 | 0.00 | 0.12 | 0.14*** | 0.06 | 0.21** | 0.08 | -0.02 | 0.03 | 0.11 | 0.24 | 0.03 |
| | (3.32) | (0.00) | (0.49) | (2.88) | (4.41) | (0.92) | (0.09) | (0.97) | (3.02) | (0.40) | (2.42) | (1.35) | (-0.13) | (0.58) | (0.76) | (0.65) | (0.42) |
| Div.p.E. | 0.01 | -0.42 | -0.21 | 0.20 | -0.81 | -0.49 | 0.88* | -0.41 | -0.32 | 0.16 | 1.22** | 0.19 | -2.06** | -0.26 | -0.72 | 0.59 | -0.25 |
| | (0.05) | (-1.09) | (-0.49) | (0.40) | (-1.18) | (-0.68) | (1.70) | (-0.81) | (-0.79) | (0.37) | (2.22) | (0.18) | (-3.17) | (-0.97) | (-1.21) | (1.00) | (-0.68) |
| R&D | -0.00 | 5.98** | 0.73* | -0.00* | -2.36 | 0.83*** | -0.03 | -32.65* | 0.01*** | 24.35*** | -0.13*** | 0.00 | 87.79 | -2.49 | 0.12 | 0.32*** | -6.55 |
| | (-1.35) | (2.18) | (1.77) | (-1.79) | (-0.23) | (8.64) | (-0.50) | (-1.79) | (7.08) | (3.21) | (-34.12) | (0.82) | (0.95) | (-1.00) | (1.48) | (6.92) | (-1.53) |
| M./B. | 0.00 | -0.01 | -0.01 | -0.00 | -0.68*** | -0.02 | 0.00 | -0.00 | -0.02** | -0.00 | 0.02* | 0.00 | 0.04 | 0.02 | -0.08** | -0.01 | 0.00 |
| | (0.46) | (-0.22) | (-1.19) | (-0.17) | (-4.07) | (-0.36) | (0.80) | (-0.57) | (-2.24) | (-0.02) | (1.80) | (0.02) | (0.49) | (1.39) | (-2.96) | (-0.40) | (1.14) |
| Obs. | 7,457 | 263 | 840 | 1,096 | 102 | 236 | 1,266 | 248 | 535 | 95 | 439 | 468 | 77 | 339 | 276 | 157 | 1,020 |
| Adj. $R^2$ | 0.05 | 0.24 | 0.06 | 0.08 | 0.15 | 0.22 | 0.06 | 0.16 | 0.13 | 0.12 | 0.16 | 0.05 | 0.00 | 0.08 | 0.10 | 0.08 | 0.04 |

Dependent variables: estimated positive and negative exposures with constant signs of two prior years respectively ($\hat{\gamma}$-cons.). 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a fixed-effects panel regression with robust and clustered standard errors on the industry level in the first regression and on the company level per industry in the following regressions. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. The industry breakdown displayed in Table 7 is used to divide the sample into 17 sectors. Not included is the agriculture, hunting, forestry and fishing sector due to the lack of observations.

**Table 9:** Estimated foreign exchange rate exposures without a market factor: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 3.02* | 8.84 | 16.86*** | 8.43*** | 19.10*** | 25.53*** | 74.36*** | 222.33*** | 53.26*** |
| | (1.91) | (1.21) | (9.57) | (5.94) | (2.78) | (12.70) | (13.73) | (5.23) | (10.51) |
| CAB | -0.16 | 0.07 | -0.65*** | 0.30** | -0.76** | -0.41*** | 6.55*** | 55.75*** | 16.95*** |
| | (-1.02) | (0.19) | (-4.23) | (2.47) | (-2.51) | (-3.18) | (3.43) | (3.52) | (8.66) |
| CPI | 23.13*** | 8.64 | -22.26*** | 23.77*** | -0.29 | -26.22*** | -175.06*** | -23.73 | -13.44 |
| | (10.26) | (1.48) | (-8.83) | (14.02) | (-0.06) | (-9.75) | (-21.44) | (-1.08) | (-1.26) |
| TS | 0.69*** | 0.97*** | 0.24** | 1.05*** | 0.61*** | 0.78*** | -14.17*** | 9.82* | -7.01*** |
| | (7.29) | (4.99) | (2.48) | (13.66) | (3.44) | (10.05) | (-5.23) | (1.80) | (-2.77) |
| ULC | -3.65* | 7.33 | 13.10*** | 4.32** | -1.86 | 22.37*** | 7568.44*** | 1667.43 | 6768.20*** |
| | (-1.81) | (0.55) | (6.33) | (2.05) | (-0.11) | (9.50) | (15.27) | (0.92) | (14.25) |
| Gov.exp. | -41.36*** | 42.48*** | -57.08*** | -18.77*** | 24.53** | -26.60*** | 16.10*** | 11.81 | -10.44*** |
| | (-8.73) | (3.21) | (-13.60) | (-4.59) | (2.06) | (-7.47) | (6.57) | (1.53) | (-3.95) |
| Control variables: | | | | | | | | | |
| Size | -0.24*** | -0.14 | -0.04 | -0.20*** | -0.17 | -0.03 | 0.01 | -0.17 | 0.15*** |
| | (-5.82) | (-1.27) | (-0.97) | (-4.81) | (-1.58) | (-0.59) | (0.34) | (-1.37) | (3.46) |
| F.Ass. | -0.12 | 0.29 | -0.04 | -0.14 | 0.40 | -0.04 | -0.37** | 0.25 | -0.24 |
| | (-0.77) | (0.57) | (-0.26) | (-0.86) | (0.81) | (-0.25) | (-2.43) | (0.43) | (-1.58) |
| F.Sal. | -0.74*** | -0.77 | -0.58*** | -0.68*** | -0.92* | -0.53*** | 0.13 | -0.69* | -0.04 |
| | (-3.61) | (-1.48) | (-3.20) | (-3.36) | (-1.87) | (-3.00) | (0.65) | (-1.74) | (-0.22) |
| Int.Inc. | -0.75*** | -0.39 | -0.64*** | -0.77*** | -0.26 | -0.62*** | -0.64*** | -0.17 | -0.66*** |
| | (-8.36) | (-0.93) | (-7.61) | (-8.60) | (-0.59) | (-7.57) | (-7.56) | (-0.42) | (-8.00) |
| Lev. | -0.01*** | -0.01 | -0.01*** | -0.01*** | -0.01 | -0.01*** | -0.01*** | -0.01 | -0.01*** |
| | (-3.22) | (-0.48) | (-2.92) | (-3.16) | (-0.48) | (-2.92) | (-3.95) | (-0.45) | (-3.35) |
| Quick | 0.01 | -0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01* | -0.00 | 0.01 |
| | (1.63) | (-0.05) | (1.37) | (1.46) | (0.33) | (1.22) | (1.76) | (-0.30) | (1.26) |
| Div.p.E. | 0.26* | -0.39 | 0.53*** | 0.35*** | -0.49 | 0.57*** | 0.36*** | -0.69 | 0.61*** |
| | (1.95) | (-0.87) | (4.23) | (2.60) | (-1.15) | (4.67) | (3.14) | (-1.57) | (5.25) |
| R&D | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 |
| | (0.08) | (0.15) | (0.00) | (0.12) | (0.02) | (-0.14) | (0.24) | (0.15) | (-0.48) |
| M./B. | 0.00*** | -0.00 | 0.00*** | 0.00** | -0.00 | 0.00*** | 0.00*** | -0.00 | 0.00*** |
| | (2.60) | (-0.77) | (3.17) | (2.51) | (-0.73) | (3.17) | (2.77) | (-0.72) | (3.17) |
| Obs. | 11,706 | 1,340 | 10,366 | 11,706 | 1,340 | 10,366 | 11,706 | 1,340 | 10,366 |
| Adj. $R^2$ | 0.12 | 0.09 | 0.09 | 0.13 | 0.11 | 0.09 | 0.19 | 0.16 | 0.09 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. In the first regression I use $\hat{\gamma}_{i,t}$ with constant positive or negative signs of two prior years respectively ($\hat{\gamma}_{i,t}$-cons.). In the second regressions ($\hat{\gamma}^{+}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. For the third regressions ($\hat{\gamma}^{-}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table 10:** Estimated foreign exchange rate exposures: fixed-effects model without control variables

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. |
| GDP | 2.70 | 5.82*** | -0.74 | 7.87*** | 12.08*** | -7.11*** | 10.55 | 1.52 | -17.30 |
| | (1.40) | (2.92) | (-0.31) | (4.44) | (7.05) | (-3.09) | (1.26) | (0.18) | (-1.57) |
| CAB | 0.58*** | 0.63*** | 0.06 | 0.19* | -0.05 | 0.36*** | -2.07 | 1.41 | 8.92** |
| | (4.28) | (4.23) | (0.40) | (1.74) | (-0.47) | (2.75) | (-0.77) | (0.51) | (2.45) |
| CPI | 26.05*** | 12.30*** | -4.04 | 19.85*** | 8.04*** | 3.85 | -93.94*** | -37.31*** | 64.88*** |
| | (15.34) | (7.88) | (-1.27) | (16.40) | (7.21) | (1.30) | (-15.46) | (-7.26) | (5.99) |
| TS | 0.70*** | 0.95*** | -0.07 | 0.63*** | 0.78*** | -0.09 | -2.65 | 5.81** | 2.11 |
| | (9.31) | (11.40) | (-0.76) | (9.43) | (10.64) | (-1.15) | (-0.96) | (2.00) | (0.64) |
| ULC | 7.49*** | 13.00*** | 2.87 | 14.51*** | 22.96*** | -5.40 | 1222.10** | 3718.56*** | -271.58 |
| | (2.91) | (5.11) | (0.86) | (5.09) | (7.84) | (-1.49) | (1.99) | (5.85) | (-0.38) |
| Gov.exp. | 1.01 | 39.07*** | -42.35*** | -1.24 | 30.24*** | -38.29*** | 11.73*** | 8.48*** | -17.33*** |
| | (0.20) | (8.57) | (-9.25) | (-0.28) | (7.82) | (-9.85) | (4.23) | (2.64) | (-4.78) |
| Obs. | 10,264 | 5,521 | 4,743 | 10,264 | 5,521 | 4,743 | 10,264 | 5,521 | 4,743 |
| Adj. $R^2$ | 0.05 | 0.05 | 0.03 | 0.05 | 0.06 | 0.03 | 0.05 | 0.03 | 0.01 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. In the first regression I use $\hat{\gamma}_{i,t}$ with constant positive or negative signs of two prior years respectively ($\hat{\gamma}_{i,t}$-cons.). In the second regressions ($\hat{\gamma}^{+}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. For the third regressions ($\hat{\gamma}^{-}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table 11:** Estimated foreign exchange rate exposures: feasible generalized least square model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. | $\hat{\gamma}_{i,t}$-cons. | $\hat{\gamma}^{+}_{i,t}$-cons. | $\hat{\gamma}^{-}_{i,t}$-cons. |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 0.73 | 9.03*** | -7.31*** | 3.99*** | 12.32*** | -10.73*** | -1.49 | 8.89** | -15.05*** |
| | (0.59) | (27.76) | (-5.01) | (3.92) | (14.96) | (-7.91) | (-0.32) | (2.22) | (-2.75) |
| CAB | 0.19** | 0.58*** | 0.08 | -0.04 | -0.17*** | 0.25*** | 0.26 | 5.00*** | 5.64*** |
| | (2.27) | (17.33) | (0.83) | (-0.73) | (-3.03) | (3.30) | (0.16) | (3.88) | (2.60) |
| CPI | 14.70*** | 2.89*** | 0.61 | 10.37*** | 1.84*** | 5.14*** | -58.92*** | -1.08 | 29.73*** |
| | (15.17) | (7.62) | (0.35) | (14.83) | (3.13) | (3.11) | (-19.19) | (-0.40) | (5.62) |
| TS | 0.41*** | 0.86*** | -0.11** | 0.36*** | 0.61*** | -0.14*** | -0.25 | 5.47*** | 3.43* |
| | (9.16) | (61.21) | (-2.20) | (9.44) | (17.69) | (-2.95) | (-0.18) | (4.19) | (1.92) |
| ULC | 2.46 | 15.85*** | -8.48*** | 7.34*** | 19.00*** | -18.12*** | 954.70*** | 2685.83*** | -292.28 |
| | (1.64) | (41.75) | (-4.82) | (4.60) | (14.67) | (-8.86) | (2.74) | (8.47) | (-0.73) |
| Gov.exp. | -4.39* | 35.96*** | -31.43*** | -5.90*** | 25.49*** | -27.37*** | 5.93*** | 7.07*** | -13.85*** |
| | (-1.88) | (32.87) | (-11.47) | (-3.09) | (14.29) | (-11.67) | (3.54) | (4.53) | (-7.74) |
| Control variables: | | | | | | | | | |
| Size | 0.03*** | -0.16*** | 0.10*** | 0.02*** | -0.10*** | 0.11*** | 0.02*** | -0.12*** | 0.11*** |
| | (4.13) | (-26.05) | (18.71) | (3.37) | (-17.83) | (20.39) | (3.75) | (-22.24) | (15.76) |
| F.Ass. | -0.48*** | 0.43*** | -0.26*** | -0.43*** | 0.15** | -0.20** | -0.52*** | 0.15** | -0.31*** |
| | (-6.33) | (9.35) | (-3.15) | (-5.59) | (1.97) | (-2.31) | (-7.22) | (2.10) | (-3.56) |
| F.Sal. | -0.33*** | -0.26*** | 0.28*** | -0.36*** | -0.28*** | 0.24*** | -0.32*** | -0.33*** | 0.27*** |
| | (-6.72) | (-10.17) | (5.18) | (-7.37) | (-6.79) | (4.29) | (-5.66) | (-7.03) | (4.79) |
| Int.Inc. | -0.24*** | -0.17*** | -0.14*** | -0.20*** | -0.15*** | -0.16*** | -0.15*** | -0.00 | -0.22*** |
| | (-4.64) | (-5.27) | (-2.70) | (-3.95) | (-3.14) | (-2.94) | (-2.94) | (-0.09) | (-4.27) |
| Lev. | -0.00* | -0.00 | -0.00 | -0.00* | 0.00 | -0.00 | -0.00 | 0.00 | -0.00 |
| | (-1.87) | (-1.57) | (-0.45) | (-1.82) | (1.23) | (-0.50) | (-1.48) | (0.88) | (-0.26) |
| Quick | 0.02*** | 0.00 | 0.01** | 0.02*** | -0.00 | 0.01** | 0.02*** | -0.00 | 0.01** |
| | (4.99) | (1.11) | (2.28) | (4.77) | (-1.19) | (2.05) | (4.34) | (-0.34) | (2.45) |
| Div.p.E. | -0.07 | -0.51*** | 0.67*** | -0.09* | -0.62*** | 0.61*** | -0.21*** | -0.60*** | 0.64*** |
| | (-1.50) | (-15.34) | (13.40) | (-1.92) | (-15.14) | (11.48) | (-4.27) | (-13.16) | (12.57) |
| R&D | 0.00 | 0.00 | -0.00*** | -0.00 | 0.00*** | -0.00*** | -0.00 | 0.00 | -0.00*** |
| | (0.13) | (1.01) | (-3.12) | (-0.20) | (2.95) | (-3.33) | (-0.35) | (1.18) | (-3.43) |
| M./B. | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| | (1.34) | (-0.25) | (1.51) | (1.19) | (-0.27) | (1.53) | (0.39) | (-0.56) | (1.47) |
| Obs. | 7,149 | 3,641 | 3,033 | 7,149 | 3,641 | 3,033 | 7,149 | 3,641 | 3,033 |
| $cor(\hat{\gamma},\hat{\hat{\gamma}})^2$ | 0.01 | 0.13 | 0.10 | 0.10 | 0.13 | 0.10 | 0.02 | 0.12 | 0.10 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. In the first regression I use $\hat{\gamma}_{i,t}$ with constant positive or negative signs of two prior years respectively ($\hat{\gamma}_{i,t}$-cons.). In the second regressions ($\hat{\gamma}^{+}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. For the third regressions ($\hat{\gamma}^{-}_{i,t}$-cons.) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a FGLS regression with AR(1) autocorrelations structure within the panel. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. I also report the squared correlation (cor) of the estimated exposures and fitted values of the dependent variable, as a standard $R^2$ statistic is not useful as a diagnostic tool for GLS regressions.

**Table A.1:** Estimated foreign exchange rate exposures without market factor

| year | Obs. | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t} > 0$ | $\hat{\gamma}_{i,t} < 0$ | SD | $p < 0.1$ | $R^2$ |
|---|---|---|---|---|---|---|---|
| 1995 | 803 | -0.014 | 0.84 | -0.81 | 1.23 | 11% | 0.02 |
| 1996 | 888 | -0.229 | 1.98 | -2.09 | 2.75 | 12% | 0.02 |
| 1997 | 989 | -1.227 | 1.03 | -1.93 | 2.03 | 21% | 0.03 |
| 1998 | 1,065 | -0.116 | 1.00 | -1.05 | 1.42 | 11% | 0.02 |
| 1999 | 1,106 | -0.006 | 1.64 | -1.67 | 2.23 | 16% | 0.02 |
| 2000 | 1,203 | -1.43 | 1.65 | -2.55 | 2.67 | 13% | 0.02 |
| 2001 | 1,264 | -1.027 | 1.38 | -2.00 | 2.21 | 14% | 0.02 |
| 2002 | 1,293 | -0.695 | 1.58 | -2.43 | 2.66 | 19% | 0.03 |
| 2003 | 1,314 | 0.302 | 1.26 | -1.21 | 1.70 | 13% | 0.02 |
| 2004 | 1,346 | -0.793 | 0.73 | -1.21 | 1.28 | 23% | 0.03 |
| 2005 | 1,397 | -0.87 | 0.93 | -1.36 | 1.44 | 29% | 0.04 |
| 2006 | 1,453 | -1.43 | 0.84 | -1.80 | 1.60 | 43% | 0.06 |
| 2007 | 1,519 | -1.532 | 1.08 | -1.98 | 1.73 | 34% | 0.05 |
| 2008 | 1,590 | -2.466 | 0.67 | -2.54 | 1.51 | 8% | 0.18 |
| 2009 | 1,603 | -2.657 | 0.85 | -2.84 | 1.99 | 66% | 0.11 |
| 2010 | 1,648 | -2.36 | 0.87 | -2.47 | 1.37 | 83% | 0.17 |
| 2011 | 1,700 | -2.267 | 0.80 | -2.40 | 1.48 | 79% | 0.17 |
| 2012 | 1,756 | -2.096 | 1.25 | -2.36 | 1.69 | 61% | 0.10 |
| 2013 | 1,819 | -0.788 | 0.92 | -1.18 | 1.30 | 30% | 0.04 |
| 2014 | 1,914 | 0.09 | 1.46 | -1.35 | 1.98 | 11% | 0.02 |
| 2015 | 1,973 | -0.948 | 0.86 | -1.33 | 1.39 | 35% | 0.04 |
| 2016 | 1,934 | -0.28 | 0.86 | -1.11 | 1.47 | 15% | 0.03 |
| 2017 | 1,795 | 0.178 | 1.03 | -1.03 | 1.52 | 14% | 0.02 |
| | 33,372 | -1.04 | 1.19 | -1.87 | 2.00 | 34% | 0.06 |

This table shows the results of Equation (2) that includes the market factor with a standard OLS estimation and the Newey and West (1987) correction. Weekly data is used to estimate yearly coefficients, with at least 40 observations. The displayed sensitivities are the average US companies' coefficients of each year. To account for outliners of the companies' sensitivities I winsorize 0.5% of the estimated $\gamma$ factors at each end. I also show standard deviation, the percentage amount of the significant $\gamma$-factors ($p < 0.10$) as well as the average $R^2$. Significance level: * p<10%.

**Table A.2:** Foreign exchange rate exposures estimated without a market factor: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | -6.78*** | 3.02* | 2.26** | 1.34 | 8.43*** | 3.34*** | 148.26*** | 74.36*** | -55.77*** |
| | (-5.45) | (1.91) | (2.28) | (1.20) | (5.94) | (3.63) | (27.73) | (13.73) | (-14.29) |
| CAP | -0.38*** | -0.16 | 0.37*** | -0.11* | 0.30** | -0.15*** | 8.21*** | 6.55*** | -9.82*** |
| | (-4.14) | (-1.02) | (5.35) | (-1.67) | (2.47) | (-2.83) | (4.54) | (3.43) | (-6.27) |
| CPI | 4.41*** | 23.13*** | 7.86*** | 3.30*** | 23.77*** | 2.50*** | -65.52*** | -175.06*** | 19.35*** |
| | (2.81) | (10.26) | (6.63) | (2.78) | (14.02) | (2.85) | (-13.00) | (-21.44) | (4.82) |
| TS | 0.18*** | 0.69*** | 0.42*** | 0.48*** | 1.05*** | 0.20*** | 2.18 | -14.17*** | 8.66*** |
| | (3.53) | (7.29) | (11.23) | (10.75) | (13.66) | (6.29) | (1.15) | (-5.23) | (6.59) |
| ULC | -35.28*** | -3.65* | 16.08*** | -33.88*** | 4.32** | 21.80*** | 9356.82*** | 7568.44*** | -3170.70*** |
| | (-22.60) | (-1.81) | (13.47) | (-19.77) | (2.05) | (16.19) | (22.91) | (15.27) | (-10.39) |
| Gov.exp. | -23.28*** | -41.36*** | 45.39*** | -7.26*** | -18.77*** | 29.16*** | -1.82 | 16.10*** | 4.74*** |
| | (-7.51) | (-8.73) | (20.20) | (-2.88) | (-4.59) | (15.68) | (-0.98) | (6.57) | (3.62) |
| Control variables: | | | | | | | | | |
| Size | -0.09*** | -0.24*** | -0.02 | -0.06** | -0.20*** | -0.05** | 0.07*** | 0.01 | -0.16*** |
| | (-3.20) | (-5.82) | (-1.01) | (-2.38) | (-4.81) | (-2.36) | (2.58) | (0.34) | (-7.99) |
| F.Ass. | -0.22 | -0.12 | 0.13 | -0.15 | -0.14 | 0.11 | -0.43*** | -0.37** | 0.24** |
| | (-1.60) | (-0.77) | (1.24) | (-1.05) | (-0.86) | (1.09) | (-3.38) | (-2.43) | (2.42) |
| F.Sal. | -0.14 | -0.74*** | 0.31*** | -0.12 | -0.68*** | 0.27** | 0.28** | 0.13 | -0.02 |
| | (-0.98) | (-3.61) | (2.68) | (-0.85) | (-3.36) | (2.30) | (2.04) | (0.65) | (-0.17) |
| Int.Inc. | -0.70*** | -0.75*** | 0.49*** | -0.75*** | -0.77*** | 0.53*** | -0.60*** | -0.64*** | 0.54*** |
| | (-8.99) | (-8.36) | (8.11) | (-9.59) | (-8.60) | (8.74) | (-8.43) | (-7.56) | (9.03) |
| Lev. | -0.00 | -0.01*** | 0.00** | -0.00 | -0.01*** | 0.00** | -0.00 | -0.01*** | 0.00** |
| | (-1.09) | (-3.22) | (2.36) | (-1.00) | (-3.16) | (2.27) | (-0.85) | (-3.95) | (2.29) |
| Quick | -0.01 | 0.01 | 0.01 | -0.01 | 0.01 | 0.01* | -0.01 | 0.01* | 0.01* |
| | (-1.11) | (1.63) | (1.48) | (-1.27) | (1.46) | (1.66) | (-1.32) | (1.76) | (1.80) |
| Div.p.E. | 0.34*** | 0.26* | -0.47*** | 0.45*** | 0.35*** | -0.53*** | 0.46*** | 0.36*** | -0.64*** |
| | (3.53) | (1.95) | (-6.12) | (4.69) | (2.60) | (-6.88) | (5.39) | (3.14) | (-8.98) |
| R&D | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 |
| | (0.30) | (0.08) | (-0.09) | (0.34) | (0.12) | (-0.14) | (0.46) | (0.24) | (-0.41) |
| M./B. | 0.00 | 0.00*** | -0.00** | 0.00 | 0.00** | -0.00*** | 0.00 | 0.00*** | -0.00** |
| | (1.28) | (2.60) | (-2.47) | (1.23) | (2.51) | (-2.58) | (0.59) | (2.77) | (-2.27) |
| Obs. | 24,064 | 24,064 | 11,706 | 24,064 | 24,064 | 11,706 | 24,064 | 24,064 | 11,706 |
| Adj. $R^2$ | 0.00 | 0.05 | 0.06 | 0.00 | 0.05 | 0.06 | 0.00 | 0.05 | 0.05 |

Dependent variables: foreign exchange rate exposure estimated with Equation (1). 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. In the second regressions I use $\hat{\gamma}_{i,t}$-cons., which are the constant positive and negative exposures with equal signs of two prior years respectively. In the third regressions I use $|\hat{\gamma}_{i,t}|$. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table A.3:** Positive estimated foreign exchange rate exposures without a market factor: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | -1.45 | -0.65 | 8.84 | 7.13*** | 9.06** | 19.10*** | 61.92*** | 137.83*** | 222.33*** |
| | (-0.66) | (-0.14) | (1.21) | (3.76) | (2.18) | (2.78) | (6.78) | (6.01) | (5.23) |
| CAB | 0.25** | -0.05 | 0.07 | -0.22** | -0.55*** | -0.76** | 24.41*** | 43.86*** | 55.75*** |
| | (2.05) | (-0.21) | (0.19) | (-2.50) | (-3.60) | (-2.51) | (6.11) | (4.99) | (3.52) |
| CPI | 7.54*** | 4.13 | 8.64 | 2.54* | 0.02 | -0.29 | -32.29*** | -24.29** | -23.73 |
| | (4.03) | (1.18) | (1.48) | (1.91) | (0.01) | (-0.06) | (-5.35) | (-2.16) | (-1.08) |
| TS | 0.72*** | 0.81*** | 0.97*** | 0.63*** | 0.62*** | 0.61*** | 11.43*** | 11.78*** | 9.82* |
| | (12.33) | (5.58) | (4.99) | (11.95) | (4.93) | (3.44) | (6.55) | (3.28) | (1.80) |
| ULC | -5.27* | 4.73 | 7.33 | 0.74 | 9.17 | -1.86 | 3255.89*** | 3842.39*** | 1667.43 |
| | (-1.66) | (0.64) | (0.55) | (0.20) | (0.96) | (-0.11) | (4.98) | (3.17) | (0.92) |
| Gov.exp. | 26.77*** | 29.97*** | 42.48*** | 20.45*** | 21.86*** | 24.53** | 8.37*** | 2.91 | 11.81 |
| | (7.46) | (4.40) | (3.21) | (6.76) | (3.81) | (2.06) | (3.44) | (0.60) | (1.53) |
| Control variables: | | | | | | | | | |
| Size | -0.12*** | -0.17*** | -0.14 | -0.14*** | -0.21*** | -0.17 | -0.15*** | -0.20*** | -0.17 |
| | (-3.62) | (-2.81) | (-1.27) | (-4.49) | (-3.45) | (-1.58) | (-4.75) | (-3.22) | (-1.37) |
| F.Ass. | 0.05 | -0.00 | 0.29 | 0.12 | 0.05 | 0.40 | -0.01 | -0.16 | 0.25 |
| | (0.28) | (-0.00) | (0.57) | (0.61) | (0.16) | (0.81) | (-0.03) | (-0.52) | (0.43) |
| F.Sal. | 0.08 | -0.15 | -0.77 | 0.00 | -0.28 | -0.92* | -0.07 | -0.41 | -0.69* |
| | (0.45) | (-0.41) | (-1.48) | (0.01) | (-0.76) | (-1.87) | (-0.37) | (-1.19) | (-1.74) |
| Int.Inc. | 0.03 | -0.18 | -0.39 | 0.04 | -0.13 | -0.26 | 0.13 | 0.00 | -0.17 |
| | (0.31) | (-0.78) | (-0.93) | (0.38) | (-0.53) | (-0.59) | (1.29) | (0.02) | (-0.42) |
| Lev. | 0.00** | -0.01 | -0.01 | 0.00** | -0.01 | -0.01 | 0.00** | -0.01 | -0.01 |
| | (2.10) | (-0.99) | (-0.48) | (2.19) | (-0.85) | (-0.48) | (2.23) | (-1.11) | (-0.45) |
| Quick | 0.00 | -0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| | (0.08) | (-0.18) | (-0.05) | (0.32) | (0.11) | (0.33) | (0.28) | (-0.33) | (-0.30) |
| Div.p.E. | -0.34*** | -0.20 | -0.39 | -0.35*** | -0.24 | -0.49 | -0.41*** | -0.28 | -0.69 |
| | (-2.91) | (-0.93) | (-0.87) | (-3.08) | (-1.09) | (-1.15) | (-3.56) | (-1.35) | (-1.57) |
| R&D | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| | (0.49) | (-0.04) | (0.15) | (0.38) | (-0.09) | (0.02) | (0.48) | (-0.03) | (0.15) |
| M./B. | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (-0.94) | (-0.72) | (-0.77) | (-1.20) | (-0.83) | (-0.73) | (-1.12) | (-0.61) | (-0.72) |
| Obs. | 6,390 | 2,557 | 1,340 | 6,390 | 2,557 | 1,340 | 6,390 | 2,557 | 1,340 |
| Adj. $R^2$ | 0.08 | 0.09 | 0.09 | 0.08 | 0.10 | 0.11 | 0.09 | 0.14 | 0.16 |

Dependent variables: foreign exchange rate exposure estimated with Equation (1). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Positive values of the exposures ($\hat{\gamma}_{i,t} > 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table A.4:** Negative estimated foreign exchange rate exposures without a market factor: fixed-effects model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 0.57 | 9.68*** | 16.86*** | -0.15 | 17.33*** | 25.53*** | 77.36*** | 61.71*** | 53.26*** |
| | (0.48) | (6.67) | (9.57) | (-0.14) | (10.79) | (12.70) | (16.91) | (12.38) | (10.51) |
| CAB | -0.21** | -0.55*** | -0.65*** | 0.27*** | -0.38*** | -0.41*** | 9.31*** | 15.91*** | 16.95*** |
| | (-2.43) | (-4.61) | (-4.23) | (4.19) | (-3.88) | (-3.18) | (5.43) | (8.73) | (8.66) |
| CPI | -8.29*** | -21.11*** | -22.26*** | -2.21* | -23.80*** | -26.22*** | -10.64** | 11.64 | -13.44 |
| | (-5.64) | (-10.39) | (-8.83) | (-1.94) | (-11.55) | (-9.75) | (-2.13) | (1.49) | (-1.26) |
| TS | -0.21*** | -0.15** | 0.24** | 0.03 | 0.33*** | 0.78*** | -9.52*** | -5.40** | -7.01*** |
| | (-3.94) | (-2.13) | (2.48) | (0.72) | (5.15) | (10.05) | (-5.21) | (-2.55) | (-2.77) |
| ULC | -8.13*** | 1.78 | 13.10*** | -11.85*** | 6.82*** | 22.37*** | 5007.93*** | 6356.73*** | 6768.20*** |
| | (-5.94) | (1.05) | (6.33) | (-7.88) | (3.47) | (9.50) | (13.85) | (15.23) | (14.25) |
| Gov.exp. | -49.81*** | -52.28*** | -57.08*** | -31.73*** | -25.25*** | -26.60*** | -4.65*** | -17.95*** | -10.44*** |
| | (-17.44) | (-14.55) | (-13.60) | (-13.51) | (-8.42) | (-7.47) | (-2.78) | (-7.74) | (-3.95) |
| Control variables: | | | | | | | | | |
| Size | 0.01 | -0.03 | -0.04 | 0.04 | -0.02 | -0.03 | 0.15*** | 0.14*** | 0.15*** |
| | (0.45) | (-0.88) | (-0.97) | (1.33) | (-0.57) | (-0.59) | (5.85) | (4.38) | (3.46) |
| F.Ass. | -0.17 | -0.10 | -0.04 | -0.16 | -0.08 | -0.04 | -0.30*** | -0.27** | -0.24 |
| | (-1.52) | (-0.74) | (-0.26) | (-1.43) | (-0.65) | (-0.25) | (-2.74) | (-2.16) | (-1.58) |
| F.Sal. | -0.32** | -0.49*** | -0.58*** | -0.29** | -0.48*** | -0.53*** | 0.02 | -0.05 | -0.04 |
| | (-2.29) | (-3.04) | (-3.20) | (-2.08) | (-2.97) | (-3.00) | (0.17) | (-0.28) | (-0.22) |
| Int.Inc. | -0.50*** | -0.60*** | -0.64*** | -0.54*** | -0.62*** | -0.62*** | -0.54*** | -0.61*** | -0.66*** |
| | (-7.41) | (-7.90) | (-7.61) | (-7.87) | (-8.15) | (-7.57) | (-8.05) | (-8.14) | (-8.00) |
| Lev. | -0.00** | -0.00*** | -0.01*** | -0.00** | -0.00*** | -0.01*** | -0.00** | -0.00*** | -0.01*** |
| | (-2.14) | (-2.98) | (-2.92) | (-2.12) | (-2.95) | (-2.92) | (-2.38) | (-3.20) | (-3.35) |
| Quick | -0.01 | 0.01 | 0.01 | -0.01* | 0.00 | 0.01 | -0.01* | 0.00 | 0.01 |
| | (-1.55) | (0.79) | (1.37) | (-1.72) | (0.66) | (1.22) | (-1.94) | (0.46) | (1.26) |
| Div.p.E. | 0.53*** | 0.56*** | 0.53*** | 0.57*** | 0.60*** | 0.57*** | 0.66*** | 0.63*** | 0.61*** |
| | (5.67) | (5.24) | (4.23) | (6.22) | (5.77) | (4.67) | (7.71) | (6.50) | (5.25) |
| R&D | 0.00 | -0.00 | 0.00 | -0.00 | -0.00 | -0.00 | 0.00 | -0.00 | -0.00 |
| | (0.01) | (-0.76) | (0.00) | (-0.01) | (-0.84) | (-0.14) | (0.00) | (-0.99) | (-0.48) |
| M./B. | 0.00* | 0.00** | 0.00*** | 0.00* | 0.00** | 0.00*** | 0.00 | 0.00* | 0.00*** |
| | (1.88) | (2.39) | (3.17) | (1.95) | (2.37) | (3.17) | (1.49) | (1.96) | (3.17) |
| Obs. | 17,674 | 13,208 | 10,366 | 17,674 | 13,208 | 10,366 | 17,674 | 13,208 | 10,366 |
| Adj. $R^2$ | 0.06 | 0.07 | 0.09 | 0.05 | 0.07 | 0.09 | 0.06 | 0.08 | 0.09 |

Dependent variables: foreign exchange rate exposure estimated with Equation (1). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Negative values of the exposures ($\hat{\gamma}_{i,t} < 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table A.5:** Estimated foreign exchange rate exposures without a market factor: industry fixed-effects regression and breakdown of each sector

| | $\hat{\gamma}$-cons. All | 2 BFP | 3 BUS | 4 CMP | 5 CON | 6 EGW | 7 EOQ | 8 FBT | 9 MEN | 10 MNR | 11 MQA | 12 OSE | 13 TLF | 14 TPT | 15 TRQ | 16 WPP | 17 WRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Foreign macroeconomic variables: | | | | | | | | | | | | | | | | | |
| GDP | 3.33 | -0.82 | 0.74 | -3.07 | 5.16 | -4.90 | 11.59 | -4.14 | -1.54 | 23.10* | 15.37* | 4.77 | 40.22*** | 3.83 | 15.92 | 22.67** | -8.28* |
| | (1.27) | (-0.10) | (0.18) | (-0.50) | (0.31) | (-0.72) | (1.63) | (-0.51) | (-0.30) | (2.15) | (1.89) | (0.98) | (4.39) | (0.47) | (1.66) | (2.17) | (-1.70) |
| CAB | -0.19 | -0.87 | 0.11 | 0.07 | -1.40* | 0.05 | -1.64** | 1.01 | -0.31 | 0.07 | -0.24 | -0.27 | 0.38 | 0.50 | 0.28 | 0.62 | 1.07*** |
| | (-0.80) | (-1.29) | (0.21) | (0.15) | (-1.99) | (0.06) | (-2.40) | (1.48) | (-0.59) | (0.05) | (-0.27) | (-0.32) | (0.29) | (0.85) | (0.36) | (0.64) | (2.70) |
| CPI | 23.03*** | 9.06 | 32.95*** | 35.51*** | 3.12 | 12.75 | 8.59 | 29.33*** | 14.39* | 37.58** | 2.36 | 24.13*** | 33.19** | 24.22** | 26.58** | 37.19*** | 28.67*** |
| | (6.91) | (0.94) | (5.20) | (5.99) | (0.14) | (1.23) | (0.79) | (4.03) | (1.99) | (2.75) | (0.21) | (2.74) | (2.86) | (2.47) | (2.24) | (3.38) | (5.98) |
| TS | 0.68*** | 0.37 | 1.13*** | 0.51 | -0.16 | 0.44 | 0.16 | 1.07*** | 0.43* | 1.09* | 1.26*** | 0.71 | 1.46 | 0.92*** | 1.39* | 1.62** | 0.82*** |
| | (5.36) | (0.97) | (4.20) | (1.09) | (-0.28) | (1.01) | (0.64) | (3.48) | (1.84) | (1.88) | (4.22) | (1.43) | (1.67) | (2.86) | (1.98) | (2.49) | (2.93) |
| ULC | -3.48 | -15.58 | -1.15 | -13.15 | -32.22 | -11.87 | 4.41 | 3.90 | -7.16 | 5.23 | 13.56* | -6.60 | 50.59*** | 3.92 | 8.07 | 12.99 | -11.81 |
| | (-0.99) | (-1.59) | (-0.18) | (-1.08) | (-1.24) | (-1.49) | (0.61) | (0.46) | (-0.96) | (0.45) | (1.92) | (-0.77) | (4.15) | (0.40) | (0.41) | (1.08) | (-1.62) |
| Gov.exp. | -41.71*** | -82.56*** | -14.53 | -26.18* | -41.21 | -0.71 | -62.83*** | 16.78 | -66.76*** | -31.83 | -114.33*** | -58.38*** | -58.05*** | -27.46* | -14.91 | -26.03 | -24.08** |
| | (-6.31) | (-3.77) | (-1.01) | (-1.81) | (-1.89) | (-0.02) | (-3.27) | (0.91) | (-5.42) | (-1.09) | (-9.76) | (-3.17) | (-3.26) | (-1.86) | (-0.80) | (-1.27) | (-2.36) |
| Control variables: | | | | | | | | | | | | | | | | | |
| Size | -0.24*** | -0.62** | -0.08 | -0.01 | -0.58 | -0.41*** | -0.27** | -0.24 | -0.34** | -0.20 | -0.65*** | -0.22* | -0.55** | -0.31 | -0.34 | 0.15 | -0.28** |
| | (-4.24) | (-2.36) | (-0.56) | (-0.14) | (-1.11) | (-3.46) | (-2.65) | (-0.87) | (-2.47) | (-0.63) | (-5.48) | (-1.86) | (-3.00) | (-1.41) | (-1.04) | (0.53) | (-2.41) |
| F.Ass. | -0.12 | -1.99*** | -0.11 | -0.59* | -0.37 | 2.21** | -0.01 | -0.58 | 0.22 | 1.20 | -0.15 | -0.47 | -0.91 | 1.03 | -0.81 | -0.31 | -0.11 |
| | (-0.87) | (-3.37) | (-0.30) | (-1.78) | (-0.22) | (2.89) | (-0.04) | (-0.98) | (0.39) | (1.11) | (-0.15) | (-0.47) | (-1.28) | (0.66) | (-1.72) | (-0.43) | (-0.16) |
| F.Sal. | -0.74*** | -0.08 | -1.13 | -1.00*** | 1.16 | -2.54** | -1.28*** | 0.58 | -0.67 | 0.68 | 1.06** | -3.12*** | 3.66* | 0.92 | -0.44 | -1.29 | -0.48 |
| | (-3.39) | (-0.08) | (-1.50) | (-3.04) | (1.34) | (-3.07) | (-3.57) | (1.18) | (-0.65) | (0.64) | (2.66) | (-3.03) | (2.04) | (0.37) | (-0.29) | (-0.96) | (-0.69) |
| Int.Inc. | -0.75*** | -0.57* | -0.37** | -1.15*** | -0.87 | 1.09 | -0.76*** | -0.64 | -1.06*** | -0.58 | -0.06 | 0.09 | -0.53 | -1.71*** | -2.25*** | -0.34 | -0.35 |
| | (-7.21) | (-1.84) | (-2.11) | (-3.96) | (-1.60) | (1.54) | (-6.01) | (-1.65) | (-5.79) | (-1.43) | (-0.11) | (0.22) | (-1.22) | (-5.97) | (-4.21) | (-0.49) | (-0.59) |
| Lev. | -0.01*** | -0.06 | 0.04** | -0.01*** | 0.12 | 0.09*** | -0.03*** | -0.00 | -0.00 | 0.00 | 0.00 | -0.01 | -0.12** | -0.02** | 0.04 | 0.05 | -0.02*** |
| | (-3.24) | (-0.97) | (2.10) | (-3.31) | (1.55) | (4.67) | (-3.09) | (-0.32) | (-0.02) | (0.12) | (0.32) | (-1.54) | (-2.60) | (-2.09) | (0.97) | (0.45) | (-4.04) |
| Quick | 0.01* | -0.08** | 0.09 | 0.00 | -0.85*** | -0.01 | 0.02 | 0.26 | 0.07 | 0.04 | 0.04 | 0.01 | -0.22 | 0.17 | -0.11 | 0.06 | -0.07 |
| | (1.67) | (-2.16) | (1.39) | (0.86) | (-4.88) | (-1.59) | (0.87) | (0.97) | (1.57) | (0.27) | (0.79) | (0.42) | (-1.07) | (1.33) | (-1.02) | (0.31) | (-1.24) |
| Div.p.E. | 0.26* | 0.15 | -0.18 | 0.56 | -0.49 | -0.37 | 0.52** | 0.17 | 0.45 | 0.64 | 0.24 | -0.30 | -0.87 | -0.42 | 1.81** | 0.43 | -0.16 |
| | (1.81) | (0.40) | (-0.31) | (1.33) | (-0.84) | (-0.56) | (2.16) | (0.20) | (0.75) | (1.10) | (0.36) | (-0.63) | (-1.43) | (-0.78) | (2.88) | (0.54) | (-0.36) |
| R&D | 0.00 | -11.40*** | 0.03 | 0.00 | 82.56 | 1.57*** | -0.01 | -74.63 | 0.01*** | 3.19 | -0.03*** | -0.00*** | 55.71*** | -0.20*** | -7.97 | 0.28 | 2.13** |
| | (0.07) | (-5.94) | (1.49) | (0.18) | (0.29) | (18.81) | (-1.57) | (-1.26) | (19.87) | (1.54) | (-12.15) | (-4.51) | (5.78) | (-19.33) | (-1.25) | (0.49) | (2.40) |
| M./B. | 0.00*** | 0.06 | 0.01*** | 0.00 | -0.00 | -0.04*** | 0.00 | 0.00 | -0.00 | 0.00 | -0.01 | 0.00 | 0.48*** | 0.01** | -0.02 | 0.01 | 0.02** |
| | (2.62) | (1.03) | (3.03) | (1.65) | (-0.05) | (-5.11) | (0.45) | (0.07) | (-0.15) | (0.77) | (-1.22) | (1.12) | (3.89) | (2.17) | (-0.52) | (0.19) | (2.32) |
| Observations | 11,706 | 479 | 1,266 | 1,712 | 188 | 382 | 2,147 | 335 | 892 | 190 | 600 | 690 | 131 | 535 | 450 | 281 | 1,428 |
| Adj. $R^2$ | 0.12 | 0.25 | 0.10 | 0.11 | 0.25 | 0.15 | 0.14 | 0.13 | 0.19 | 0.21 | 0.19 | 0.16 | 0.40 | 0.14 | 0.19 | 0.15 | 0.13 |

Dependent variables: estimated positive and negative exposures without an included market factor and with constant signs of two prior years respectively. 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a fixed-effects panel regression with robust and clustered standard errors on the industry level in the first regression and on the company level per industry in the following regressions. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. The industry breakdown displayed in Table 7 is used to divide the sample into 17 sectors. Not included is the agriculture, hunting, forestry and fishing sector due to the lack of observations.

**Table B.1:** Positive estimated foreign exchange rate exposures: fixed-effects model without control variables

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| GDP | 1.09 | 1.51 | 5.82*** | 8.13*** | 9.24*** | 12.08*** | -5.68 | 6.43 | 1.52 |
| | (1.04) | (1.05) | (2.92) | (8.60) | (7.22) | (7.05) | (-1.21) | (1.04) | (0.18) |
| CAB | 0.75*** | 0.82*** | 0.63*** | 0.11* | 0.08 | -0.05 | -3.00* | -1.11 | 1.41 |
| | (9.61) | (7.24) | (4.23) | (1.85) | (0.94) | (-0.47) | (-1.95) | (-0.56) | (0.51) |
| CPI | 15.04*** | 14.36*** | 12.30*** | 9.79*** | 8.97*** | 8.04*** | -58.71*** | -43.18*** | -37.31*** |
| | (15.88) | (11.93) | (7.88) | (13.56) | (10.27) | (7.21) | (-17.62) | (-10.86) | (-7.26) |
| TS | 0.84*** | 0.89*** | 0.95*** | 0.73*** | 0.76*** | 0.78*** | 7.80*** | 8.62*** | 5.81** |
| | (20.20) | (14.53) | (11.40) | (19.60) | (13.76) | (10.64) | (5.89) | (4.39) | (2.00) |
| ULC | 5.91*** | 7.78*** | 13.00*** | 15.80*** | 17.69*** | 22.96*** | 2246.53*** | 2606.38*** | 3718.56*** |
| | (4.56) | (4.19) | (5.11) | (10.46) | (8.34) | (7.84) | (6.25) | (5.45) | (5.85) |
| Gov.exp. | 39.44*** | 41.65*** | 39.07*** | 31.61*** | 32.54*** | 30.24*** | 6.04*** | 3.64 | 8.48*** |
| | (16.92) | (12.78) | (8.57) | (16.37) | (12.15) | (7.82) | (3.70) | (1.52) | (2.64) |
| Obs. | 16,339 | 8,972 | 5,521 | 16,339 | 8,972 | 5,521 | 16,339 | 8,972 | 5,521 |
| Adj. $R^2$ | 0.05 | 0.06 | 0.05 | 0.05 | 0.06 | 0.06 | 0.04 | 0.03 | 0.03 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Positive values of the exposures ($\hat{\gamma}_{i,t} > 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table B.2:** Negative estimated foreign exchange rate exposures: fixed-effects model without control variables

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| GDP | 1.03 | 2.71* | -0.74 | -6.03*** | -2.25 | -7.11*** | 6.33 | -10.39 | -17.30 |
| | (0.92) | (1.68) | (-0.31) | (-5.72) | (-1.38) | (-3.09) | (1.24) | (-1.30) | (-1.57) |
| CAB | -0.45*** | -0.28** | 0.06 | 0.14** | 0.01 | 0.36*** | 4.75** | 12.35*** | 8.92** |
| | (-5.55) | (-2.45) | (0.40) | (2.21) | (0.07) | (2.75) | (2.48) | (4.42) | (2.45) |
| CPI | -12.96*** | -16.78*** | -4.04 | -6.90*** | -11.72*** | 3.85 | 50.11*** | 77.06*** | 64.88*** |
| | (-12.59) | (-8.43) | (-1.27) | (-8.99) | (-6.09) | (1.30) | (14.14) | (11.71) | (5.99) |
| TS | -0.73*** | -0.49*** | -0.07 | -0.65*** | -0.46*** | -0.09 | -14.35*** | -7.40*** | 2.11 |
| | (-15.93) | (-7.64) | (-0.76) | (-15.93) | (-8.03) | (-1.15) | (-8.73) | (-3.21) | (0.64) |
| ULC | -1.96 | 1.24 | 2.87 | -12.29*** | -7.91*** | -5.40 | -2144.19*** | -1219.89** | -271.58 |
| | (-1.42) | (0.59) | (0.86) | (-7.87) | (-3.30) | (-1.49) | (-6.37) | (-2.43) | (-0.38) |
| Gov.exp. | -40.87*** | -36.67*** | -42.35*** | -31.61*** | -28.63*** | -38.29*** | -7.29*** | -17.58*** | -17.33*** |
| | (-16.69) | (-10.51) | (-9.25) | (-16.19) | (-9.76) | (-9.85) | (-4.65) | (-6.91) | (-4.78) |
| Obs. | 17,258 | 8,889 | 4,743 | 17,258 | 8,889 | 4,743 | 17,258 | 8,889 | 4,743 |
| Adj. $R^2$ | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.01 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Negative values of the exposures ($\hat{\gamma}_{i,t} < 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a fixed-effects panel regression with robust and company clustered standard errors. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%.

**Table B.3:** Industry fixed-effects regression and breakdown of each sector without control variables

| | $\hat{\gamma}$-cons. All | 2 BFP | 3 BUS | 4 CMP | 5 CON | 6 EGW | 7 EOQ | 8 FBT | 9 MEN | 10 MNR | 11 MQA | 12 OSE | 13 TLF | 14 TPT | 15 TRQ | 16 WPP | 17 WRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP | 2.48 | -0.27 | -7.06 | 10.34** | 1.33 | -6.88 | 1.87 | 5.32 | -4.90 | 12.89 | -9.47 | 8.39 | 5.14 | 8.76 | 16.42** | 11.02 | 7.49 |
| | (1.15) | (-0.04) | (-1.11) | (2.09) | (0.13) | (-1.42) | (0.61) | (0.49) | (-0.59) | (0.72) | (-1.13) | (0.79) | (0.50) | (1.48) | (2.17) | (0.96) | (1.15) |
| CAP | 0.56*** | -0.62 | 0.57 | 0.54* | 0.38 | 1.28** | 0.44** | 1.28 | 0.17 | 0.76 | 1.33*** | 0.14 | 0.28 | 0.07 | 0.04 | 0.42 | 0.78** |
| | (4.25) | (-1.10) | (1.13) | (1.97) | (0.46) | (2.89) | (2.15) | (1.25) | (0.30) | (0.71) | (3.09) | (0.22) | (0.25) | (0.11) | (0.08) | (0.51) | (2.33) |
| CPI | 25.73*** | 12.31** | 32.27*** | 25.78*** | 7.22 | 33.71*** | 27.60*** | 23.20*** | 21.76*** | 24.46* | 33.08*** | 39.93*** | 20.61 | 32.44*** | 21.03*** | 12.09 | 20.18*** |
| | (14.71) | (2.66) | (5.76) | (7.04) | (1.48) | (7.24) | (6.67) | (2.95) | (4.85) | (1.92) | (5.02) | (4.17) | (1.48) | (3.12) | (3.50) | (1.32) | (3.89) |
| TS | 0.69*** | 0.02 | 0.71*** | 0.91*** | 0.71 | 0.99** | 0.53*** | 1.54*** | 0.39* | 0.49 | 1.21*** | 0.53 | 0.73 | 0.70** | 1.09*** | -0.00 | 0.57*** |
| | (8.77) | (0.05) | (3.26) | (4.98) | (1.07) | (3.33) | (2.89) | (3.05) | (1.90) | (1.17) | (3.33) | (1.31) | (0.85) | (2.09) | (5.31) | (-0.00) | (3.74) |
| ULC | 7.09** | -9.71 | -5.55 | 23.48*** | 39.83* | -0.31 | 6.97 | 20.19 | -7.97 | 7.36 | 6.44 | -18.30 | 5.56 | 16.95*** | 30.69** | -3.64 | 12.30 |
| | (2.56) | (-0.97) | (-0.88) | (4.39) | (2.08) | (-0.05) | (0.97) | (1.58) | (-1.09) | (0.33) | (1.22) | (-1.10) | (0.50) | (2.91) | (2.86) | (-0.24) | (1.48) |
| Gov.exp. | 0.68 | -52.64*** | 28.11** | -22.23* | -29.86*** | 52.64** | 11.95 | 4.12 | -32.42*** | 17.29 | -42.61*** | 16.79 | 26.38 | 17.42 | 38.57** | -47.01* | 19.39 |
| | (0.14) | (-3.69) | (2.09) | (-1.96) | (-3.51) | (3.13) | (1.16) | (0.22) | (-3.60) | (0.39) | (-5.00) | (0.88) | (0.52) | (0.71) | (2.54) | (-1.83) | (1.62) |
| Observations | 8,937 | 335 | 1,036 | 1,340 | 134 | 237 | 1,773 | 274 | 570 | 147 | 357 | 625 | 102 | 438 | 322 | 191 | 1,056 |
| Adj. $R^2$ | 0.05 | 0.10 | 0.05 | 0.06 | 0.07 | 0.12 | 0.03 | 0.08 | 0.07 | 0.05 | 0.09 | 0.07 | 0.00 | 0.09 | 0.09 | 0.07 | 0.05 |

Dependent variables: estimated positive and negative exposures with constant signs of two prior years respectively and without company-specific control variables. 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a fixed-effect panel regression with robust and clustered standard errors on the industry level in the first regression and on the company level per industry in the following regressions. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. The industry breakdown displayed in Table 7 is used to divide the sample into 17 sectors. Not included is the agriculture, hunting, forestry and fishing sector due to the lack of observations.

**Table C.1:** Foreign exchange rate exposures: feasible generalized least square model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ | $\hat{\gamma}_{i,t}$ | $\hat{\gamma}_{i,t}$-cons. | $\lvert\hat{\gamma}_{i,t}\rvert$ |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | -0.50 | 0.73 | 1.36** | -1.25 | 3.99*** | 6.42*** | -8.68** | -1.49 | 9.64*** |
| | (-0.55) | (0.59) | (2.16) | (-1.63) | (3.92) | (12.12) | (-2.41) | (-0.32) | (3.95) |
| CAP | 0.03 | 0.19** | 0.37*** | 0.04 | -0.04 | -0.04 | -4.38*** | 0.26 | -2.60*** |
| | (0.54) | (2.27) | (8.93) | (0.91) | (-0.73) | (-1.11) | (-3.43) | (0.16) | (-3.04) |
| CPI | -0.31 | 14.70*** | 5.16*** | -0.02 | 10.37*** | 2.00*** | -0.82 | -58.92*** | -17.11*** |
| | (-0.43) | (15.17) | (9.88) | (-0.03) | (14.83) | (4.89) | (-0.36) | (-19.19) | (-9.89) |
| TS | 0.15*** | 0.41*** | 0.48*** | 0.11*** | 0.36*** | 0.42*** | 5.49*** | -0.25 | 9.25*** |
| | (4.56) | (9.16) | (21.43) | (3.80) | (9.44) | (21.19) | (5.75) | (-0.18) | (14.06) |
| ULC | 0.75 | 2.46 | 4.58*** | 0.03 | 7.34*** | 12.17*** | 410.31 | 954.70*** | 2265.54*** |
| | (0.66) | (1.64) | (5.70) | (0.02) | (4.60) | (13.85) | (1.57) | (2.74) | (12.81) |
| Gov.exp. | -1.72 | -4.39* | 27.65*** | -1.22 | -5.90*** | 21.14*** | 0.23 | 5.93*** | 4.79*** |
| | (-1.06) | (-1.88) | (23.93) | (-0.93) | (-3.09) | (22.27) | (0.19) | (3.54) | (5.64) |
| Control variables: | | | | | | | | | |
| Size | 0.02*** | 0.03*** | -0.10*** | 0.02*** | 0.02*** | -0.10*** | 0.02*** | 0.02*** | -0.10*** |
| | (4.22) | (4.13) | (-30.22) | (4.12) | (3.37) | (-30.68) | (4.32) | (3.75) | (-29.61) |
| F.Ass. | -0.20*** | -0.48*** | 0.10*** | -0.19*** | -0.43*** | 0.11*** | -0.20*** | -0.52*** | 0.10** |
| | (-3.60) | (-6.33) | (2.62) | (-3.47) | (-5.59) | (2.86) | (-3.60) | (-7.22) | (2.41) |
| F.Sal. | -0.17*** | -0.33*** | -0.07** | -0.17*** | -0.36*** | -0.09*** | -0.16*** | -0.32*** | -0.09*** |
| | (-4.40) | (-6.72) | (-2.46) | (-4.41) | (-7.37) | (-3.01) | (-3.91) | (-5.66) | (-2.97) |
| Int.Inc. | -0.05 | -0.24*** | -0.04 | -0.05 | -0.20*** | -0.03 | -0.07* | -0.15*** | 0.05** |
| | (-1.27) | (-4.64) | (-1.46) | (-1.25) | (-3.95) | (-0.99) | (-1.92) | (-2.94) | (1.96) |
| Lev. | -0.00*** | -0.00* | 0.00 | -0.00*** | -0.00* | 0.00 | -0.00*** | -0.00 | 0.00 |
| | (-2.92) | (-1.87) | (0.84) | (-2.88) | (-1.82) | (0.91) | (-2.92) | (-1.48) | (1.16) |
| Quick | 0.00 | 0.02*** | 0.01*** | 0.00 | 0.02*** | 0.01*** | 0.00 | 0.02*** | 0.01*** |
| | (1.27) | (4.99) | (4.47) | (1.23) | (4.77) | (4.44) | (1.23) | (4.34) | (4.06) |
| Div.p.E. | -0.02 | -0.07 | -0.51*** | -0.02 | -0.09* | -0.51*** | -0.02 | -0.21*** | -0.53*** |
| | (-0.60) | (-1.50) | (-21.46) | (-0.59) | (-1.92) | (-21.30) | (-0.65) | (-4.27) | (-20.75) |
| R&D | 0.00* | 0.00 | 0.00*** | 0.00* | -0.00 | 0.00*** | 0.00* | -0.00 | 0.00** |
| | (1.71) | (0.13) | (2.78) | (1.72) | (-0.20) | (2.74) | (1.79) | (-0.35) | (2.20) |
| M./B. | 0.00*** | 0.00 | 0.00 | 0.00*** | 0.00 | 0.00 | 0.00*** | 0.00 | -0.00 |
| | (2.86) | (1.34) | (0.34) | (2.80) | (1.19) | (0.18) | (2.87) | (0.39) | (-0.35) |
| Obs. | 24,128 | 7,149 | 24,128 | 24,128 | 7,149 | 24,128 | 24,128 | 7,149 | 24,128 |
| $cor(\hat{\gamma},\hat{\hat{\gamma}})^2$ | 0.00 | 0.01 | 0.13 | 0.00 | 0.01 | 0.14 | 0.00 | 0.02 | 0.13 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a a FGLS regression with AR(1) autocorrelations structure within the panel. In the first regressions I use $|\hat{\gamma}_{i,t}|$. In the second regressions I use $\hat{\gamma}_{i,t}$. In the third regressions I use $\hat{\gamma}_{i,t}$-cons., which are the constant positive and negative exposures with equal signs of two prior years respectively. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. I also report the squared correlation (cor) of the estimated exposures and fitted values of the dependent variable, as a standard $R^2$ statistic is not useful as a diagnostic tool for GLS regressions.

**Table C.2:** Positive estimated foreign exchange rate exposures: feasible generalized least square model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | 1.68** | 4.42*** | 9.03*** | 5.75*** | 9.33*** | 12.32*** | 3.25 | 12.60*** | 8.89** |
| | (2.32) | (5.46) | (27.76) | (9.57) | (12.64) | (14.96) | (1.08) | (4.38) | (2.22) |
| CAB | 0.46*** | 0.46*** | 0.58*** | 0.03 | -0.10** | -0.17*** | -0.67 | 0.91 | 5.00*** |
| | (9.37) | (7.64) | (17.33) | (0.89) | (-2.19) | (-3.03) | (-0.63) | (0.84) | (3.88) |
| CPI | 5.63*** | 5.10*** | 2.89*** | 3.76*** | 1.97*** | 1.84*** | -21.11*** | -5.91*** | -1.08 |
| | (9.65) | (7.94) | (7.62) | (9.22) | (4.12) | (3.13) | (-11.06) | (-2.65) | (-0.40) |
| TS | 0.57*** | 0.60*** | 0.86*** | 0.48*** | 0.53*** | 0.61*** | 9.03*** | 6.74*** | 5.47*** |
| | (21.59) | (18.66) | (61.21) | (20.30) | (17.00) | (17.69) | (11.41) | (6.85) | (4.19) |
| ULC | 4.90*** | 8.11*** | 15.85*** | 10.23*** | 14.41*** | 19.00*** | 1619.20*** | 2804.08*** | 2685.83*** |
| | (5.32) | (7.44) | (41.75) | (10.32) | (12.09) | (14.67) | (6.92) | (12.05) | (8.47) |
| Gov.exp. | 26.51*** | 28.50*** | 35.96*** | 20.81*** | 22.45*** | 25.49*** | 1.84 | 3.15*** | 7.07*** |
| | (20.19) | (16.64) | (32.87) | (19.53) | (15.66) | (14.29) | (1.63) | (2.69) | (4.53) |
| Control variables: | | | | | | | | | |
| Size | -0.10*** | -0.11*** | -0.16*** | -0.11*** | -0.10*** | -0.10*** | -0.10*** | -0.11*** | -0.12*** |
| | (-29.10) | (-25.80) | (-26.05) | (-30.54) | (-22.23) | (-17.83) | (-29.72) | (-23.43) | (-22.24) |
| F.Ass. | -0.03 | -0.01 | 0.43*** | -0.06 | 0.04 | 0.15** | -0.06 | 0.08 | 0.15** |
| | (-0.73) | (-0.19) | (9.35) | (-1.26) | (0.70) | (1.97) | (-1.32) | (1.51) | (2.10) |
| F.Sal. | -0.10*** | -0.16*** | -0.26*** | -0.10*** | -0.17*** | -0.28*** | -0.12*** | -0.25*** | -0.33*** |
| | (-3.15) | (-4.09) | (-10.17) | (-3.44) | (-4.50) | (-6.79) | (-4.14) | (-6.11) | (-7.03) |
| Int.Inc. | -0.06* | -0.10*** | -0.17*** | -0.05* | -0.06 | -0.15*** | 0.06** | 0.04 | -0.00 |
| | (-1.91) | (-2.69) | (-5.27) | (-1.80) | (-1.64) | (-3.14) | (2.04) | (1.06) | (-0.09) |
| Lev. | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (1.07) | (1.28) | (-1.57) | (1.07) | (1.11) | (1.23) | (0.90) | (0.61) | (0.88) |
| Quick | 0.00* | 0.01*** | 0.00 | 0.01*** | 0.00 | -0.00 | 0.01** | 0.00 | -0.00 |
| | (1.91) | (3.48) | (1.11) | (3.07) | (1.54) | (-1.19) | (2.56) | (1.57) | (-0.34) |
| Div.p.E. | -0.55*** | -0.60*** | -0.51*** | -0.57*** | -0.65*** | -0.62*** | -0.61*** | -0.67*** | -0.60*** |
| | (-21.11) | (-17.78) | (-15.34) | (-21.91) | (-21.17) | (-15.14) | (-24.34) | (-19.56) | (-13.16) |
| R&D | 0.00** | 0.00 | 0.00 | 0.00** | 0.00 | 0.00*** | 0.00** | 0.00 | 0.00 |
| | (2.23) | (0.98) | (1.01) | (2.06) | (1.64) | (2.95) | (2.51) | (0.98) | (1.18) |
| M./B. | 0.00 | 0.00** | -0.00 | 0.00 | 0.00** | -0.00 | 0.00 | 0.00*** | -0.00 |
| | (1.44) | (2.21) | (-0.25) | (1.54) | (2.21) | (-0.27) | (0.74) | (7.85) | (-0.56) |
| Obs. | 11,706 | 6,272 | 3,641 | 11,706 | 6,272 | 3,641 | 11,706 | 6,272 | 3,641 |
| $cor(\hat{\gamma}, \hat{\hat{\gamma}})^2$ | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.12 | 0.12 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Positive values of the exposures ($\hat{\gamma}_{i,t} > 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} > 0$, whereby $\hat{\gamma}_{i,t-1} > 0$ and $\hat{\gamma}_{i,t-2} > 0$. All regressions are estimated using a FGLS regression with AR(1) autocorrelations structure within the panel. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. I also report the squared correlation (cor) of the estimated exposures and fitted values of the dependent variable, as a standard $R^2$ statistic is not useful as a diagnostic tool for GLS regressions.

**Table C.3:** Negative estimated foreign exchange rate exposures: feasible generalized least square model

| | Forecasted values | | | Actual values | | | Deviations | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| Foreign macroeconomic variables: | | | | | | | | | |
| GDP | -2.14*** | 0.16 | -7.31*** | -6.32*** | -2.96** | -10.73*** | -1.93 | -8.66* | -15.05*** |
| | (-2.74) | (0.13) | (-5.01) | (-9.62) | (-2.48) | (-7.91) | (-0.57) | (-1.72) | (-2.75) |
| CAB | -0.18*** | 0.01 | 0.08 | 0.16*** | 0.10 | 0.25*** | 1.22 | 12.66*** | 5.64*** |
| | (-3.34) | (0.19) | (0.83) | (3.87) | (1.57) | (3.30) | (0.94) | (6.48) | (2.60) |
| CPI | -2.98*** | -8.53*** | 0.61 | -0.87 | -5.33*** | 5.14*** | 14.41*** | 44.98*** | 29.73*** |
| | (-4.48) | (-7.38) | (0.35) | (-1.59) | (-4.58) | (3.11) | (6.70) | (14.99) | (5.62) |
| TS | -0.42*** | -0.25*** | -0.11** | -0.39*** | -0.25*** | -0.14*** | -8.98*** | -1.23 | 3.43* |
| | (-14.48) | (-5.96) | (-2.20) | (-15.63) | (-6.32) | (-2.95) | (-9.35) | (-0.93) | (1.92) |
| ULC | -4.95*** | -3.60** | -8.48*** | -12.13*** | -10.99*** | -18.12*** | -1794.44*** | -84.88 | -292.28 |
| | (-5.24) | (-2.45) | (-4.82) | (-11.46) | (-6.14) | (-8.86) | (-7.48) | (-0.27) | (-0.73) |
| Gov.exp. | -24.88*** | -20.92*** | -31.43*** | -19.24*** | -15.93*** | -27.37*** | -4.98*** | -17.16*** | -13.85*** |
| | (-17.65) | (-9.94) | (-11.47) | (-15.37) | (-9.11) | (-11.67) | (-4.62) | (-11.53) | (-7.74) |
| Control variables: | | | | | | | | | |
| Size | 0.10*** | 0.09*** | 0.10*** | 0.10*** | 0.10*** | 0.11*** | 0.11*** | 0.10*** | 0.11*** |
| | (25.78) | (18.78) | (18.71) | (22.10) | (17.76) | (20.39) | (26.81) | (25.85) | (15.76) |
| F.Ass. | -0.21*** | -0.16** | -0.26*** | -0.16*** | -0.13** | -0.20** | -0.22*** | -0.17*** | -0.31*** |
| | (-6.31) | (-2.52) | (-3.15) | (-3.22) | (-2.00) | (-2.31) | (-4.38) | (-3.21) | (-3.56) |
| F.Sal. | 0.10*** | 0.17*** | 0.28*** | 0.03 | 0.14*** | 0.24*** | 0.11*** | 0.26*** | 0.27*** |
| | (2.91) | (3.54) | (5.18) | (0.83) | (2.80) | (4.29) | (3.15) | (6.35) | (4.79) |
| Int.Inc. | 0.03 | -0.05 | -0.14*** | 0.03 | -0.04 | -0.16*** | -0.07** | -0.21*** | -0.22*** |
| | (0.80) | (-1.18) | (-2.70) | (0.79) | (-0.81) | (-2.94) | (-2.06) | (-5.65) | (-4.27) |
| Lev. | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (-0.26) | (-0.50) | (-0.45) | (-0.16) | (-0.52) | (-0.50) | (-0.74) | (-0.77) | (-0.26) |
| Quick | -0.02*** | 0.00 | 0.01** | -0.01*** | 0.00 | 0.01** | -0.01*** | 0.00 | 0.01** |
| | (-6.30) | (0.61) | (2.28) | (-5.18) | (0.34) | (2.05) | (-3.81) | (0.33) | (2.45) |
| Div.p.E. | 0.53*** | 0.61*** | 0.67*** | 0.49*** | 0.56*** | 0.61*** | 0.59*** | 0.75*** | 0.64*** |
| | (19.62) | (15.77) | (13.40) | (16.47) | (13.71) | (11.48) | (21.34) | (23.17) | (12.57) |
| R&D | -0.00* | -0.00*** | -0.00*** | -0.00 | -0.00*** | -0.00*** | -0.00* | -0.00*** | -0.00*** |
| | (-1.88) | (-4.03) | (-3.12) | (-0.86) | (-4.02) | (-3.33) | (-1.94) | (-3.16) | (-3.43) |
| M./B. | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| | (0.54) | (-0.18) | (1.51) | (0.18) | (-0.11) | (1.53) | (0.90) | (-0.72) | (1.47) |
| Obs. | 12,121 | 6,019 | 3,033 | 12,121 | 6,019 | 3,033 | 12,121 | 6,019 | 3,033 |
| $cor(\hat{\gamma}, \hat{\hat{\gamma}})^2$ | 0.13 | 0.12 | 0.10 | 0.14 | 0.12 | 0.10 | 0.13 | 0.11 | 0.10 |

Dependent variables: foreign exchange rate exposure estimated with Equation (2). 0.5% of the estimated exposures are winsorized on each end to account for outliners. Negative values of the exposures ($\hat{\gamma}_{i,t} < 0$) are used for the first regressions (1). In the second regressions (2) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$. For the third regressions (3) I use $\hat{\gamma}_{i,t} < 0$, whereby $\hat{\gamma}_{i,t-1} < 0$ and $\hat{\gamma}_{i,t-2} < 0$. All regressions are estimated using a FGLS regression with AR(1) autocorrelations structure within the panel. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. I also report the squared correlation (cor) of the estimated exposures and fitted values of the dependent variable, as a standard $R^2$ statistic is not useful as a diagnostic tool for GLS regressions.

**Table C.4:** Feasible generalized least squares regression per industry

| | $\hat{\gamma}$-cons. All | 2 BFP | 3 BUS | 4 CMP | 5 CON | 6 EGW | 7 EOQ | 8 FBT | 9 MEN | 10 MNR | 11 MQA | 12 OSE | 13 TLF | 14 TPT | 15 TRQ | 16 WPP | 17 WRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Foreign macroeconomic variables: | | | | | | | | | | | | | | | | | |
| GDP | 0.23 | -13.31** | -8.53** | 6.28* | 12.63 | -10.62** | 3.76 | -5.53 | -4.30 | -1.11 | -20.00*** | -3.26 | 25.47** | 14.48*** | 4.63 | 26.44*** | 4.09 |
| | (0.17) | (-2.46) | (-2.31) | (1.81) | (1.28) | (-1.98) | (1.31) | (-0.88) | (-0.85) | (-0.09) | (-2.71) | (-0.49) | (2.04) | (3.11) | (0.72) | (2.72) | (1.44) |
| CAB | 0.18** | -0.57 | 0.83*** | 0.10 | 0.09 | 0.98*** | 0.28 | 0.92** | -0.32 | 0.44 | 1.56*** | -0.26 | 0.33 | -0.64* | 0.72* | -0.53 | 0.22 |
| | (2.02) | (-1.37) | (3.52) | (0.45) | (0.12) | (2.72) | (1.47) | (2.18) | (-0.95) | (0.61) | (3.03) | (-0.68) | (0.32) | (-1.76) | (1.83) | (-0.91) | (1.18) |
| CPI | 15.94*** | 9.34** | 25.66*** | 9.33*** | 34.33*** | 19.60*** | 14.00*** | 20.72*** | 11.89*** | 29.15*** | 33.34*** | 15.58*** | 1.50 | 6.49* | 20.66*** | 2.91 | 9.98*** |
| | (16.70) | (2.10) | (7.44) | (3.52) | (3.39) | (4.70) | (6.36) | (4.40) | (3.46) | (3.43) | (5.10) | (3.05) | (0.19) | (1.87) | (4.70) | (0.40) | (4.40) |
| TS | 0.45*** | -0.39* | 0.77*** | 0.24** | 0.61 | 0.98*** | 0.33*** | 0.65*** | 0.34* | 0.57 | 0.94*** | -0.05 | 0.57 | 0.55*** | 0.98*** | 0.22 | 0.36*** |
| | (9.72) | (-1.89) | (5.95) | (2.01) | (1.58) | (5.36) | (3.48) | (2.82) | (1.90) | (1.64) | (3.00) | (-0.23) | (1.26) | (3.22) | (4.61) | (0.78) | (3.30) |
| ULC | 1.05 | -36.30*** | 3.69 | 8.17* | 47.14*** | -10.84* | 9.92*** | 7.33 | -5.13 | 11.58 | -14.96 | -18.20** | 1.68 | 25.46*** | 18.60** | 3.99 | 9.66*** |
| | (0.67) | (-4.94) | (0.81) | (1.86) | (3.91) | (-1.72) | (3.35) | (0.99) | (-0.81) | (0.95) | (-1.63) | (-2.31) | (0.11) | (4.34) | (2.42) | (0.34) | (2.82) |
| Gov.exp. | -4.78** | -38.96*** | 32.23*** | -30.20*** | -8.63 | 45.70*** | 2.20 | 5.53 | -53.69*** | -1.05 | -29.12** | 7.51 | -49.51** | 11.87 | 32.73** | -61.38*** | 12.78** |
| | (-2.01) | (-3.41) | (4.54) | (-4.88) | (-0.36) | (4.48) | (0.45) | (0.50) | (-6.58) | (-0.06) | (-2.03) | (0.57) | (-2.47) | (1.47) | (2.43) | (-3.58) | (2.20) |
| Control variables: | | | | | | | | | | | | | | | | | |
| Size | 0.03*** | -0.20*** | 0.03 | -0.00 | 0.30*** | -0.03 | 0.08*** | -0.02 | -0.01 | 0.27*** | 0.12*** | 0.14*** | -0.01 | 0.02 | 0.16*** | 0.03 | 0.03 |
| | (5.35) | (-4.92) | (1.05) | (-0.19) | (3.21) | (-1.42) | (4.46) | (-0.59) | (-0.26) | (3.66) | (3.01) | (3.48) | (-0.07) | (0.91) | (4.60) | (0.58) | (1.61) |
| F.Ass. | -0.59*** | -1.11*** | -0.43* | -0.11 | -0.97 | 0.81 | -0.22* | 0.04 | -0.25 | -2.38** | -0.78 | -0.80 | 0.00 | 0.86 | -0.25 | -1.12 | -0.57** |
| | (-8.23) | (-2.61) | (-1.75) | (-0.54) | (-0.82) | (0.96) | (-1.83) | (0.09) | (-1.04) | (-2.18) | (-1.26) | (-0.99) | (0.00) | (1.01) | (-0.63) | (-1.55) | (-2.07) |
| F.Sal. | -0.30*** | 0.37 | -0.23 | -0.48*** | 0.07 | -1.31 | -0.42*** | -0.61 | 0.38** | -0.48 | -0.27 | -1.62*** | -0.74 | -1.69*** | -0.99*** | 0.81 | -1.07*** |
| | (-7.39) | (0.88) | (-1.28) | (-2.85) | (0.08) | (-1.48) | (-3.82) | (-1.44) | (1.97) | (-1.07) | (-0.50) | (-2.80) | (-0.79) | (-2.72) | (-3.82) | (1.00) | (-5.54) |
| Int.Inc. | -0.26*** | 0.26 | -0.21 | -0.50*** | -1.37*** | 0.62 | -0.27*** | 0.11 | -0.00 | -0.95** | 0.41 | 0.82 | 0.44 | -0.00 | -0.34 | -0.04 | 0.51*** |
| | (-5.25) | (0.85) | (-1.38) | (-3.89) | (-3.11) | (1.07) | (-3.05) | (0.30) | (-0.01) | (-2.25) | (1.02) | (1.42) | (0.97) | (-0.01) | (-1.61) | (-0.09) | (3.35) |
| Lev. | -0.00** | -0.02 | 0.01 | 0.00 | 0.06 | -0.09** | -0.15*** | -0.01 | -0.00 | -0.02 | -0.03*** | -0.01 | 0.26 | -0.01 | -0.01 | 0.04 | -0.00* |
| | (-2.09) | (-0.39) | (0.32) | (0.18) | (0.99) | (-2.26) | (-6.56) | (-0.78) | (-0.10) | (-0.89) | (-2.79) | (-1.21) | (1.33) | (-1.03) | (-0.32) | (0.81) | (-1.67) |
| Quick | 0.02*** | 0.10** | 0.01 | 0.01** | 0.58*** | -0.02 | 0.03*** | 0.09 | 0.02 | 0.28*** | 0.17*** | 0.10*** | 0.13 | 0.02 | 0.19*** | 0.34*** | -0.02 |
| | (5.78) | (2.42) | (0.34) | (2.51) | (3.54) | (-0.95) | (2.63) | (1.43) | (0.62) | (2.85) | (4.51) | (5.04) | (0.80) | (0.93) | (2.63) | (2.97) | (-1.19) |
| Div.p.E. | -0.03 | 0.13 | -0.00 | 0.02 | -0.61* | 0.69*** | -0.21 | 0.16 | 1.04*** | 0.67** | 0.72*** | -0.51 | -0.36 | -0.39** | -0.42 | -0.64* | -0.34*** |
| | (-0.58) | (0.57) | (-0.01) | (0.12) | (-1.86) | (4.07) | (-1.39) | (0.76) | (5.65) | (1.98) | (2.71) | (-1.29) | (-0.82) | (-2.29) | (-1.64) | (-1.72) | (-3.08) |
| R&D | 0.00 | 6.55*** | 1.44*** | -0.00 | 51.52*** | -0.57** | -0.02 | -0.74 | 0.01*** | 8.14* | -0.15*** | 0.00 | -11.75 | -2.97 | 0.03 | -0.31* | -3.76 |
| | (0.50) | (3.63) | (3.04) | (-1.07) | (2.82) | (-2.34) | (-0.58) | (-1.20) | (6.63) | (1.75) | (-4.70) | (0.70) | (-1.30) | (-1.60) | (1.00) | (-1.82) | (-1.57) |
| M./B. | 0.00** | 0.01 | 0.00 | 0.01* | -0.47*** | 0.11** | 0.00 | 0.00 | -0.00 | 0.06 | 0.05** | -0.00 | -0.02 | 0.02* | 0.01 | 0.01 | 0.00 |
| | (2.21) | (0.30) | (0.02) | (1.85) | (-3.72) | (2.47) | (1.32) | (0.03) | (-0.23) | (1.37) | (2.51) | (-0.43) | (-0.51) | (1.72) | (0.43) | (0.52) | (1.09) |
| Obs. | 7,149 | 257 | 786 | 1,047 | 96 | 232 | 1,211 | 243 | 521 | 89 | 425 | 433 | 73 | 326 | 264 | 149 | 997 |
| $cor(\hat{\gamma}, \hat{\hat{\gamma}})^2$ | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |

Dependent variables: estimated positive and negative exposures of Equation (2) with constant signs of two prior years respectively. 0.5% of the estimated exposures are winsorized on each end to account for outliners. All regressions are estimated using a FGLS regression with AR(1) autocorrelations structure within the panel. T-statistics are given in parentheses. The coefficients are tagged with the respective significance levels: * p<10%, ** p<5%, *** p<1%. The industry breakdown displayed in Table 7 is used to divide the sample into 17 sectors. Not included is the agriculture, hunting, forestry and fishing sector due to the lack of observations. I also report the squared correlation (cor) of the estimated exposures and fitted values of the dependent variable, as a standard $R^2$ statistic is not useful as a diagnostic tool for GLS regressions.

# Figures

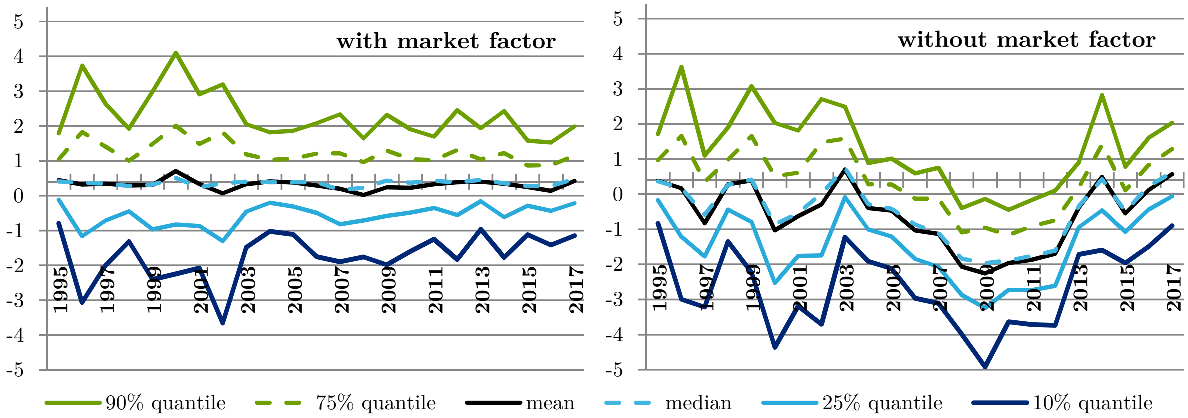


**Figure 1:** This figure shows the cross-sectional distribution of exposures for the model with the market factor and without a market factor for the years 1995 to 2017.

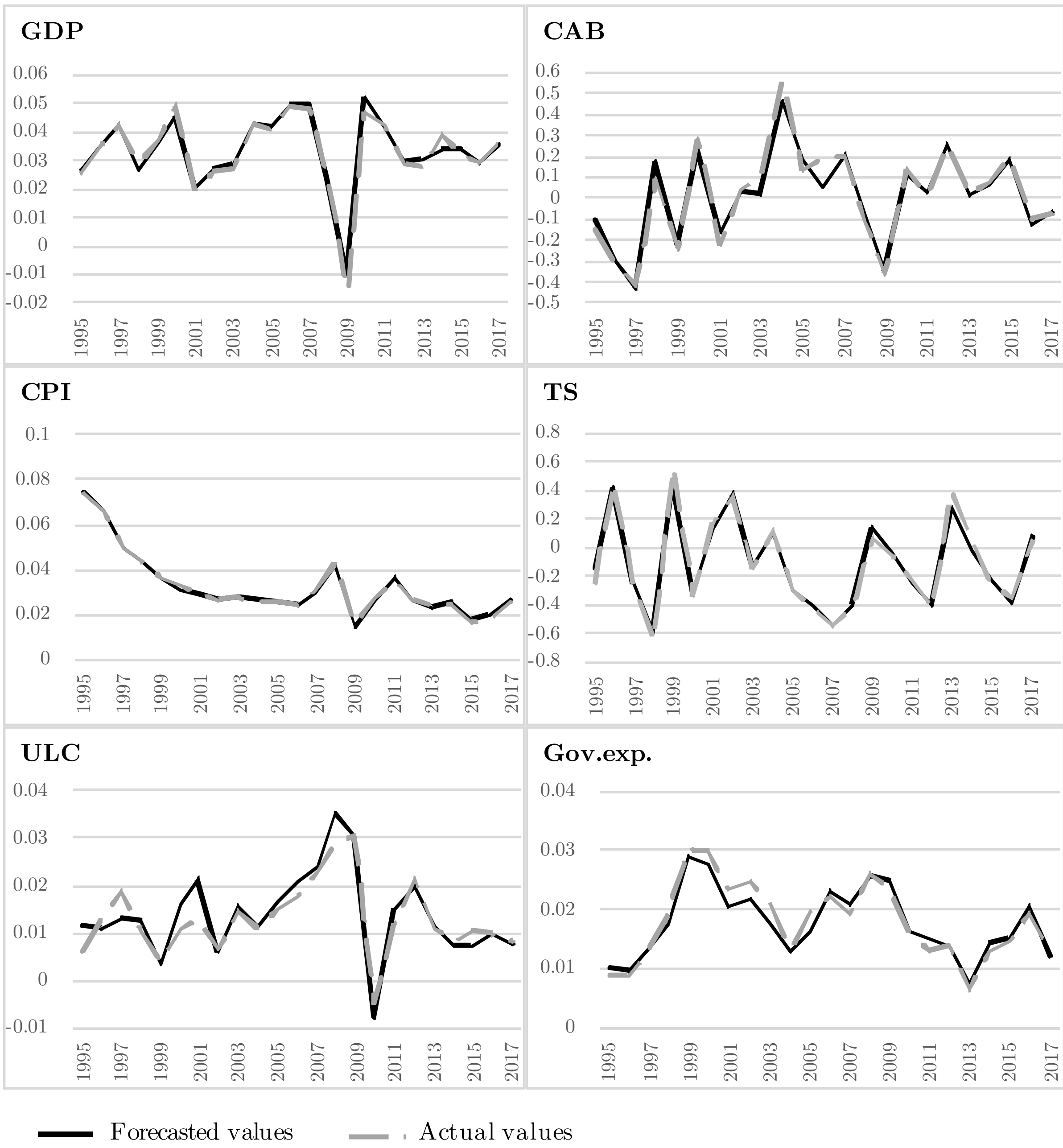


**Figure 2:** This figure shows the returns of the foreign forecasted and actual macroeconomic indices for the years 1995 to 2017.

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