US Monetary Policy and the Stability of Currency Pegs

Ingmar Roevekamp[1] (October 2018)

I study the pricing of American Depositary Receipts around FOMC meetings to identify the impact of US monetary policy on managed exchange rates. ADR investors assess the domestic central bank's reluctance to maintain a currency peg regime if the costs of mimicking policy rate increases in the US are high, i.e., the current state of the domestic economy is poor. In line with currency crises models of interest rate defence, I find that positive US monetary surprises increase the breakdown probability of pegs with low real GDP growth, high fiscal deficits, high sovereign risk and a weak domestic banking sector.

Keywords: American Depositary Receipts, Currency Crises, Exchange Rates, FOMC Meetings, Monetary Policy

JEL-Classification: E52**,** F31, G01, G12, G15

[1] TU Dresden, Department of Business and Economics, Chair of International Monetary Economics, E-Mail: ingmar.roevekamp@tu-dresden.de

1. Introduction

There is common agreement that US monetary policy shocks have a significant impact on exchange rates (e.g., Dedola, Rivolta & Stracca, 2017; Mueller et al., 2017). However, most central banks manipulate the value of the domestic currency by active foreign exchange market intervention (Fratzscher et al., 2018). Therefore, identifying the effects of US monetary surprises on the fundamental values of these currencies is nontrivial.[2]

In the extreme case of a currency pegged to the US dollar, there is – by definition - no change in the official spot exchange rate as long as the peg regime holds. However, an unexpected policy rate increase in the US might affect investors' assessment of the stability of a peg regime and lead to a higher expected peg breakdown probability. To sustain the peg regime, the domestic central bank must mimic policy rate increases by the FED as long as capital is fully mobile.

Second-generation currency crises models predict that domestic policy makers will opt to abandon a peg regime if the economic costs of maintaining the peg regime (i.e. increasing the domestic policy rate following a positive US monetary surprise) outweigh the benefits (e.g. Obstfeld, 1994; Bensaid & Jeanne, 1997).[3] Domestic policy makers will perceive high costs of raising the domestic interest rate, if the current state of the domestic economy is poor. For example, Lahiri & Végh (2007) state that raising the domestic policy rate might be associated with fiscal and output cost and might lead to a deterioration of the domestic banking system.

[2] For this paper, the "fundamental value" of a currency refers to the exchange rate that would materialize if there was no intervention by the domestic central bank and the exchange rate was fully determined by market forces.
[3] This is not an exclusive feature of second-generation currency crises models, but can also be found in augmented first-generation models of interest rate defence (e.g. Flood & Jeanne, 2005; Lahiri & Végh, 2007).

I introduce a novel empirical approach to identify the impact of US monetary policy on managed exchange rates. Following Kadiyala & Kadiyala (2004) and Eichler et al. (2009), I use American Depositary Receipts (ADRs) to derive investors' assessment of the fundamental values of managed exchange rates.[4] In the extreme case of currencies pegged to the US dollar, ADR investors might perceive that the domestic government faces high economic costs of mimicking an unexpected policy rate increase in the US. Therefore, they will assume a lower willingness to maintain the currency peg using an interest rate defence and thus price a higher peg breakdown probability in ADRs.

To my best knowledge, I am the first to study the deviations from the law of one price of ADRs on FOMC meeting days and relate them to the underlying currency's exchange rate regime, thereby adding to the existing literature in two ways. First, I introduce a new ADR-based method that allows identifying the impact of US monetary surprises on the fundamental values of currencies with managed exchange rate regimes. Second, I test the predictions of standard currency crises models of interest rate defence by applying this method to currencies pegged to the US dollar and study how US monetary policy shocks affect the stability of these peg regimes, conditional on the current state of the domestic economy. The pricing of ADRs around FOMC meetings offers a unique setting that allows for the identification of investors' assessments of the probability that domestic policy makers opt to abandon a peg regime in response to an exogenous shock and relate this to the current state of the domestic economy as a proxy for the cost of maintaining the peg regime.

I identify increases in the expected peg breakdown probability by negative abnormal ADR returns following positive US monetary surprises.[5] By

[4] Several papers study the relative price spreads between ADRs and their underlying stocks during episodes of capital controls and financial crises (e.g., Melvin, 2003; Levy Yeyati et al., 2004; Auguste et al., 2006; Arquette et al., 2008; Levy Yeyati et al., 2009). Kadiyala & Kadiyala (2004) and Eichler et al. (2009) suggest that these price spreads indicate the future expected value of the exchange rate, e.g. after the breakdown of a currency peg that is currently in place.

[5] Theoretically, negative abnormal ADR returns following positive US monetary surprises in peg regimes might either result from increases in the expected breakdown probability of the peg regime or from a higher expected depreciation of the currency with respect to the US dollar if

interacting with macro fundamentals that describe the cost of interest rate increases in standard currency crises models of interest rate defence (e.g. GDP growth, the fiscal balance, public debt, the current state of the banking system), I identify investors' assessment of the domestic policy makers' cost of raising the domestic policy rate. Higher perceived cost of raising the domestic policy rate are associated with a lower willingness to maintain the peg regime and thus a higher expected peg breakdown probability, identified by negative abnormal ADR returns.

In the general case of managed exchange rate regimes (where the domestic central bank intervenes in the foreign exchange market in a significant way), the current returns of the official spot exchange rate might not fully reflect changes in the true fundamental value of these currencies caused by US monetary policy shocks because central bank intervention drives the official spot exchange rate away from its fundamental value. Existing studies fail to account for these effects and might therefore underestimate the impact of US monetary policy on managed exchange rates. Analyzing the response of abnormal ADR returns to US monetary surprises reveals investors' assessment of the change in the fundamental value of managed currencies. For policy makers and (ADR) investors, it is important to be aware of these differences between the actual and the true fundamental values of currencies. Once the domestic central bank stops intervening in the foreign exchange market,[6] there might be a sudden drop in the exchange rate (in the extreme case, a peg regime is abandoned), potentially causing severe losses to investors and real disruptions (Eichler & Roevekamp, 2018).

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the peg regime breaks down. Empirically, I cannot distinguish between the two. Therefore, for the remainder of the paper, "increases in the breakdown probability of peg regimes" refers to both possibilities.

[6] There might be several reasons for that. According to first-generation currency crises models, the domestic central bank might be forced to stop its intervention since foreign exchange reserves are depleted. According to second-generation currency crises models, the domestic policy maker might voluntarily decide to abandon a peg regime (and thus stop the intervention in the foreign exchange market), since the costs of maintaining the peg regime outweigh the benefits.

My paper adds to a large body of literature that studies the effects of US monetary policy shocks on equity markets in the US (e.g., Thorbecke, 1997; Ehrmann & Fratzscher, 2004; Bernanke & Kuttner, 2005; Lucca & Moench, 2015) and their global transmission (e.g., Kim, 2001; Ehrmann & Fratzscher, 2009; Hausman & Wongswan, 2011; Dedola, Rivolta & Stracca, 2017; Han & Wei, 2018).

The empirical approach in this paper might provide a valuable tool to policy makers that are eager to monitor investors' perception of currency peg stability and the government's willingness to defend a peg regime in real-time, potentially also to identify the risk of speculative attacks against the domestic currency. Also, employing daily data of ADRs allows for a clean identification of the impact of US monetary shocks on managed exchange rate regimes (as compared to existing approaches using macro variables at lower frequency, e.g., Maćkowiak, 2007).

My sample includes daily data of 249 level II and level III ADRs from 33 countries over the period from 1996 to 2016, covering 168 FOMC meetings (3,887 observations by country and meeting in total).[7] I find robust evidence that the impact of US monetary surprises on abnormal ADR returns differs significantly by the exchange rate regime. US monetary surprises significantly negatively affect abnormal returns for countries with managed currencies, whereas there is no significant effect for countries with freely floating currencies, which I include as a placebo test. A one standard deviation increase in US monetary surprises reduces abnormal ADR returns for countries with a managed exchange rate regime by 6.2 – 7.4 basis points (equivalent to 0.06 – 0.08 standard deviations).[8] The results are robust to the inclusion of various

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[7] Due to limitations in space, a list of the ADRs in my sample is not included in the paper, but is available upon request.

[8] When judging the economic significance of this effect, it must be kept in mind that as long as arbitrage possibilities exist, abnormal ADR returns should not be significantly different from zero. However, it is important to note that the focus of this paper is not to make a statement about whether profitable arbitrage possibilities exist in the ADR market around FOMC meetings. Also, the economic significance of US monetary surprises is higher than for other control variables that I include to proxy for other sources of deviations from the law of one

control variables to account for potential sources of deviations from the law of one price other than the exchange rate channel[9] and a variety of robustness checks.

Next, I test the predictions of standard currency crises models of interest rate defence with respect to the stability of peg regimes. Using triple interaction models, I find that abnormal ADR returns following positive US monetary surprises are more negative for peg regimes with low real GDP growth, high fiscal deficits, high sovereign yield spreads, a weak domestic banking system and low central bank independence. These results indicate that investors perceive high costs for maintaining the peg regime by raising the domestic policy rate and thus expect a higher breakdown probability for these peg regimes. The results are also highly economically significant. The impact of a positive US monetary surprise on abnormal ADR returns for currencies pegged to the US dollar and high cost of maintaining the peg regime ranges between 37.82 and 69.50 basis points.

Finally, I apply my method to the currency crisis episode in Argentina in 2001/2002, which is frequently studied by the ADR literature (e.g., Melvin, 2003; Kadiyala & Kadiyala, 2004; Auguste et al., 2006 and Eichler et al. , 2009). Using my empirical approach enables me to show that positive US monetary surprises led to 0.34 – 0.56% lower abnormal returns for five Argentinean ADRs between January 1st, 2000 and December 3rd, 2001, which was prior to the introduction of the *corralito*.[10] This result indicates that investors anticipated

price, except for the return of the US market, the return of the local stock index and the change in the VIX.

[9] I control for limits to arbitrage (following Gagnon & Karolyi, 2010) as well as financial (dis-)integration (following Pasquariello, 2008). Furthermore, I include additional control variables that are specific to the domestic economy of the underlying and capture how the unexpected change in the FED Funds Rate affects the economic conditions in the domestic economy. These include the US dollar return of the domestic stock index and changes in the domestic sovereign yield and the domestic money market interest rate (potentially capturing an immediate or expected response of the domestic central bank to the monetary surprise in the US). Finally, I include the return of the US market and the change in the VIX as global control variables.

[10] This is an extension of the existing literature, which merely focuses on the period after capital controls were implemented.

the breakdown of the peg regime of the Argentinean peso to the US dollar even before capital controls were implemented.

2. Method, hypotheses and data

2.1 Definition of abnormal ADR returns

American Depositary Receipts (ADRs) provide ownership of a specific number of underlying shares. While ADRs and their underlying shares represent the same ownership rights (such as dividend claims and voting rights), the key differences between both are their trading location and currency denomination. ADRs are denominated in US dollars and trade in the United States, whereas their underlying shares are denominated in local currency and trade on the local stock market.

Since they can be converted into each other at a fixed conversion ratio, the law of one price implies that the exchange rate adjusted prices of both stocks should be equal (Gagnon and Karolyi, 2010):

$$P_{i,j,t}^{ADR,LOOP} = \frac{P_{i,j,t}^{UND} * \gamma_{i,j}}{S_{j,t}} \quad (1)$$

with $P_{i,j,t}^{ADR,LOOP}$ and $P_{i,j,t}^{UND}$ representing the prices of ADR i from country j and its corresponding underlying stock, $\gamma_{i,j}$ is a fixed ADR-underlying pair-specific conversion parameter and $S_{j,t}$ is the current spot exchange rate of the underlying currency in local currency units per US dollar. Accordingly, the return of the ADR should be equal to the US dollar return of the respective underlying:

$$ret_{i,j,t}^{ADR,LOOP} = ret_{i,j,t}^{UND} - ret_{j,t}^{S} \quad (2)$$

Abnormal ADR returns represent deviations from the dynamic version of the law of one price:

$$AR_{i,j,t}^{ADR} = ret_{i,j,t}^{ADR} - ret_{i,j,t}^{ADR,LOOP} = ret_{i,j,t}^{ADR} - ret_{i,j,t}^{UND} + ret_{j,t}^{S} \quad (3)$$

Abnormal ADR returns are different from zero if the actual change in the price of the ADR does not match the theoretically predicted change, determined by the return of the underlying stock and the exchange rate.[11] It is not a priori clear whether one would expect positive or negative abnormal ADR returns (if significant at all) around FOMC meetings. The existing literature well documents how stock prices and exchange rates respond to US monetary surprises (e.g., Thorbecke, 1997; Kim, 2001; Ehrmann & Fratzscher, 2004; Bernanke & Kuttner, 2005; Ehrmann & Fratzscher, 2009; Lucca & Moench, 2015; Mueller et al., 2017). However, it is nontrivial to hypothesize how actual ADR returns around FOMC meetings might deviate from theoretical ADR returns. In the following section, I will introduce the two central hypotheses of this paper.

2.2 Hypotheses

In this paper, I study the impact of US monetary surprises on abnormal ADR returns, conditional on the exchange rate regime of the country from where the underlying stock of the ADR originates. I hypothesize that there is a significant difference between countries with a managed exchange rate regime (characterized by the intervention of the domestic central bank in the foreign exchange market) and countries with a freely floating exchange rate regime.

There is common agreement and empirical evidence that US monetary policy has an immediate effect on exchange rates (e.g., Hausman & Wongswan, 2011; Mueller et al., 2017). Following standard exchange rate models, (unexpected) interest rate increases in the US ceteris paribus lead to a lower

[11] The focus of this paper is not to analyze whether profitable arbitrage possibilities around FOMC meetings exist in the ADR market. This question is difficult to answer empirically since it is unclear whether an ADR and its underlying stock can be traded in the exact same instance. In addition, I abstract from differences between bid and ask prices (although I will include the bid-ask-spread of both the ADR and its underlying stock as control variables in the following analysis). Finally, price differences between theoretical and actual ADR prices might not be large enough to cover the transaction cost of arbitrage transactions.

fundamental value (defined as the exchange rate that would materialize if it was fully determined by market force and there was no intervention of the domestic central bank) of any currency relative to the US dollar. However, the actual response of exchange rates to US monetary policy shocks depends on the exchange rate regime. For freely floating regimes (characterized by the absence of intervention by the domestic central bank in the foreign exchange market), the change in the fundamental value of the currency will be fully reflected by the return of the current spot exchange rate. For managed exchange rate regimes however, either an immediate intervention or the expectation of a future intervention by the domestic central bank prevents the change in the fundamental value of the currency from (fully) materializing into an actual change in the current spot exchange rate. This is supported empirically by Hausman & Wongswan (2011), who document that currencies with less flexible exchange rate regimes respond less to US monetary policy shocks. In the extreme case of currencies pegged to the US dollar, there will be no observable change in the official current spot exchange rate as long as the peg regime holds.

The pricing of ADRs around FOMC meetings presents an ideal laboratory to identify the impact of US monetary policy on currencies with managed exchange rates. ADR investors do not only consider the current spot exchange rate, but also take into account their expectations of the future value of the exchange rate (e.g., Kadiyala & Kadiyala, 2004; Eichler et al., 2009). A positive (negative) US monetary surprise will decrease (increase) the true fundamental value of any currency relative to the US dollar. If this does not fully materialize into a change in the current spot exchange rate due to the intervention of the domestic central bank, the new true fundamental value will be below (above) the current spot exchange rate of the currency. Therefore, ADR returns reflect the probability of a future adjustment of the actual value of the exchange rate to its true fundamental value.[12] In the case of a positive (negative) monetary surprise in the US, we should therefore observe negative (positive) abnormal ADR returns for managed exchange rate regimes. For freely floating exchange rate regimes however, there is no reason for significant abnormal ADR returns due to this exchange rate channel since the return of the current spot exchange rate fully reflects the change in the fundamental value of the currency (due to the absence of intervention by the domestic central bank).[13] Therefore, ADRs from countries with freely floating exchange rate regimes are included as a placebo test and the first central hypothesis of this paper is as follows:

(H1): *Abnormal returns of ADRs from countries with managed exchange rates respond significantly negatively to US monetary surprises. There are no significant effects for ADRs from countries with floating exchange rates.*

In the extreme case of a currency pegged to the US dollar, there is no change in the current spot exchange rate following an unexpected FOMC policy rate change as long as the peg regime holds. However, US monetary surprises might have an impact on investor's assessment of a peg regime's stability. To sustain a peg regime to the US dollar, the domestic central bank of countries with free capital accounts must mimic the policy rate moves by the FED. As predicted by standard currency crises models of interest rate defence, domestic policy makers will opt to abandon a peg regime if the economic cost of increasing the domestic policy rate outweighs the benefits of keeping the peg regime. This might be the case if, for example, following a positive US monetary surprise, increasing the

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[12] Such an adjustment might occur if the domestic central bank is no longer able or willing to intervene in the foreign exchange market, for example if foreign reserves are depleted or if it opts to switch its exchange rate regime to a more flexible one.

[13] The literature has provided empirical evidence of various reasons for deviations from the law of one price of ADRs beyond changes in the (expected) fundamental value of the underlying currency. These include the (dis-)integration of the domestic economy from the world economy (Pasquariello, 2008), capital control circumvention premia (e.g., Melvin, 2003; Auguste et al., 2006) as well as limits to arbitrage (Gagnon & Karolyi, 2010). As I will point out more in detail in the following section, I control for these other sources of deviations from the law of one price.

domestic policy rate is perceived as costly by the domestic policy maker, e.g., if it would deepen an already ongoing recession (e.g., Bensaid & Jeanne, 1997; Flood & Jeanne, 2005; Lahiri & Végh, 2007). Increases in the breakdown probability of peg regimes would (following the same logic as before) be reflected in negative abnormal ADR returns of countries with peg regimes vis-à-vis the US dollar. Therefore, the second central hypothesis of this paper is as follows:

(H2): *Abnormal returns of ADRs from countries with a currency pegged to the US dollar respond significantly negatively to positive US monetary surprises around FOMC meetings if the current state of the domestic economy is poor, i.e., the costs of mimicking the policy rate increase by the FED are high.*

2.3 Data description

To study the impact of policy rate decisions by the FOMC on abnormal ADR returns as precisely as possible, I calculate daily returns based on intraday data from Thomson Reuters Tick History. I consider the last values prior to 3 p.m. UTC as the closing prices for the respective day. I chose this time because most of the stock markets of the 33 countries in my sample operate in regular mode at that time. FOMC statements on meeting days are published at approximately 2:15 p.m. ET (corresponding to 7:15 p.m. UTC in the winter and 6:15 p.m. UTC during the summer).

Following Kuttner (2001), I derive monetary surprises (i.e., unexpected changes in the FED Funds Rate) from FED Funds Futures that are settled daily at 4 p.m. CST (10 p.m. UTC in the winter and 9 p.m. UTC during summer). Thus, prices of FED Funds Futures already incorporate the monetary surprise of a FOMC meeting on the respective day, whereas this is not the case for the prices of ADRs and their underlyings stocks. Therefore, I match abnormal ADR returns between day t+1 (incorporating the FOMC decision) and day t (not incorporating the FOMC decision) to monetary surprises on day t.

I identify potential pairs of ADRs and underlying stocks using information from the ADR databases of JP Morgan and the Bank of New York Mellon, as well as from Thomson Reuters DATASTREAM. Following the standard practice in the literature (e.g., Gagnon & Karolyi, 2010), I consider Level II and Level III ADRs only, thus excluding Level I ADRs as well as SEC Regulation S shares and private placements under SEC Rule 144a. This yields a sample of 249 ADRs from 33 countries over the period from 1996 – 2016 (covering 168 FOMC meetings).

3. Abnormal ADR returns around FOMC meetings and the role of the exchange rate regime

3.1 Results of the interaction model

In this section, I study the impact of the exchange rate regime of the currency underlying the ADR on deviations from the law of one price following US monetary policy surprises. Analyzing abnormal ADR returns can help identify the impact of US monetary policy on the investors' assessment of the true fundamental value of currencies, which might not be fully reflected in the current spot exchange rate of currencies that are managed. Within an interaction model, I distinguish between managed and floating exchange rate regimes where ADRs originating from countries with floating exchange rates serve as a placebo test. As explained in the previous section, there is no reason why they would yield significant abnormal returns following monetary surprises (after controlling for all other potential sources of deviations from the law of one price).

The literature has provided empirical evidence of various reasons for deviations from the law of one price of ADRs beyond changes in the (expected) fundamental value of the underlying currency: (dis-)integration of the domestic economy from the world economy (Pasquariello, 2008), capital control circumvention premia (e.g., Melvin, 2003; Auguste et al., 2006) and limits to arbitrage (Gagnon & Karolyi, 2010). In my empirical framework, I control for all other potential sources of deviations from the law of one price listed above using a broad set of control variables. While US monetary policy decisions theoretically might also have an impact on the other potential sources of deviations from the law of one price listed above, there is no reason why they should significantly interact with the exchange rate regime.

In this section, I look at a panel of 33 countries over the period from January 1996 to December 2016, covering 168 FOMC meetings. There is one observation for each country and FOMC meeting. This yields a sample of 3,887 observations. I estimate the following regression equation:

$$AR_{j,t}^{ADR} = \beta_1 monetary\ surprise_t + \beta_2 managed\ regime_{j,t} + \beta_3 monetary\ surprise_t * managed\ regime_{j,t} + \sum_n^N(\beta_{4,n} X_{n,t} + \beta_{5,n} managed\ regime_t * X_{n,t}) + \alpha_j + \mu_a + \varepsilon_{j,t} \quad (4)$$

where $AR_{j,t}^{ADR}$ is computed as the mean of abnormal returns over all ADRs of the respective country for the respective FOMC meeting[14] and $monetary\ surprise_t$ corresponds to the monetary surprise of the respective FOMC meeting (calculated using the method proposed by Kuttner, 2001). $managed\ regime_{j,t}$ is a dummy variable equal to 1 if the country's exchange rate regimes has been classified as 1 – 3 in the de facto exchange rate classification by Ilzetzki et al. (2017),[15] and zero otherwise. $\sum_n^N X_{n,t}$ represents a broad set of control variables, α_j is the country fixed effect, μ_a is a year fixed

[14] This approach is chosen to avoid potential bias resulting from the different number of ADRs by country in my sample. In the case of the ADR-underlying pair specific variables controlling for limits to arbitrage, I also consider the means of the measures over all ADRs from the respective country and FOMC meeting. As a robustness check, I estimate another panel with one observation for each ADR and FOMC meeting, which allows controlling for individual ADR-underlying pair fixed effects and limits to arbitrage. Also, with this approach, the interaction and marginal effects are significant. The results are available upon request.

[15] 55.22% of the observations are classified as managed regimes.

effect[16] and $\varepsilon_{j,t}$ is the error term. All variables are also included in the interaction with $managed\,regime_t$ to allow for the impact of the control variables on abnormal ADR returns to be heterogeneous among different exchange rate regimes. Eq. (4) is estimated using robust standard errors clustered at the country level to account for potential heteroscedasticity and autocorrelation in the error term.

I include various control variables to account for potential sources of deviations from the law of one price other than the exchange rate channel. The first set of control variables is specific to the ADR-underlying pair. Deviations from the law of one price might emerge if arbitrage possibilities are limited. Therefore, following Gagnon & Karolyi (2010), I include the change of the bid-ask-spread of both the ADR and its underlying stock as well as the change in idiosyncratic risk of the ADR[17] to control for changes in limits to arbitrage around the FOMC meeting.

I further include control variables that capture how the US monetary surprise affects the economic conditions in the home country of the underlying stock. These include the US dollar return of the domestic stock index, changes in the domestic sovereign yield and the domestic money market interest rate (potentially capturing an immediate or expected response of the domestic central bank to the policy rate change in the US). In addition, I include the change in the domestic CAPM β with respect to the US market, capturing potential (dis-)integration of the domestic economy from the US economy

[16] The results presented in the following part remain robust throughout various definitions of fixed effects: without any fixed effects, with country fixed effects, with country and year effects and with country x year fixed effects.

[17] ADR-specific idiosyncratic risk is calculated following Gagnon & Karolyi (2010) as the standard deviation of the residuals from regressing the difference between US dollar returns of the ADR and its underlying stock on contemporaneous and one day lagged and leading values of the US stock market, the respective domestic stock market and the change in the EUR/USD exchange rate using a rolling window of 30 trading days, see eq. (1) in Gagnon & Karolyi (2010).

(Pasquariello, 2008).[18] Finally, I include the return of the US market and the change in the VIX as global control variables. Table A1 in the appendix gives an overview over the variables and their sources, and Table A2 provides descriptive statistics. Figure A1 and Figure A2 in the appendix present histograms of mean abnormal ADR returns by country and meeting for managed vs. freely floating exchange rate regimes as well as a histogram of US monetary surprises.

<INSERT TABLE 1 AND TABLE 2 ABOUT HERE>

Table 1 summarizes the results, Table 2 reports the corresponding marginal effects for managed and freely floating exchange rate regimes separately. The interaction between $monetary\ surprise_t$ and $managed\ regime_{j,t}$ is negative and highly significant throughout a variety of different specifications and is robust to the inclusion of various control variables. As hypothesized in H1, there is a strong negative impact of US monetary surprises on abnormal ADR returns for countries with a managed exchange rate, whereas there is no significant impact for countries with a fully flexible exchange rate. The relation for managed regimes is also economically significant ,i.e., a one standard deviation increase in *monetary surprise* leads to a decrease in abnormal ADR returns in the magnitude of 6.2 – 7.4 basis points (equivalent to 0.06 – 0.08 standard deviations). Table 3 reveals that the economic significance (expressed in basis points of abnormal ADR returns for one standard deviation of the respective variable) by far exceeds that of the other variables included to control for limits to arbitrage.

<INSERT TABLE 3 ABOUT HERE>

[18] Computed as the daily change in the CAPM beta of the US dollar returns of the local stock index of the respective country with respect to the US market, estimated using a rolling regressions framework of 30 trading days.

3.2 Robustness checks

In the following section, I present a variety of robustness checks to validate the results from the previous section.[19] I start by discussing the important role of US unconventional monetary policy and its impact on my results. The global financial crisis of 2007/2008 and the unconventional monetary policy measures implemented by the FED and other central banks all over the world in its aftermath affected a significant fraction of the sample of this paper. Several recent papers study the global transmission of US unconventional monetary policy (e.g., Bauer & Neely, 2014; Bowman et al., 2015; Neely, 2015).

One major concern with my identification of the impact of US monetary policy on managed exchange rate regimes might be that the distribution of US monetary surprises during the zero lower bound (ZLB) period from December 2008 to December 2015 differed significantly from the rest of the sample. In the empirical approach used for the analysis in this paper (as described in eq. (4)), year fixed effects are included to control for the general conditions of the global economy. I therefore account for the possibility that financial crises (such as the Asian Crisis 1997/1998, the burst of the dotcom bubble 2000/2001 and the global financial crisis of 2007/2008) and other major macro events have an impact on my results.

In addition, I ensure that my main result (the significant impact of US monetary surprises on abnormal ADR returns for countries with managed exchange rates) also holds if I exclude all observations during the ZLB period. Additionally, Gürkaynak et al. (2007) suggest using the one-month Eurodollar deposit rate as an alternative to identify US monetary surprises. Again, I identify a significant impact of daily changes in the Eurodollar rate on abnormal ADR returns for managed exchange rate regimes during the ZLB period, whereas there is no significant effect for freely floating exchange rates.

[19] Not all the results of this section are displayed in the paper due to limitations with respect to space. However, they are available upon request.

Next, I consider further variables that might have an impact on ADR pricing around FOMC meetings. First, I ensure that the results hold regardless of differences in de facto capital account openness between the countries from where the underlying stock originates. Auguste et al. (2006) suggest using the ADR discount as a measure of de facto capital account openness. The idea behind this concept is that significant and persistent deviations from the law of one price (outside the no-arbitrage band determined by transaction cost) only occur if capital mobility is restricted. So that my approach is as conservative as possible (and is independent from the choice of the representative ADR-underlying pair for each country), I consider the mean by country and year of the daily minimum values of the absolute deviation from the law of one price[20] of all ADRs from the respective country. I expand eq. (4) by adding $deviation\ loop_{j,t}$ as well as its interaction with $monetary\ surprise_t$ and all the control variables. In an alternative specification (not reported here), I use the Chinn-Ito (2008) index as a measure of de facto capital account openness.

Second, I include the GDP per capita (in constant US dollar) of the respective country relative to the US as an additional control variable to validate that my results are not affected by omitted macro variables, such as the development status of the respective countries that might be correlated with the exchange rate regime. As Table 4 and Table 5 demonstrate, both the significant negative interaction between monetary $monetary\ surprise_t$ and $managed\ regime_{j,t}$ and the negative marginal effects of $monetary\ surprise_t$ for managed exchange rate regimes are robust to the inclusion of these two additional control variables.[21] The results also remain significant when including the two additional control variables and their interactions at the same time. One specific concern might be that the results are driven by the fact that US monetary policy leads to capital reallocation from the

[20] Defined as $\left|\ln\left(P_{i,t}^{ADR}\right) - \ln\left(P_{i,t}^{ADR,LOOP}\right)\right|$.

[21] For the specifications controlling for the GDP per capita relative to the US, the number of observations reduces to 3,759 since this variable is currently only available up to 2015.

US to emerging markets or vice versa. However, the impact of US monetary surprises on abnormal ADR returns also remains significantly negative for managed regimes when an emerging market dummy (=1 if a country is classified as an “Emerging Market” or “Frontier Market” by MSCI, zero otherwise) is introduced instead of the relative GDP per capita measure. For emerging market economies, the economic significance is also higher, as a one standard deviation of US monetary surprises lowers abnormal ADR returns by 10.37 – 12.22 basis points.

<INSERT TABLE 4 AND TABLE 5 ABOUT HERE>

In another specification, I account for the role of economic policy uncertainty in the global economy and the US economy as well as US monetary policy uncertainty using the respective indices proposed by Baker et al. (2015). Again, the results remain robust.

Additionally, I ensure the robustness of the results with respect to the exchange rate classification. First, I make sure that my results are not driven by managed regimes with an anchor currency other than the US dollar. Therefore, I use the Ilzetzki et al. (2017) anchor currency classification and replace the dummy variable $managed\ regime_{j,t}$ to zero for these observations. Also, I control for episodes classified as freely falling (Ilzetzki et al., 2017, classification equal to 5). In both cases, the results remain robust.

As additional robustness checks, I ensure that my results are not driven by outliers. First, I re-estimate specification (6), dropping single countries or meetings one at a time. Second, I exclude all observations below the 1st and above the 99th percentiles of abnormal ADR returns. In all these cases, the results remain significant. Finally, I run an additional placebo test, choosing 168 random non-FOMC meeting trading days to make sure that the results are specific to FOMC meeting days. I run the same regressions as before, this time obtaining neither a significant interaction between the exchange rate regime and monetary surprise nor a significant marginal effect of monetary surprises for managed exchange rate regimes.

4. US monetary policy and the cost of defending a currency peg

4.1 Evidence from abnormal ADR returns around FOMC meetings

Positive US monetary surprises might lead to a higher expected probability that a currency peg regime to the US dollar breaks down. As predicted by standard currency crises models of interest rate defence, domestic policy makers will opt to abandon a peg regime if the economic costs of mimicking the US policy rate increase outweigh the benefits of maintaining the peg regime. This will be the case if an increase in the domestic policy rate is perceived as costly, e.g., if it deepes an already ongoing recession.

In the previous section, I provided evidence for a significant negative symmetric effect of US monetary surprises (i.e., independent of the direction of the change) on abnormal ADR returns for managed exchange rate regimes. Now, I focus on the asymmetric effect of a positive monetary surprise on peg regimes, conditional on the current state of the domestic economy, to identify investors' assessment of the domestic government's willingness to defend the peg regime. Therefore, I estimate the following triple interaction model as described in eq. (5):[22]

$$
\begin{aligned}
AR_{j,t}^{ADR} = \quad & \beta_1 pos\,MS_t + \beta_2 peg_{j,t} + \beta_3 macro_{j,t} + \beta_4 pos\,MS_t * peg_{j,t} \\
& + \beta_5 pos\,MS_t * macro_{j,t} + \beta_6 peg_{j,t} * macro_{j,t} \\
& + \beta_7 pos\,MS_t * peg_{j,t} * macro_{j,t} \\
& + \textstyle\sum_{i=1,2}(\beta_{8,i} ER_{i,j,t} + \beta_9 pos\,MS_t * ER_{i,j,t} + \beta_{10,i} ER_{i,j,t} * macro_{j,t} \\
& + \beta_{11,i} pos\,MS_t * ER_{i,j,t} * macro_{j,t}) + \textstyle\sum_n^N(\beta_{12,n} X_{n,t} \\
& + \beta_{13,n} peg_{j,t} * X_{n,t} + \beta_{14,n} X_{n,t} * macro_{j,t}
\end{aligned}
$$

[22] I exclude all observations between December 2008 and December 2015 for the following analysis since interest rate expectations were anchored during the ZLB period. However, not dropping these observations yields relatively robust results, which are available upon request.

$$+\beta_{15,n} peg_{j,t} * X_{n,t} * macro_{j,t}$$

$$+ \sum_{i=1,2} \sum_{n}^{N} \left(\beta_{16,n,i} ER_{i,j,t} * X_{n,t} + \beta_{17,n,i} ER_{i,j,t} * X_{n,t} * macro_{j,t}\right)$$

$$+\alpha_j + \mu_a + \varepsilon_{j,t} \quad (5)$$

I examine the interaction between the dummy variable $pos\ MS_t$ (equal to one, if the monetary surprise of the respective FOMC meeting is >0, and zero otherwise) and dummy variables describing the exchange rate regime as well as macro fundamentals that proxy the cost of mimicking the unexpected policy rate increase from the domestic policy makers' perspective.[23] To capture the differences between the exchange rate regimes, I use the three dummy variables $peg_{j,t}$, $managed\ float_{j,t}$ and $freely\ falling_{j,t}$. $Peg_{j,t}$ indicates a peg regime to the US dollar (equal to one if the Ilzetzki et al., 2017, exchange rate classification is equal to 1 or 2 and the US dollar is the anchor currency according to the Ilzetzki et al., 2017, anchor currency classification, and zero otherwise).[24] $managed\ float_{j,t}$ indicates a country that implements a managed float regime (equal to one if the Ilzetzki et al., 2017, classification is equal to 3, and zero otherwise). $Freely\ falling_{j,t}$ captures the residual category of freely falling exchange rate regimes (Ilzetzki et al., 2017, classification equal to 5). $Macro_{j,t}$ denotes the macro fundamental variable tested in the respective specification. $\sum_n^N X_{n,t}$ includes the same set of control variables as in the previous section. In the following, the marginal effects of $pos\ MS_t$ for regimes pegged to the US dollar over the 10th to 90th percentiles of the respective macro fundamental variable resulting from these interaction models are discussed.[25] Figure 1 to Figure 5 illustrate the marginal effects and their 90% confidence

[23] The mean of US monetary surprises for FOMC meetings with positive monetary surprises is approximately 0.03%.

[24] Observations for Denmark, Ireland, Italy, Sweden and Switzerland are classified as pegs in the Ilzetzki et al. (2017) classification, but they peg to the euro instead of the US dollar.

[25] The coefficients of the respective interactions are not reported due to limitations with respect to space. However, there are available upon request.

intervals. The gray shaded areas highlight significance at the 10% level. Table A3 in the appendix provides descriptive statistics over the respective macro fundamentals.

<INSERT FIGURE 1 ABOUT HERE>

I test the predictions of standard currency crises models of interest rate defence and study the interactions with macro variables that proxy the cost of mimicking the unexpected US policy rate increase from a domestic policy maker’s perspective. There is common agreement in the currency crisis literature that raising the domestic policy rate in order to defend a peg regime leads to significant output costs (e.g. Eichengreen & Wyplosz, 1993; Lahiri & Végh, 2007). As consequence, one would expect domestic policy makers to be more reluctant to raise the domestic interest rate if current growth was low already. To test this, I interact with relative real GDP growth, which I define as the real GDP growth in the respective country relative to the country’s average real GDP growth over the previous ten years. I opt to use this approach to account for country-specific growth characteristics.

Figure 1 illustrates the marginal effects of a positive monetary surprise for peg regimes over the ratio of current real GDP growth to historical real GDP growth. In line with standard currency crises models of interest rate defence, the effects are stronger (i.e., the impact on abnormal ADR returns is more negative), the lower the current economic growth in the respective country relative to the country’s growth performance over the previous ten years. If the current real GDP growth is well below the average growth over the past ten years, a positive US monetary surprise leads to significantly lower abnormal ADR returns for countries with currencies pegged to the US dollar. Investors anticipate that the domestic government will be reluctant to mimic the policy rate increase by the FED to avoid further dampening of the economic growth and therefore price a higher peg breakdown probability in ADRs, leading to negative abnormal ADR returns. At the same time, there are no significant effects if current real GDP growth is above the historic average.

A second important macro variable that proxies the cost of maintaining a currency peg using an interest rate defence is the fiscal balance. If the government currently runs a fiscal deficit, the government perceives high cost of defending the currency peg since raising the domestic policy rate would further worsen the financial situation of the government due to the increase in the borrowing cost (e.g. Lahiri & Végh, 2003; Flood & Jeanne, 2005; Lahiri & Végh, 2007). To test this, I study the interaction with the fiscal balance (relative to nominal GDP). The marginal effects of this interaction model, which are depicted in Figure 2, support this hypothesis. There are significant negative abnormal returns for ADRs from countries with governments that currently run fiscal deficits, while there are no significant effects for countries with governments currently running fiscal surpluses. Additionally, the size of the effect increases strongly with the magnitude of the fiscal deficit.[26] For countries where the cost of maintaining the peg regime is high as characterized by a high fiscal deficit, positive US monetary surprises lead to lower abnormal ADR returns of approximately 69.50 basis points.

<INSERT FIGURE 2 ABOUT HERE>

Third, I interact with the sovereign yield spread of the respective country relative to the US. A higher sovereign yield spread indicates higher sovereign risk and higher refinancing cost of the government. Flood & Jeanne (2005) state that interest rate defences of currency pegs can only be successful if the level of public debt is not too high and the fiscal situation is sustainable. As Figure 3 illustrates, a positive US monetary surprise results in a significantly higher peg breakdown probability (proxied by negative abnormal ADR returns) if the

[26] First-generation currency crises models provide an alternative explanation for this finding. According to these models, the fiscal balance serves as a proxy for the overall stability of the peg regime. Persistent deficits of the domestic government are inconsistent with a peg regime if the domestic central bank refinances the fiscal deficit.

sovereign yield spread is equal to or above 4%. The effects are larger, the higher the sovereign yield spread. One potential explanation is that a higher sovereign yield spread reflects the higher refinancing cost of the government. If the refinancing cost of the government is high (and the government currently runs a fiscal deficit as seen before), domestic policy makers will be resilient to allow for increases in the domestic policy rate, which would further increase the refinancing cost. Additionally, a higher sovereign spread proxies higher sovereign default risk and, therefore, a higher incentive to abandon the peg regime. Without the currency pegged to the US dollar, the country would be able to conduct monetary policy independently from the US and implement expansionary monetary policy, thereby reducing the real burden of public debt and avoiding default on its public debt. Again, the effects are also economically significant: for countries with a high sovereign yield (indicating high cost of maintaining the peg regime), positive US monetary surprises lead to lower abnormal ADR returns of approximately 52.28 basis points.

<INSERT FIGURE 3 ABOUT HERE>

Next, I study the impact of the soundness of the domestic banking system on the stability of regimes pegged to the US dollar. Policy makers take the health of the domestic banking system into consideration when deciding on policy rate changes (e.g., Eichler et al., 2018). Raising the domestic policy rate might result in high economic cost if this leads to the further deterioration of a banking system that is already weak (Lahiri & Végh, 2007). Therefore, domestic policy makers will be reluctant to increase the domestic policy rate if the current state of the domestic banking system is fragile. I proxy banking sector stability by the US dollar returns of the respective country's banking index over the past 250 trading days. Figure 4 illustrates the results of this triple interaction model. The more fragile the current state of the domestic banking sector (proxied by negative past returns of the domestic banking index), the more negative are abnormal ADR returns for peg regimes following positive monetary surprises.

<INSERT FIGURE 4 ABOUT HERE>

Finally, I study the role of central bank independence. Up to now, domestic policy makers and the domestic central banks were assumed as one entity. In reality, however, most countries implement independent central banks to pursue monetary policy. A less independent central bank is more likely to give in to political pressure by domestic policy makers. Therefore, it might be more reluctant to mimic unexpected policy rate increases by the FOMC to guarantee the stability of the peg regime. I test this relation empirically by using data on de jure central bank independence provided by Gariga (2016). Figure 5 shows that the impact of a positive monetary surprise on abnormal ADR returns is significant only for relatively dependent central banks (scoring a central bank independence level below or equal to 0.67) and decreasing in the level of independence, while it is insignificant for countries with relatively independent central banks. This finding supports the notion that investors expect dependent central banks to be more prone to surrender to political pressure from domestic policy makers to not mimic policy rate decisions by the FOMC to stabilize the peg arrangement. This also yields a valuable message to policy makers. Increasing central bank independence can provide a powerful tool to enhance the stability of currency peg regimes.

<INSERT FIGURE 5 ABOUT HERE>

4.2 Case study: Argentina in the pre-*corralito* period from 2000 to 2001

The economic literature has extensively studied the capital control period in Argentina from December 2001 to December 2002 (e.g., Melvin, 2003; Kadiyala & Kadiyala, 2004; Auguste et al., 2006; Eichler et al., 2009). Restrictions on capital mobility made significant and persistent deviations of ADR prices from the law of one price possible. Melvin (2003) and Auguste et al. (2006) attribute the relative premia on underlying stocks (discounts on the corresponding ADRs) to capital control circumvention premia. In their logic, Argentinians were willing to pay a premium on Argentinean stocks, which they could convert into ADRs and then cash against US dollar, a legal way to circumvent the capital controls introduced under the *corralito*. In contrast, Kadiyala & Kadiyala (2004) and Eichler et al. (2009) attribute the relative discounts of Argentinean ADRs to the depreciation expectations of the Argentinean peso against the US dollar.

These papers are limited by their nature to the period when capital controls were implemented because significant relative price spreads between ADRs and their underlying stocks can only emerge and persist if arbitrage possibilities are limited. I add to the discussion of the Argentinean crisis by studying the period from January 1st, 2000 to December 3rd, 2001, which was prior to the introduction of capital controls. I argue that at that time, investors already perceived a significant probability that the peg of the Argentinean peso to the US dollar at parity would breakdown. To support this hypothesis, I apply the method introduced in the previous section to that period and analyze the abnormal returns of Argentinean ADRs around FOMC meetings during that time. As long as restrictions on capital mobility are absent, following interest parity, the Argentinean central bank must mimic all policy rate changes by the FED to support the peg to the US dollar. If the cost of supporting a peg outweighs the potential benefits, rational policy makers will opt to abandon the peg regime and let the currency float (which would result in a (sharp) devaluation against the US dollar). Given that the Argentinean economy had already been facing a severe economic downturn since 1999, policy makers might have been especially reluctant to mimic policy rate increases by the FED since this would deepen the ongoing recession. Therefore, I hypothesize that unexpected policy rate increases by the FOMC led to a higher expected breakdown probability of the peg regime of the Argentinean peso to the US dollar. As investors consider this when pricing ADRs, I expect to observe significant negative abnormal ADR returns following FED decisions to raise its policy rate surprisingly.

There were 14 regular FOMC meetings between January 1st, 2000 and December 3rd, 2001 (excluding the unscheduled meeting following 9/11). Six meetings were associated with positive monetary surprises, six with negative monetary surprises and two with no monetary surprises. Figure 6 indicates a negative relation between US monetary surprises on FOMC meeting days and the average abnormal returns of all Argentinean ADRs in my sample over the above-mentioned period.

<INSERT FIGURE 6 ABOUT HERE>

Similar to the previous analysis, I investigate the impact of positive US monetary surprises on abnormal returns of five Argentinean ADRs between January 1st, 2000 and December 3rd, 2001 by estimating the following regression equation: [27]

$$AR_{i,t}^{ADR} = \beta_1 pos\, MS_t + \sum_l^L \beta_l X_{l,t} + \alpha_i + \varepsilon_{i,t} \quad (6)$$

Again, $pos\, MS_t$ is a dummy variable equal to one for FOMC meeting days with positive US monetary surprises, and zero otherwise (FOMC meeting days with no/negative monetary surprises and days without FOMC meetings). I include the same control variables as before and additionally introduce ADR-underlying pair fixed effects (α_i). Table 6 summarizes the results. Positive US monetary surprise on FOMC meeting days significantly reduce abnormal returns of Argentinean ADRs. Unexpected policy rate increases in the US thus led to a higher expected breakdown probability of the peg regime of the Argentinean peso to the US dollar. The results are also economically significant. On average, Argentinean ADRs exhibited abnormal returns significantly lower

[27] The empirical approach here differs slightly from the previous section. In the previous section, where I study a panel of different countries over different FOMC meetings, one observation corresponded to the average of all ADRs from the respective country for the respective meeting. Since now I study only Argentina, there is one observation for each Argentinean ADR for each trading day over the sample period to control for ADR-underlying pair specific effects.

by 34.27 to 55.62 basis points on FOMC meeting days with positive monetary surprises.[28]

<INSERT TABLE 6 ABOUT HERE>

Finally, I ensure that the results described above are specific to Argentina and are not driven by specific characteristics of the period I investigate. Therefore, I estimate the same equation again for countries with floating exchange rates in my sample as a placebo test. There is no statistically significant impact of positive monetary surprises on abnormal ADR returns for countries with freely floating exchange rates for this period. The results of this placebo test are available upon request.

5. Conclusion

I study the impact of US monetary policy on managed exchange rates by analyzing the pricing of American Depositary Receipts around FOMC meetings. For a sample of 249 level II and level III ADRs from 33 countries over the period from 1996 to 2016 (covering 168 FOMC meetings), I identify a significant negative impact of US monetary surprises on abnormal ADR returns for countries with managed exchange rates. I interpret my findings as an indication of changes in the fundamental value of the currency underlying the respective ADR in the spirit of Kadiyala & Kadiyala (2004) and Eichler et al. (2009) due to the US monetary surprise.

I apply my empirical method to test the predictions of standard currency crises models of interest rate defence with respect to the stability of currency

[28] The literature on the Argentinean crisis in 2000/2001 also provides an alternative explanation for this finding. The unexpected policy rate decisions by the FED might also have increased the expected probability of the introduction of capital controls in Argentina as the crisis worsened. This would also materialize into negative abnormal ADR returns if domestic investors were willing to pay a higher capital control circumvention premium. Empirically, those two theoretical explanations for the negative relation between monetary surprises and abnormal ADR returns cannot be distinguished. Also, my findings might result from a combination of these two effects. However, both would indicate significant externalities of US monetary policy on an emerging market economy that currently faces severe economic problems and chose to peg its currency against the US dollar.

pegs vis-à-vis the US dollar. Using triple interaction models, I find that negative abnormal ADR returns following positive monetary surprises in the US are particularly low for peg regimes with weak real GDP growth, high fiscal deficits, high sovereign yield spreads, a weak domestic banking system and low independence of the domestic central bank. These results indicate that investors perceive a low willingness of the domestic policy maker to defend these currency pegs due to high costs of increasing the domestic policy rate. Finally, I present evidence from the Argentinean crisis in 2000/2001 prior to the introduction of capital controls, when positive monetary surprises on FOMC meeting days resulted in significant negative abnormal returns of Argentinean ADRs. I interpret this finding as evidence of a higher expected breakdown probability of the peg of the Argentinean peso to the US dollar as the ongoing recession in Argentina made the domestic central bank resilient to mimic the unexpected increases in the FED Funds rate. My methodology might provide a valuable tool to policy makers eager to monitor investors’ assessment of currency peg stability and the cost of defending a currency peg.

Table 1: The impact of US monetary surprises on abnormal ADR returns: The role of the exchange rate regime

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
monetary surprise	1.4817	0.8513	0.9333	0.9273	0.8727	0.8504
	(0.8809)	(0.6304)	(0.6478)	(0.6461)	(0.6020)	(0.5962)
managed regime	-0.0015	-0.0013	-0.0013	-0.0013	-0.0013	-0.0010
	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0011)
monetary surprise x managed regime	-3.6369***	-3.0250***	-2.8963***	-2.8760***	-2.7365**	-2.6828**
	(1.2747)	(1.0474)	(1.0266)	(1.0208)	(1.0193)	(1.0266)
return US market		0.1622***	0.1150*	0.1146*	0.1130*	0.1106*
		(0.0586)	(0.0597)	(0.0596)	(0.0605)	(0.0611)
return US market x managed regime		0.0534	0.0303	0.0296	0.0305	0.0312
		(0.0869)	(0.0830)	(0.0829)	(0.0833)	(0.0839)
return local market		-0.1486***	-0.1505***	-0.1501***	-0.1497***	-0.1484***
		(0.0529)	(0.0541)	(0.0538)	(0.0535)	(0.0528)
return local market x managed regime		-0.0186	-0.0185	-0.0187	-0.0218	-0.0220
		(0.0630)	(0.0639)	(0.0637)	(0.0626)	(0.0622)
Δ VIX			-0.0005	-0.0005	-0.0005	-0.0005
			(0.0003)	(0.0003)	(0.0003)	(0.0003)
Δ VIX x managed regime			-0.0002	-0.0002	-0.0002	-0.0002
			(0.0004)	(0.0004)	(0.0004)	(0.0004)
Δ CAPM beta				0.0007	0.0007	0.0006
				(0.0024)	(0.0024)	(0.0024)
Δ CAPM beta x managed regime				0.0017	0.0016	0.0014
				(0.0027)	(0.0027)	(0.0027)
Δ sovereign yield					0.1156	0.1308
					(0.3448)	(0.3482)
Δ sovereign yield x managed regime					-0.3591	-0.3794
					(0.4088)	(0.4120)
Δ interest rate MM					0.0446	0.0414
					(0.0867)	(0.0821)
Δ interest rate MM x managed regime					-0.0399	-0.0372
					(0.0961)	(0.0912)
Δ bid-ask ADR						0.0033***
						(0.0003)
Δ bid-ask ADR x managed regime						-0.0016
						(0.0031)
Δ bid-ask UND						0.0089
						(0.0058)
Δ bid-ask UND x managed regime						-0.0209
						(0.0378)
Δ idiosyncratic risk						0.0368
						(0.5678)
Δ idiosyncratic risk x managed regime						0.3717
						(0.7232)
Constant	-0.0007	-0.0005	-0.0007	-0.0007	-0.0007	-0.0010
	(0.0022)	(0.0021)	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Observations	3,939	3,939	3,939	3,939	3,939	3,939
Number of countries	33	33	33	33	33	33
R^2	0.02	0.09	0.09	0.09	0.10	0.10
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

The results are obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on the US monetary surprise, a dummy for managed exchange rate regimes, the interaction between the two, a set of control variables, their interactions with the managed regime dummy as well as country and year fixed effects (as described in eq. (4)). Robust standard errors are reported in parentheses.

Table 2: The impact of US monetary surprises on abnormal ADR returns: Marginal effects for managed vs. freely floating exchange rate regimes

	(1)		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**	
	managed	other	managed	other	managed	other	managed	other	managed	other	managed	other
monetary surprise	-2.1551**	1.4817*	-2.1737**	0.8513	-1.9631**	0.9333	-1.9487**	0.9273	-1.8638**	0.8727	-1.8325**	0.8504
	(1.0406)	(0.8809)	(0.9193)	(0.6304)	(0.8806)	(0.6478)	(0.8774)	(0.6461)	(0.8959)	(0.6020)	(0.9065)	(0.5962)
return US market			0.2156***	0.1622***	0.1453***	0.1150*	0.1442**	0.1146*	0.1436**	0.1130*	0.1417**	0.1106*
			(0.0648)	(0.0586)	(0.0564)	(0.0597)	(0.0562)	(0.0596)	(0.0561)	(0.0605)	(0.0560)	(0.0611)
return local market			-0.1672***	-0.1486***	-0.1691***	-0.1505***	-0.1688***	-0.1505***	-0.1715***	-0.1497***	-0.1704***	-0.1484***
			(0.0372)	(0.0529)	(0.0373)	(0.0541)	(0.0374)	(0.0541)	(0.0362)	(0.0535)	(0.0361)	(0.0528)
Δ VIX					-0.0006***	-0.0005	-0.0006***	-0.0005	-0.0007***	-0.0005	-0.0007***	-0.0005
					(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)
Δ CAPM beta							0.0023	(0.0024)	0.0022	0.0007	0.0021	0.0006
							(0.0020)	0.0023	(0.0020)	(0.0024)	(0.0019)	(0.0024)
Δ sovereign yield									-0.2435*	0.1156	-0.2486*	0.1308
									(0.1413)	(0.3448)	(0.1412)	(0.3482)
Δ interest rate MM									0.0047	0.0446	0.0041	0.0414
									(0.0199)	(0.0867)	(0.0191)	(0.0821)
Δ bid-ask ADR											0.0018	0.0033***
											(0.0031)	(0.0003)
Δ bid-ask UND											-0.0120	0.0089
											(0.0366)	(0.0058)
Δ idiosyncratic risk											0.4085	0.0368
											(0.3901)	(0.5678)
Observations	2,175	1,764	2,175	1,764	2,175	1,764	2,175	1,764	2,175	1,764	2,175	1,764
Number of countries	23	18	23	18	23	18	23	18	23	18	23	18

Marginal effects for managed and freely floating exchange rate regimes obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on the US monetary surprise, a dummy for managed exchange rate regimes, the interaction between the two, a set of control variables, their interactions with the managed regime dummy as well as country and year fixed effects (as described in eq. (4)). Robust standard errors are reported in parentheses.

Table 3: The impact of US monetary surprises on abnormal ADR returns: Standardized marginal effects for managed vs. freely floating exchange rate regimes

	(6)	
	managed	other
monetary surprise	-6.22**	2.89
return US market	18.94**	14.78*
return local market	-32.35***	-28.17***
Δ VIX	-13.84***	-9.88
Δ CAPM beta	2.33	0.67
Δ sovereign yield	-3.11*	1.64
Δ interest rate MM	0.28	2.85
Δ bid-ask ADR	3.11	5.71***
Δ bid-ask UND	-1.52	1.13
Δ idiosyncratic risk	3.99	0.36
Observations	2,175	1,764
Number of countries	23	18

Marginal effects from specification (6) (Table 2) multiplied with the standard deviation of the respective variable.

Table 4: The impact of US monetary surprises on abnormal ADR returns: Robustness check controlling for deviations from the loop and rel. GDP per capita

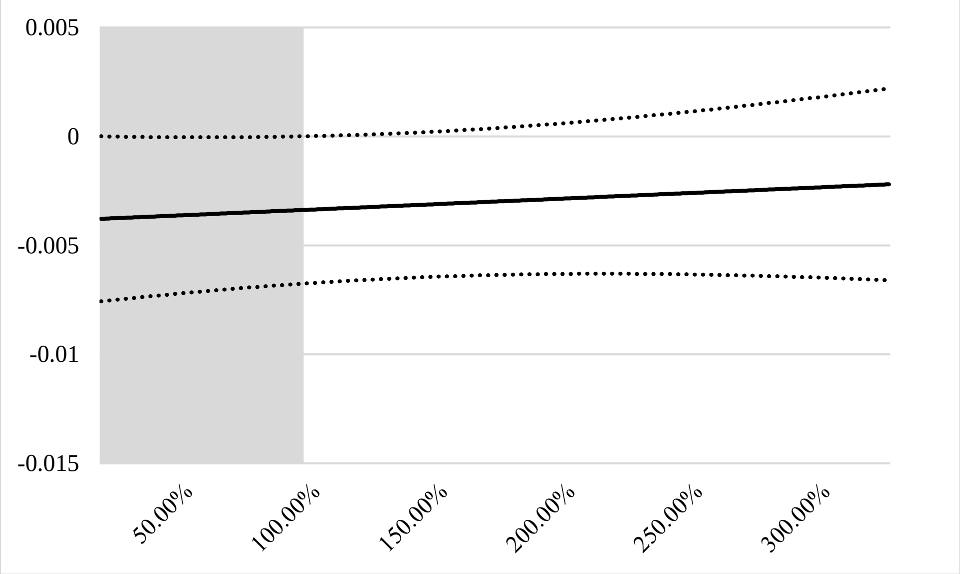
	(7)		**(8)**
monetary surprise	0.6204	monetary surprise	-1.4742
	(0.5185)		(1.1507)
managed regime	-0.0000	managed regime	-0.0010
	(0.0008)		(0.0012)
deviation loop	-0.0077	rel. GDP per capita	0.0073
	(0.0057)		(0.0055)
monetary surprise x managed regime	-1.7880**	monetary surprise x managed regime	-1.5623*
	(0.8425)		(0.7700)
monetary surprise x deviation loop	-12.3733***	monetary surprise x rel. GDP per capita	2.8280**
	(2.8518)		(1.1569)
return US market	0.1023	return US market	0.1566*
	(0.0653)		(0.0812)
return US market x managed regime	0.0138	return US market x managed regime	-0.0013
	(0.0823)		(0.0806)
return US market x deviation loop	1.6433***	return US market x rel. GDP per capita	-0.0546
	(0.2676)		(0.0704)
return local market	-0.1467**	return local market	-0.2260***
	(0.0547)		(0.0687)
return local market x managed regime	-0.0068	return local market x managed regime	0.0138
	(0.0593)		(0.0600)
return local market x deviation loop	0.0025	return local market x rel. GDP per capita	0.0963
	(0.2951)		(0.0646)
Δ VIX	-0.0004	Δ VIX	-0.0007
	(0.0004)		(0.0005)
Δ VIX x managed regime	-0.0000	Δ VIX x managed regime	-0.0001
	(0.0004)		(0.0004)
Δ VIX x deviation loop	-0.0043*	Δ VIX x rel. GDP per capita	0.0004
	(0.0025)		(0.0003)
Δ CAPM beta	0.0005	Δ CAPM beta	0.0007
	(0.0026)		(0.0060)
Δ CAPM beta x managed regime	0.0004	Δ CAPM beta x managed regime	0.0033
	(0.0028)		(0.0037)
Δ CAPM beta x deviation loop	0.0364*	Δ CAPM beta x rel. GDP per capita	-0.0023
	(0.0214)		(0.0060)
Δ sovereign yield	0.1801	Δ sovereign yield	0.5608
	(0.3681)		(0.7216)
Δ sovereign yield x managed regime	-0.3646	Δ sovereign yield x managed regime	-0.6334
	(0.4039)		(0.6278)
Δ sovereign yield x deviation loop	-1.7033	Δ sovereign yield x rel. GDP per capita	-0.7707
	(4.3659)		(0.8149)
Δ interest rate MM	0.0551	Δ interest rate MM	-0.0004
	(0.0784)		(0.0996)
Δ interest rate MM x managed regime	-0.0336	Δ interest rate MM x managed regime	-0.0147
	(0.0869)		(0.1043)
Δ interest rate MM x deviation loop	-0.7668**	Δ interest rate MM x rel. GDP per capita	0.1212
	(0.2887)		(0.1166)
Δ bid-ask ADR	0.0026***	Δ bid-ask ADR	0.0038**
	(0.0003)		(0.0017)
Δ bid-ask ADR x managed regime	-0.0028	Δ bid-ask ADR x managed regime	-0.0020
	(0.0022)		(0.0030)
Δ bid-ask ADR x deviation loop	0.0405***	Δ bid-ask ADR x rel. GDP per capita	-0.0031
	(0.0068)		(0.0100)
Δ bid-ask UND	-0.0086	Δ bid-ask UND	0.0746
	(0.0180)		(0.0500)
Δ bid-ask UND x managed regime	-0.0166	Δ bid-ask UND x managed regime	-0.0611
	(0.0423)		(0.0563)
Δ bid-ask UND x deviation loop	0.5959	Δ bid-ask UND x rel. GDP per capita	-0.1209
	(0.5620)		(0.0949)
Δ idiosyncratic risk	0.2874	Δ idiosyncratic risk	0.4627
	(0.5158)		(0.5969)
Δ idiosyncratic risk x managed regime	0.3945	Δ idiosyncratic risk x managed regime	0.1491
	(0.6748)		(0.6358)
Δ idiosyncratic risk x deviation loop	-9.0308***	Δ idiosyncratic risk x rel. GDP per capita	-0.4376
	(2.8181)		(0.4168)
Constant	-0.0011	Constant	-0.0054
	(0.0010)		(0.0046)
Observations	3,844	Observations	3,759
Number of countries	33	Number of countries	33
R^2	0.13	R^2	0.11
Country and Year FE	YES	Country FE	YES

Table 5: The impact of US monetary surprises on abnormal ADR returns: Marginal effects for managed and freely floating exchange rates for the robustness check, controlling for deviations from the loop and rel. GDP per capita

	(7)		**(8)**	
	managed	other	managed	other
monetary surprise	-1.3181*	0.4699	-1.2424*	0.3199
	(0.6968)	(0.5261)	(0.6775)	(0.6741)
return US market	0.1361***	0.1223*	0.1206**	0.1219*
	(0.0505)	(0.0659)	(0.0514)	(0.0645)
return local market	-0.1535***	-0.1467***	-0.1511***	-0.1649***
	(0.0291)	(0.0546)	(0.0332)	(0.0523)
Δ VIX	-0.0005***	-0.0005	-0.0006***	-0.0005
	(0.0002)	(0.0004)	(0.0002)	(0.0004)
Δ CAPM beta	0.0013	0.0010	0.0026	-0.0007
	(0.0018)	(0.0026)	(0.0020)	(0.0027)
Δ sovereign yield	-0.2052**	0.1594	-0.5615	0.0719
	(0.0978)	(0.3569)	(0.3928)	(0.3470)
Δ interest rate MM	0.0122	0.0458	0.0618	0.0765
	(0.0208)	(0.0803)	(0.0622)	(0.0971)
Δ bid-ask ADR	0.0003	0.0031***	-0.0001	0.0019
	(0.0021)	(0.0003)	(0.0053)	(0.0047)
Δ bid-ask UND	-0.0180	-0.0014	-0.0632	-0.0021
	(0.0380)	(0.0115)	(0.0631)	(0.0112)
Δ idiosyncratic risk	0.5720*	0.1775	0.3342	0.1851
	(0.3459)	(0.5144)	(0.3250)	(0.5246)
Observations	2,153	1,691	2,069	1,690
Number of countries	22	18	23	18

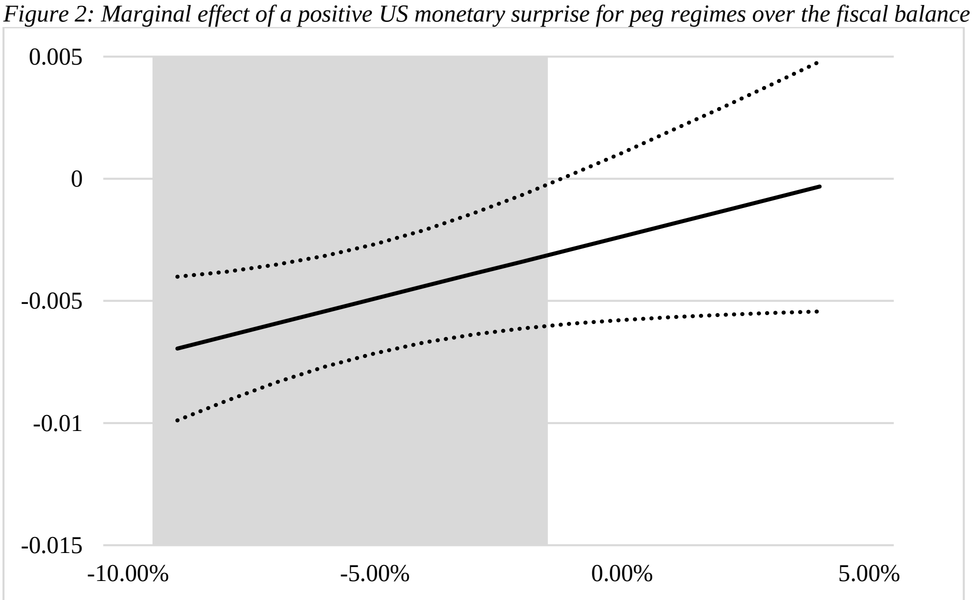
Marginal effects for managed and freely floating exchange rate regimes obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on the US monetary surprise, a dummy for managed exchange rate regimes, the interaction between the two, a set of control variables, their interactions with the managed regime dummy, the deviation from the loop (rel. GDP per capita) and their interactions as well as country and year fixed effects (as described in eq. (4)). Robust standard errors are reported in parentheses.

Figure 1: Marginal effect of a positive US monetary surprise for peg regimes over relative GDP growth



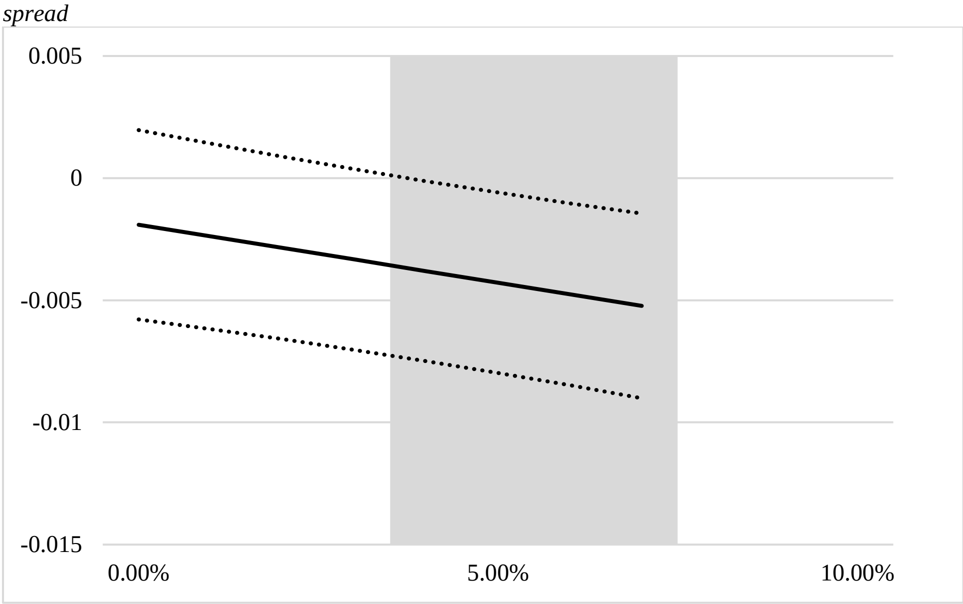
Marginal effects and 90% confidence intervals for peg regimes to the US dollar over the 10th to 90th percentiles of relative GDP growth obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on a positive monetary surprise dummy (equal to 1 if the US monetary surprise is >0, and zero otherwise), a dummy for peg regimes to the US dollar, relative GDP growth as well as their interactions and a set of control variables (as described in eq. (5)). The gray shaded areas highlight significance at the 10% level.

Figure 2: Marginal effect of a positive US monetary surprise for peg regimes over the fiscal balance



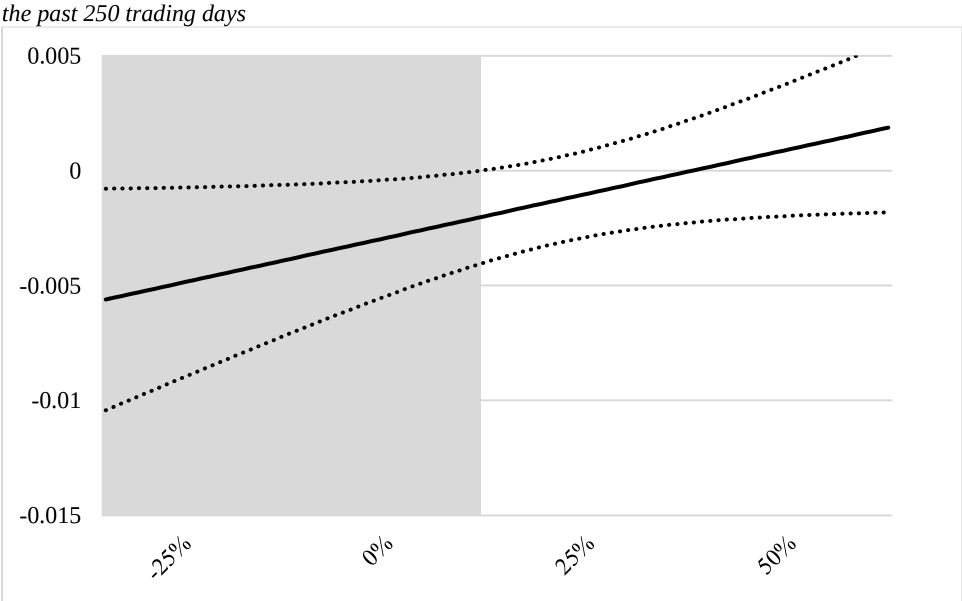
Marginal effects and 90% confidence intervals for peg regimes to the US dollar over the 10th to 90th percentiles of the fiscal balance (% of GDP) obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on a positive monetary surprise dummy (equal to 1 if the US monetary surprise is >0, and zero otherwise), a dummy for peg regimes to the US dollar, the fiscal balance as well as their interactions and a set of control variables (as described in eq. (5)). The gray shaded areas highlight significance at the 10% level.

Figure 3: Marginal effect of a positive US monetary surprise for peg regimes to the US dollar over the sovereign yield spread



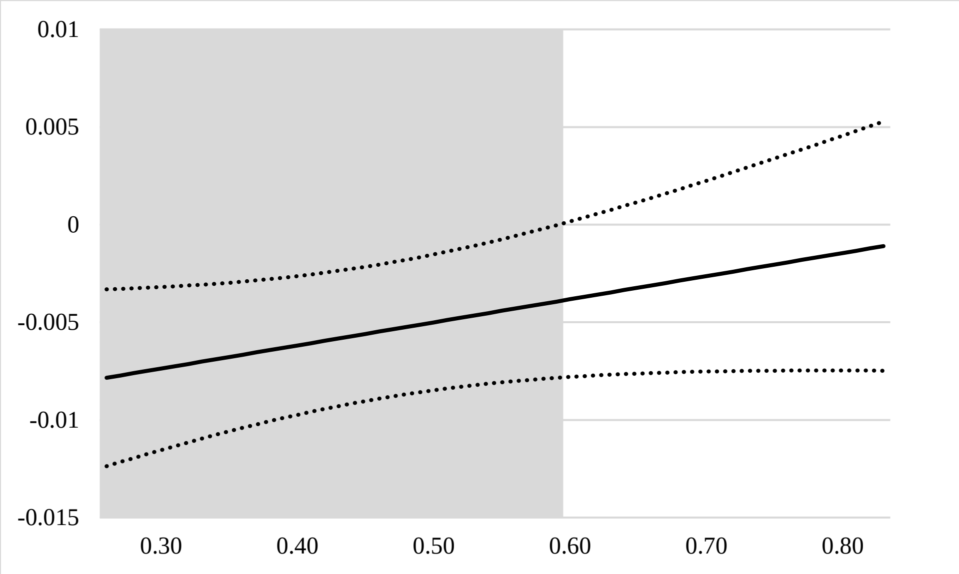
Marginal effects and 90% confidence intervals for peg regimes to the US dollar over the 10th to 90th percentiles of the sovereign yield spread obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on a positive monetary surprise dummy (equal to 1 if the US monetary surprise is >0, and zero otherwise), a dummy for peg regimes to the US dollar, sovereign yield spread as well as their interactions and a set of control variables (as described in eq. (5)). The gray shaded areas highlight significance at the 10% level.

Figure 4: Marginal effect of a positive US monetary surprise for peg regimes over the return of the domestic bank index over the past 250 trading days



Marginal effects and 90% confidence intervals for peg regimes to the US dollar over the 10th to 90th percentiles of the domestic bank index over past 250 trading days obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on a positive monetary surprise dummy (equal to 1 if the US monetary surprise is >0, and zero otherwise), a dummy for peg regimes to the US dollar, the domestic bank index over past 250 trading days as well as their interactions and a set of control variables (as described in eq. (5)). The gray shaded areas highlight significance at the 10% level.

Figure 5: Marginal effect of a positive US monetary surprise for peg regimes over central bank independence



Marginal effects and 90% confidence intervals for peg regimes to the US dollar over the 10th to 90th percentiles of the Gariga (2016) measure of central bank independence obtained by regressing the mean over all abnormal returns of all ADRs of the respective country for the respective FOMC meetings on a positive monetary surprise dummy (equal to 1 if the US monetary surprise is >0, and zero otherwise), a dummy for peg regimes to the US dollar, the Gariga (2016) measure of central bank independence as well as their interactions and a set of control variables (as described in eq. (5)). The gray shaded areas highlight significance at the 10% level.

Table 6: The impact of US monetary surprises on abnormal ADR returns: Evidence from Argentina January 1st, 2000 to December 3rd, 2001

	(10)	**(11)**
pos MS	-0.0056***	-0.0034*
	(0.0009)	(0.0015)
return US market		0.0598**
		(0.0204)
return local market		0.0070
		(0.0264)
Δ VIX		-0.0004***
		(0.0001)
Δ CAPM beta		0.0035
		(0.0032)
Δ sovereign yield		-0.2258*
		(0.0975)
Δ interest rate MM		-0.0028**
		(0.0007)
Δ bid-ask ADR		-0.0611
		(0.0752)
Δ bid-ask UND		0.0618*
		(0.0250)
Δ idiosyncratic risk		0.2739
		(0.6378)
Constant	-0.0000	0.0001*
	(0.0000)	(0.0001)
Observations	871	859
R^2	0.00	0.05
ADR-underlying pair FE	YES	YES

The results are obtained by regressing the abnormal returns of Argentinean ADRs on the US monetary surprise, a set of control variables as well as ADR-underlying fixed effects (as described in eq. (6)). Robust standard errors are reported in parentheses.

Figure 6: US monetary surprises on FOMC meeting days and average abnormal returns of Argentinean ADRs from January 1st, 2000 to December 3rd, 2001

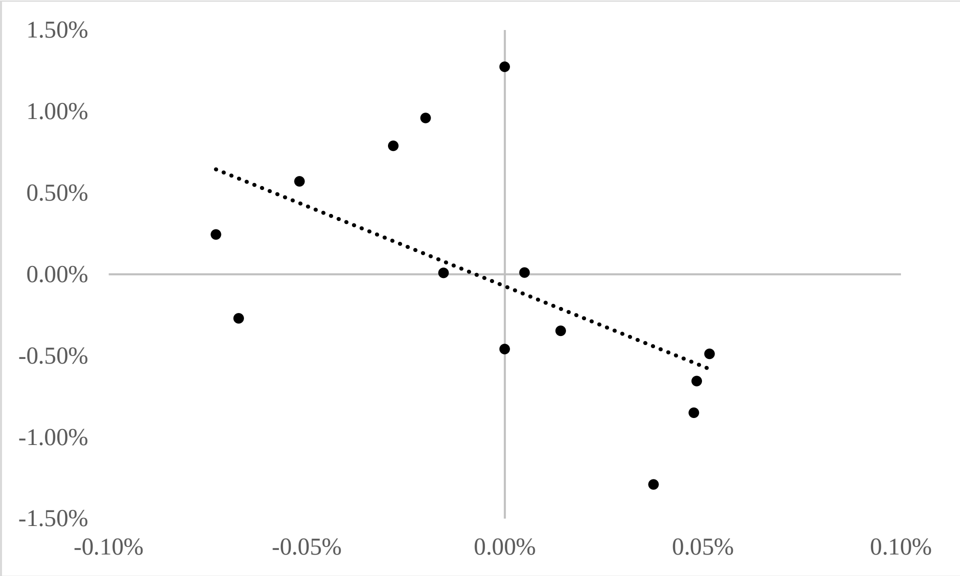


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Table A1: Description of variables and their sources

Variable	Variable Description	Frequency	Source
$\boldsymbol{AR^{ADR}}$ (%)	Mean of daily abnormal returns of all ADRs from the respective country for the respective FOMC meeting, calculated as described in eq. (3).	By meeting.	Thomson Reuters Tick History, own calculation.
monetary surprise (%)	US monetary surprise of the respective FOMC meeting calculated following the method by Kuttner (2001), derived from FED Funds Futures.	By meeting.	DATASTREAM, own calculation.
managed regime (dummy)	Dummy equal to one if the Ilzetzki et al. (2017) coarse exchange rate classification is equal to 1, 2 or 3, and zero otherwise.	Monthly.	Ilzetzki et al. (2017)
return US market (%)	Log daily return of the S&P 500.	By meeting.	Thomson Reuters Tick History
return local market (%)	Log daily US dollar return of the local stock market of the respective country.	By meeting.	Thomson Reuters Tick History
Δ VIX	Daily change in the VIX index.	By meeting.	Thomson Reuters Tick History
Δ CAPM beta	Daily change in the CAPM beta of the US dollar returns of the local stock index of the respective country with respect to the US market, calculated using a rolling regressions framework of 30 trading days.	By meeting.	Thomson Reuters Tick History, own calculation.
Δ sovereign yield (%)	Daily change in the sovereign yield of the respective country.	By meeting.	DATASTREAM
Δ interest rate MM (%)	Daily change in the money market interest rate of the respective country.	By meeting.	DATASTREAM
Δ bid-ask ADR (%)	Mean of daily changes in the bid-ask spread of all ADRs from the respective country for the respective FOMC meeting.	By meeting.	Thomson Reuters Tick History
Δ bid-ask UND (%)	Mean of daily changes in the bid-ask spread of all underlying stocks from the respective country for the respective FOMC meeting.	By meeting.	Thomson Reuters Tick History
Δ idiosyncratic risk (%)	Mean of daily changes in idiosyncratic risk of all ADRs from the respective country for the respective FOMC meeting. ADR-specific idiosyncratic risk is calculated following Gagnon & Karolyi (2010) as the standard deviation of the residuals from regressing the difference between US dollar returns of the ADR and its underlying stock on contemporaneous and one day lagged and leading values of the US stock market, the respective domestic stock market and the change in the EUR/USD exchange rate using a rolling window of 30 trading days, see eq. (1) in Gagnon & Karolyi (2010).	By meeting.	Thomson Reuters Tick History, own calculation.
deviation loop (%)	Mean by country and year of the daily minimum values of the absolute deviation from the law of one price of all ADRs from the respective country.	Annually.	Own calculation.
rel. GDP per capita (%)	GDP per capita in constant US dollars of the respective country relative to US GDP per capita.	Annually.	WDI (indicator code "NY.GDP.PCAP.KD"), own calculation.

Table A1: Description of variables and their sources (continued)

Variable	Variable Description	Frequency	Source
pos MS (dummy)	Dummy variable equal to one if the US monetary surprise of the respective meeting is >0, and zero otherwise.	By meeting.	DATASTREAM, own calculation.
peg	Dummy variable equal to one if the Ilzetzki et al. (2017) coarse exchange rate classification is equal to 1 or 2 and the Ilzetzki et al. (2017) anchor currency classification is equal to "USD", and zero otherwise.	Monthly.	Ilzetzki et al. (2017)
managed float	Dummy variable equal to one if the Ilzetzki et al. (2017) coarse exchange rate classification is equal to 3, and zero otherwise.	Monthly.	Ilzetzki et al. (2017)
freely falling	Dummy variable equal to one if the Ilzetzki et al. (2017) coarse exchange rate classification is equal to 5, and zero otherwise.	Monthly.	Ilzetzki et al. (2017)
rel. GDP growth	Real GDP growth in the respective country relative to the country's average real GDP growth over the previous ten years.	Annually.	WDI (indicator code "NY.GDP.MKTP.KD.ZG"), own calculation.
fiscal balance (% of GDP)	Government net lending relative to GDP.	Annually.	WEO (indicator code "GGXCNL_NGDP").
sovereign yield spread (%)	Sovereign yield of the respective country (based on the JPM GBI/EMBI or comparable indices) relative to the JPM GBI US.	By meeting.	DATASTREAM
return bank 250d (%)	US dollar return of the banking index of the respective country over the past 250 trading days.	By meeting.	DATASTREAM, own calculation.
central bank independence	Gariga (2016) measure of de jure central bank independence.	Annually.	Gariga (2016)

Table A2: Descriptive statistics over all countries and FOMC meetings

Variable	Mean	Standard deviation	10%	90%
$\boldsymbol{AR^{ADR}}$	-0.07%	0.97%	-1.09%	0.85%
monetary surprise	-0.00%	0.03%	-0.03%	0.02%
managed regime	0.55	0.50	0	1
return US market	0.04%	1.34%	-1.46%	1.46%
return local market	0.11%	1.90%	-2.02%	2.14%
Δ VIX	-0.35	1.98	-2.42	1.85
Δ CAPM beta	-0.01	0.11	-0.11	0.08
Δ sovereign yield	-0.01%	0.13%	-0.09%	0.07%
Δ interest rate MM	-0.01%	0.69%	-0.06%	0.03%
Δ bid-ask ADR	0.32%	17.30%	-0.22%	0.25%
Δ bid-ask UND	0.00%	1.27%	-0.22%	0.23%
Δ idiosyncratic risk	0.00%	0.10%	-0.06%	0.07%
deviation loop	1.22%	4.48%	0.03%	1.32%
rel. GDP per capita	63.44%	43.92%	6.46%	107.37%
peg	0.15	0.35	0	1
$\boldsymbol{ER_1}$	0.37	0.48	0	1
$\boldsymbol{ER_2}$	0.01	0.11	0	0

Figure A1: Histogram of abnormal ADR returns by country and FOMC meeting for managed vs. freely floating regimes

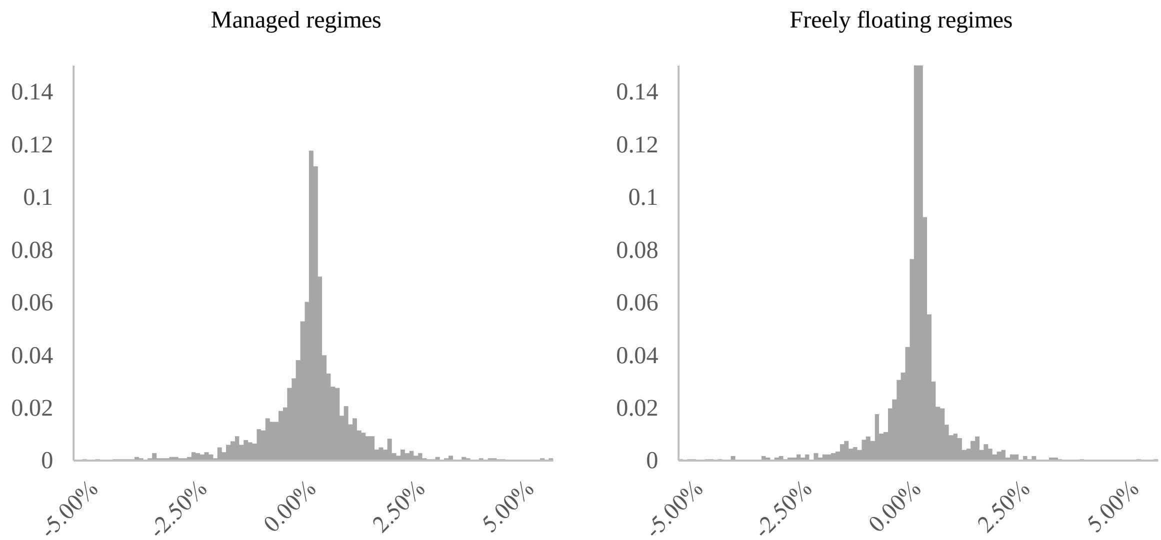

Figure A2: Histogram of US monetary surprises by FOMC meeting

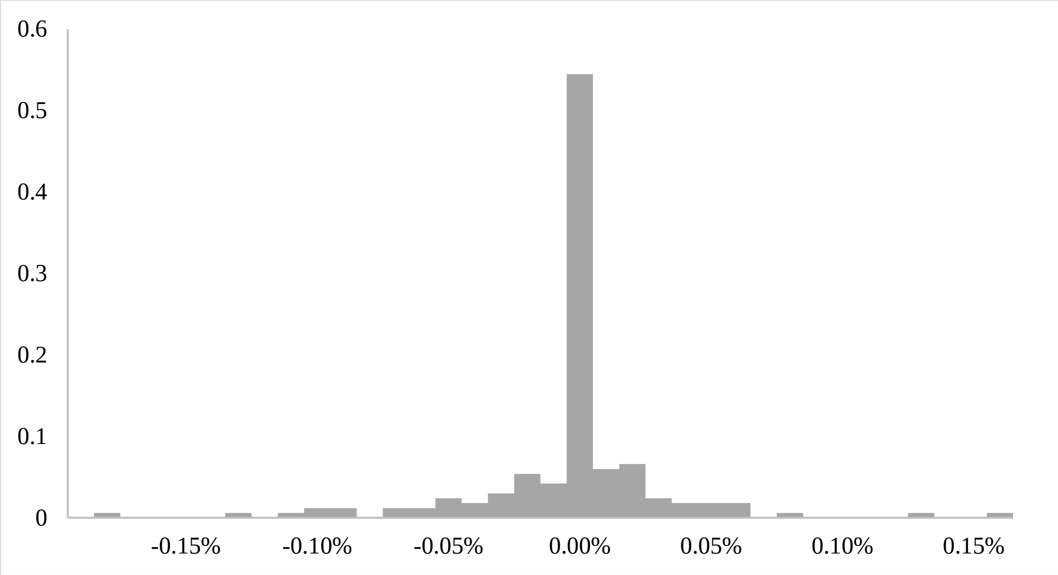

Table A3: Descriptive statistics for regimes pegged to the US dollar

Variable	**Mean**	**Standard deviation**	**10%**	**90%**
pos MS	0.29	0.45	0	1
rel. GDP growth	1.80	2.46	0.16	3.25
fiscal balance	-2.30%	4.40%	-8.98%	3.55%
sovereign yield spread	4.63%	8.36%	-0.21%	6.97%
return bank 250d	10.69%	38.66%	-35.49%	62.12%
central bank independence	0.57	0.23	0.26	0.83