Online Appendix: Monetary Policy and Exchange Rate Returns: Time-Varying Risk Regimes

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1 Variable Definitions and Data Sources

Table 6 shows summary statistics for the data series used in our analysis. These data series are described below.

1.1 Macro Data

We obtain our monthly CPI data also from the International Financial Statistics (IFS) data from the IMF, and supplement a few missing observations with data from national sources and from Eurostat. We obtain quarterly nominal GDP data in local currency terms from Oxford Economics, which is an aggregator of data collected from national sources. Missing observations are supplemented with data obtained directly from national sources or from the Organization of Economic Cooperation and Development. Nominal GDP data are converted into real terms using the IFS CPI series. Our cpiYOY (gdprYOY) variable is twelve-month (log) percent changes in the CPI index (real GDP). The exFed-CpiYOY (exFedGdprYOY) variable is cpiYOY (gdprYOY) averaged over the Eurozone, Japan, and the UK (big three ex-Fed). The left panel of Figure A6 shows the US and big three ex-Fed year-on-year CPI changes. The cpiYOYUS and gdprYOYUS are the US cpiYOY and gdprYOY series respectively.

Our foreign reserves data are available on a monthly basis from January 1996 from the IFS. This measures total reserve assets, excluding gold, in US dollars. Our reserves to GDP variable res_GDP is calculated by dividing foreign reserves by country-level nominal GDP, which is converted into US dollars using our spot exchange rate data (see below).

Net foreign assets as a percent of GDP series, nfa, is obtained from Lane and Milesi-Ferretti (2017) and covers the 1970–2015 period. From 2016 forward, we use the 2015 nfa levels since newer data are not available.

Our capital flows data are reported annually in US dollars in the IFS database (see Lane and Milesi-Ferretti 2017). Our capital flows measure is the net inflows to the private sector coming from the three portfolio investment series: debt to banks, debt to other sectors, and equity.

We use two ex-post variables to proxy for important monetary policy regime shifts. The inclusion of these variables in our forecasting regressions is to make the point that there was an important component of currency returns that was due to monetary policy choices, though these variables could not have been identified ex-ante. The first is QE which is an indicator variable for the time period of quantitative easing, from March 2008 up to an including December 2012, which is the range of events identified in Fawley and Neely (2013). This time period including January 2013 and later months is identified by the indicator variable postQE.

1.2 Market Data

We obtain spot exchange rates against the USD from the WM/Reuters FX (WMR) dataset from Datastream. For some missing data, we follow Burnside (2011) and compute an implied dollar exchange rate by using WMR's British pound (GBP) exchange rate for that currency, and then convert this into dollars using the GBP-USD exchange rate from WMR. For the remaining missing data, we use either Datastream's Thomson Reuters (DTR) or their Global Financial Data exchange rate series, in that order, when these are available. When spot data are missing we will forward from the most recent date, as long as it is within five days; otherwise the data are missing. When GFD data is monthly and labeled with a day after the last trading day of the month, we treat it as missing. The fwd filling is only for GFD data (3 series all prior to 1995).

We define a real exchange rate as the spot exchange rate (in dollars per foreign currency) multiplied by the foreign price level (CPI index) and divided by the US price level, i.e., $S_t P_t^* / P_t$, where P_t^* and P_t are the foreign and domestic consumption basket prices This has the interpretation of the number of foreign consumption baskets that can be bought with a single US consumption basket. Our real exchange rate series logRSpot, following Menkhoff et al. (2016), is calculated as the real exchange rate at the end of the current month, divided by the average real exchange rate in the year surrounding the current calendar month from five years ago. The logRSpotPos (logRSpotNeg) series is

equal to logRSpot when the latter is positive (negative) and is zero otherwise.

Our forward rates are one-month currency forwards obtained from the WMR database. For some currencies on some dates with missing dollar forward data, we use the implied dollar forward rate from the GBP forward converted into the dollar forward. For example, for Ukraine on some dates, we merge the WMR dollar forward rates with the non-deliverable forward rate from WMR. For dates where the WMR forward rate is not available, we fill in using data from either DTR, Barclays or TP. For any remaining missing data, we calculate an implied forward rate assuming covered interest rate parity (CIP) holds using the relationship $F_t = S_t \times (1 + y_t^{(mo)})/(1 + y_t^{(mo)*})$, where $y_t^{(mo)}$ ($y_t^{(mo)*}$) is the domestic (foreign) one-month riskless return (i.e., the annualized one-month rate divided by twelve). For the US $y_t^{(mo)}$ is one-month LIBOR divided by twelve, and the foreign one-month rate $y_t^{(mo)*}$ is typically the one-month interbank lending rate dividend by twelve, supplemented with other short-term interest rates if not available. For cases where both series exist, the CIP-implied and actual forward rates are almost identical (also see Figure A7).

Our carry variable is defined in equation (3), and is expressed in percent. Any country-month observation with annualized carry above 40%, i.e. $12 \times |carry_t| > 40\%$, is dropped as a bad data point. In some months Kenya's carry is identical to zero. These months are dropped from the sample. Our twelve-month exchange rate return series is defined in Section 2. For the ret12m series, unless we have three or fewer missing monthly observations, we treat the data as missing for that twelve-month period.

The one-month exchange rate volatility series vol1m is computed as the within month volatility of daily exchange rate changes, $100 \times S_{t+1}/S_t$ (within a month, we do not have currency return series which account for the interest rate differential). The twelve-month exchange rate volatility series vol12m is the average of vol1m if there are six or fewer missing monthly observations, and is missing otherwise. The VIX series is obtained from Bloomberg.

Our interest rate data are also obtained from Bloomberg. The series T-bill is the US three-month T-bill yield. In our exchange rate forecasting model, we would have preferred to include a one-month bill so that there is no confounding of forward-looking three-month expectations about future US interest rate changes with the Fed Prattle series (which is our forward-looking measure of U.S. monetary policy). However, a one-month series is not available for our entire time period. We find that the one-month and three-month series are almost identical, and given our one-year forecasting period and the lack of any close correspondence between Prattle and the short-term rate, we believe that the three-month

bill has little content for year-ahead prospective changes that may be forecasted by the Prattle measure.

The exFedRate series is the average short-term government bond yield for Germany (6 month), UK (1 year) and Japan (6 month), which are the shortest-term interest rates available. Figure A7 plots the foreign short-term interest rate implied in the one-month forward versus the short-term interest rate obtained from Bloomberg (for the set of overlapping countries). The right panel of Figure A6 plots the composite data series we created for exFedRate alongside T-bill (and the left side shows the composite CPI for the big three non-US central bank areas, esFedCpiYOY, against that of the US). Finally, we also track the US Treasury basis variable, treas_basis, of Jiang et al. (2018), which measures the average international violation of CIP against the dollar, which the authors interpret as a measure of the convenience yield of U.S. Treasuries (which reflects, inter alia, flight to quality to Treasuries during times of stress). This variable is defined as the Treasury yield minus the yield on a synthetic dollar bond constructed using currency forwards (buy foreign currency, invest at the foreign rate and sell using the forward), or

$$x_t^{Treas} = y_t - (y_t^* + f_t - s_t),$$

averaged across a basket of nine developed market currencies. Figure A8 shows the time-series of the Treasury and Libor (similarly defined, but in terms of interbank offered rates instead of Treasury yields) versions of this variable in the top panel, a time-series of Fed and CBexFed Prattle series in the middle panel, and a time-series of the US T-bill rate and exFedRate in the bottom panel for comparison.

In all cases where we have daily data, our monthly data point in a given month is the last available daily data point from that month. The exception to this is the vol1m series, as discussed above.

2 Out-of-Sample Estimates: Changing Uncertainty

In Figure A21, we consider whether and how changes in the structure of the exchange rate forecasting model over time, including during the global financial crisis and its aftermath of unconventional monetary policy, have been associated with variation in exchange rate return forecasting uncertainty. In Figure A21, we report the root mean squared errors (RMSEs) of the forecasts from the elastic net rolling forecasting regressions discussed in the main body of the paper. Alongside the RMSEs for the model we also report as a point

of reference the cross-sectional standard deviation of 12-month return forecast errors (like the RMSE, but with the cross-sectional mean removed). In Figure A21, we also report the part of the RMSEs that is attributable to the average error over time rather than the errors in cross-sectional exchange rate forecasts. The lower panel captures the errors related to the dollar factor (over- or under-forecasting the value of all currencies relative to the dollar). As Figure A21 shows, much of the RMSE and its changes over time are attributable to errors in forecasting the dollar factor.

Taylor (2018) argues that the influence of foreign interest rates on central bank reaction functions is evidence that central banks have been targeting exchange rates throughout our sample period, which he argues has prevented them from following rule-based flexible inflation targeting policy. From that perspective, the extreme rise in uncertainty about forecasting exchange rates during the global financial crisis years, which is visible in Figure A21, might be interpreted as a consequence of not having clearly defined rules in place. On the other hand, the rise in uncertainty may have been an unavoidable consequence of crisis measures that would have been used irrespective of whether rule-based flexible inflation targeting had been a feature of the pre-crisis environment.

The post-2009 period displays average RMSEs that are similar to the average RMSEs in the pre-2008 period. Thus, despite the evidence that central banks reacted to one another more in the later subperiod (Figure 6 in the main paper, Panels A and B), and despite the increasing importance of coefficients on Prattle scores for exchange rate returns during the later subperiod experience with unconventional monetary policy, it appears that their actions produced exchange rate forecasts using information about monetary policy that were not much different from the forecasts produces during the pre-crisis period.

References

Jiang, Z., A. Krishnamurthy, A., and H. Lustig, 2018, "Foreign safe asset demand and the dollar exchange rate," *working paper*.

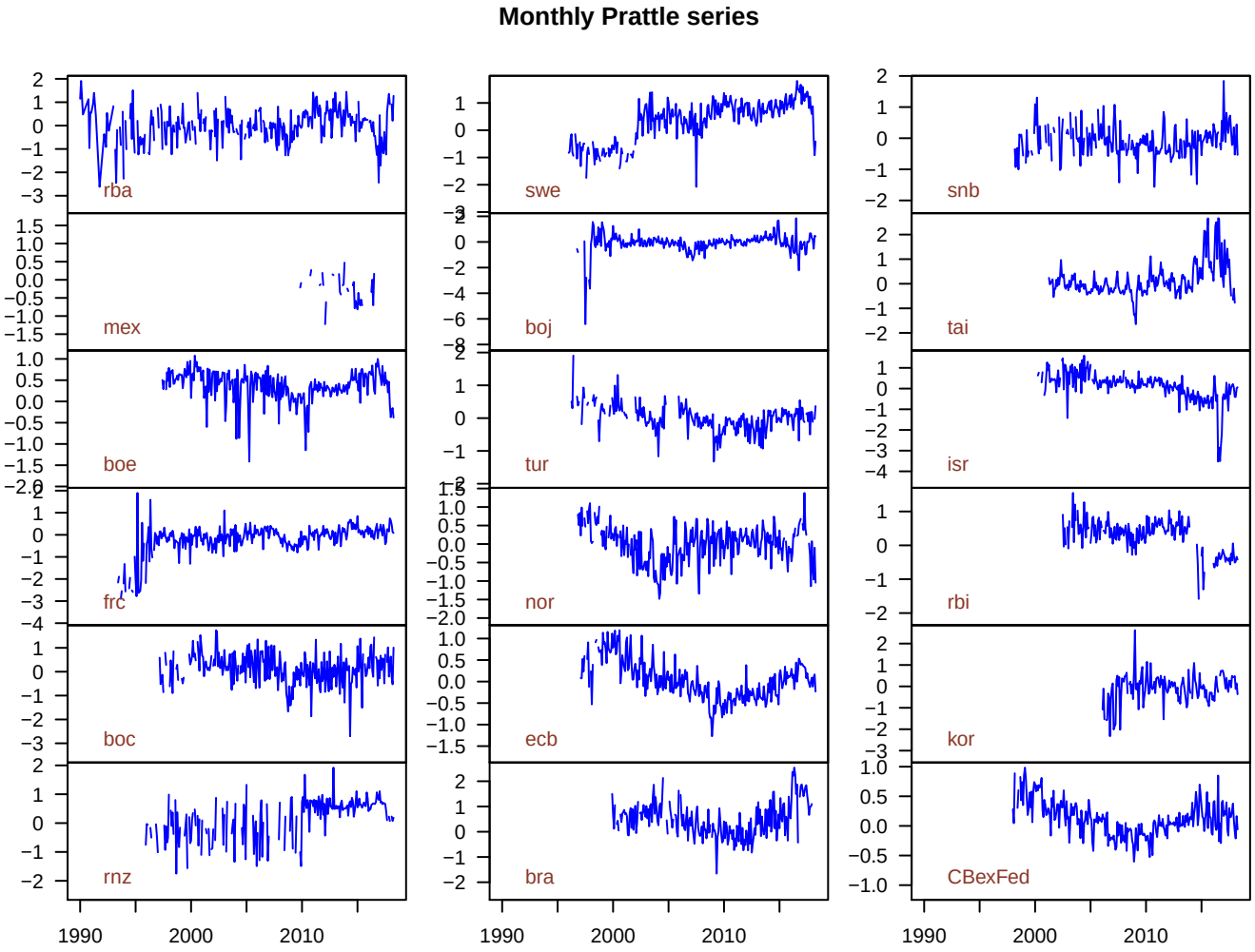


Figure A1: Monthly average Prattle scores. We select all data items from Prattle, except communication types labeled as "" (blank) and "Other Publication". Prattle series are averages of all relevant reports over a given time period. Central banks codes: rba–Australia; mex–Mexico; boe–UK; frc–US; boc–Canada; rnz–New.Zealand; swe–Sweden; boj–Japan; tur–Turkey; nor–Norway; ecb–Eurozone; bra–Brazil; snb–Switzerland; tai–Taiwan; isr–Israel; rbi–India; kor–South.Korea.

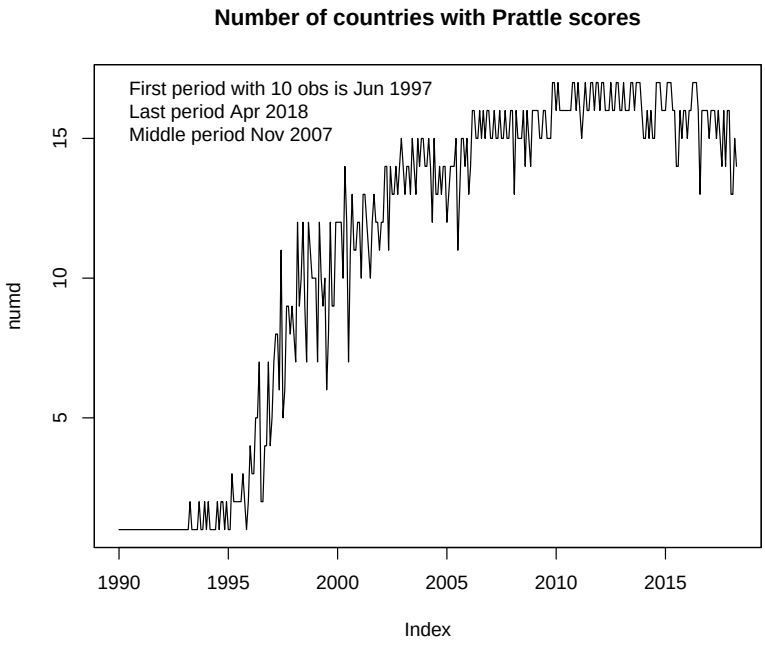


Figure A2: Number of countries with a monthly Prattle score. We select all data items from Prattle, except communication types labeled as "" (blank) and "Other Publication". Prattle series are averages of all relevant reports over a given time period.

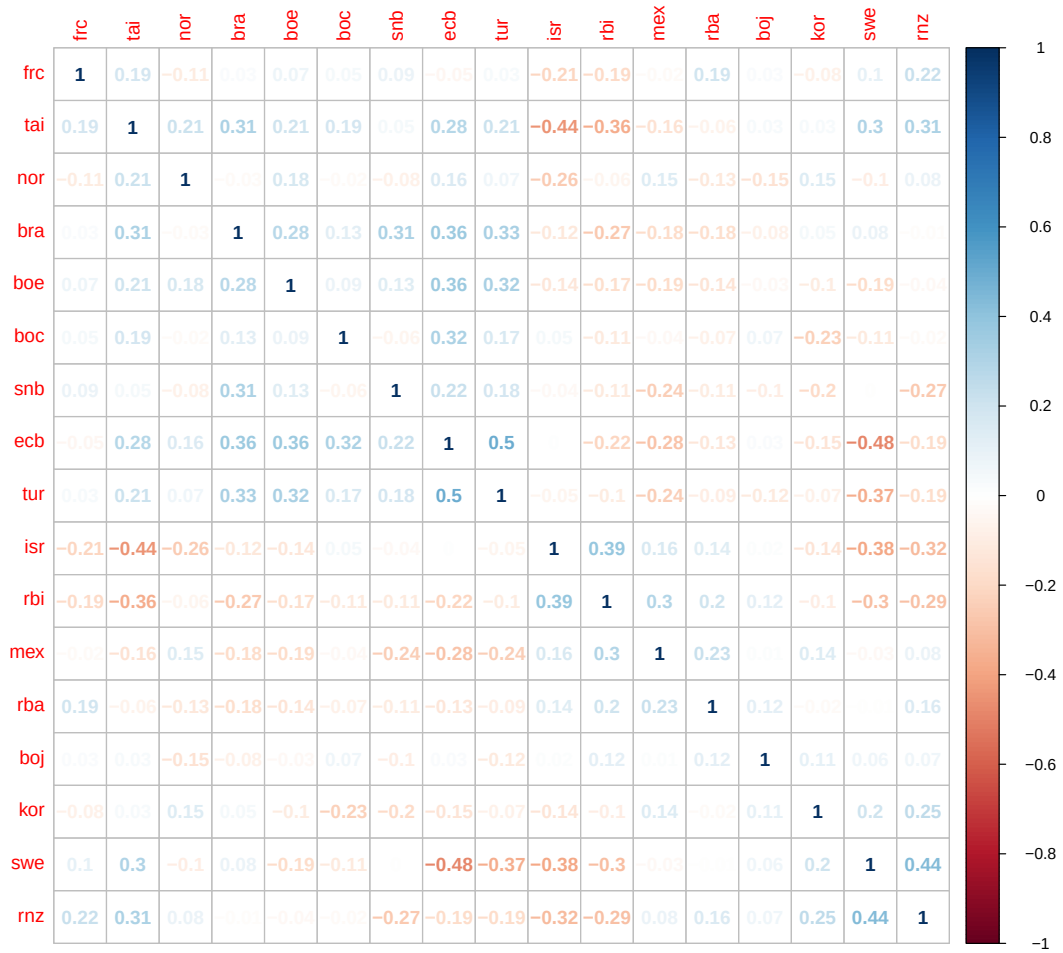


Figure A3: Correlation of monthly central bank sentiment series among all central banks covered in the Prattle sample. Central banks are ordered by the angular order of eigenvectors method from the R `corrplot` package. Each pairwise correlation is calculated using all available data for the two currencies. Hence not all correlations in the table are computed over the same time interval. We select all data items from Prattle, except communication types labeled as "" (blank) and "Other Publication". Prattle series are averages of all relevant reports over a given time period. Central banks codes: rba–Australia; mex–Mexico; boe–UK; frc–US; boc–Canada; rnz–New.Zealand; swe–Sweden; boj–Japan; tur–Turkey; nor–Norway; ecb–Eurozone; bra–Brazil; snb–Switzerland; tai–Taiwan; isr–Israel; rbi–India; kor–South.Korea.

LRV developed market counrty sample countries

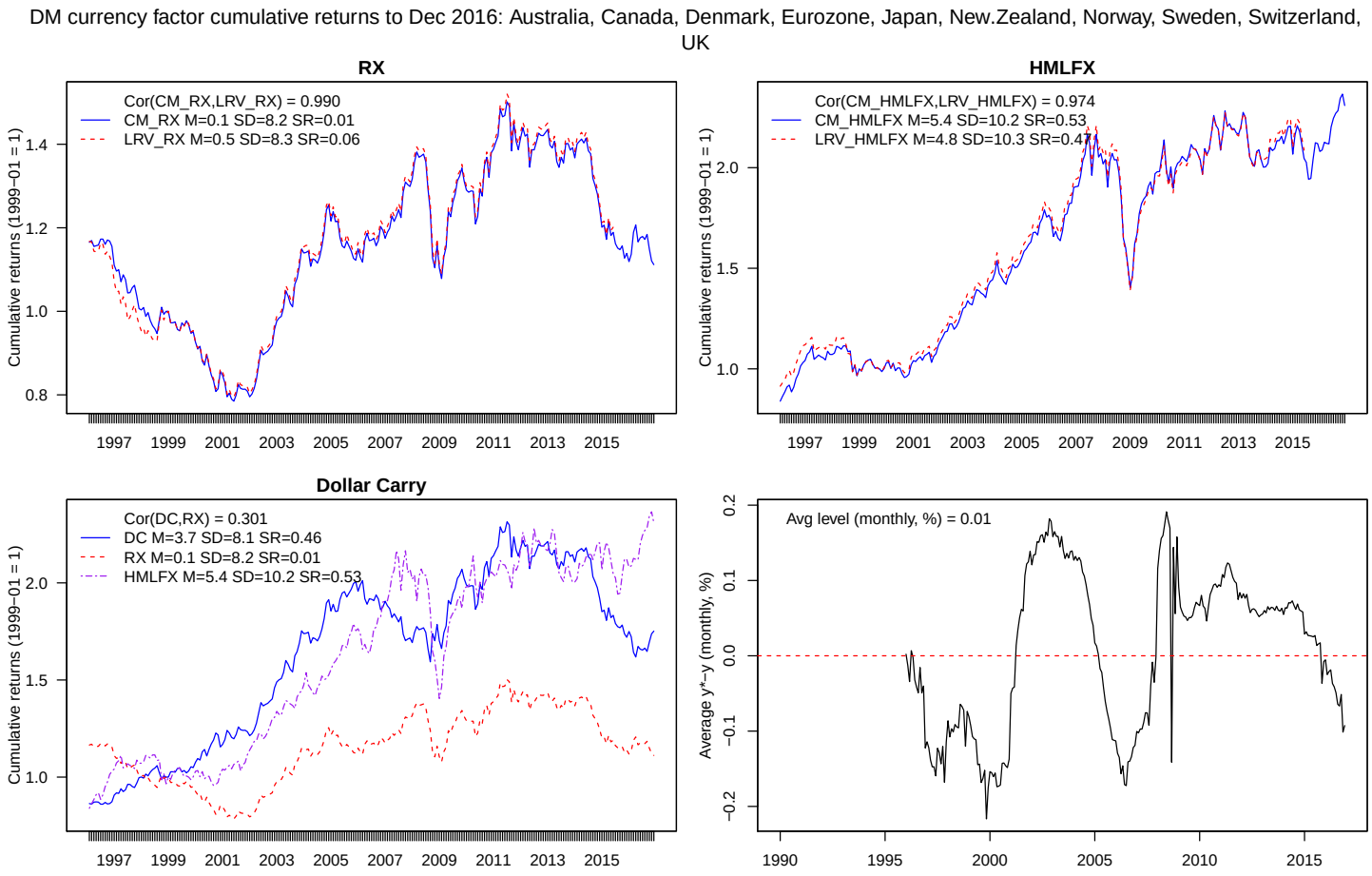


Figure A4: This figure shows cumulative returns for the dollar factor RX, the currency carry factor $HMLFX$ and the dollar carry factor $Dollar\ Carry$. The factors are constructed for LRV developed market counrty sample countries. The top two charts show our version of the RX and $HMLFX$ factors versus the same two factors as downloaded from Lustig and Verdelhan's websites. The lower right hand chart shows the average rate differential between foreign currencies and the dollar, i.e. $y^* - y$ where y^* (y) is the foreign (dollar) monthly nominal yield (not annualized).

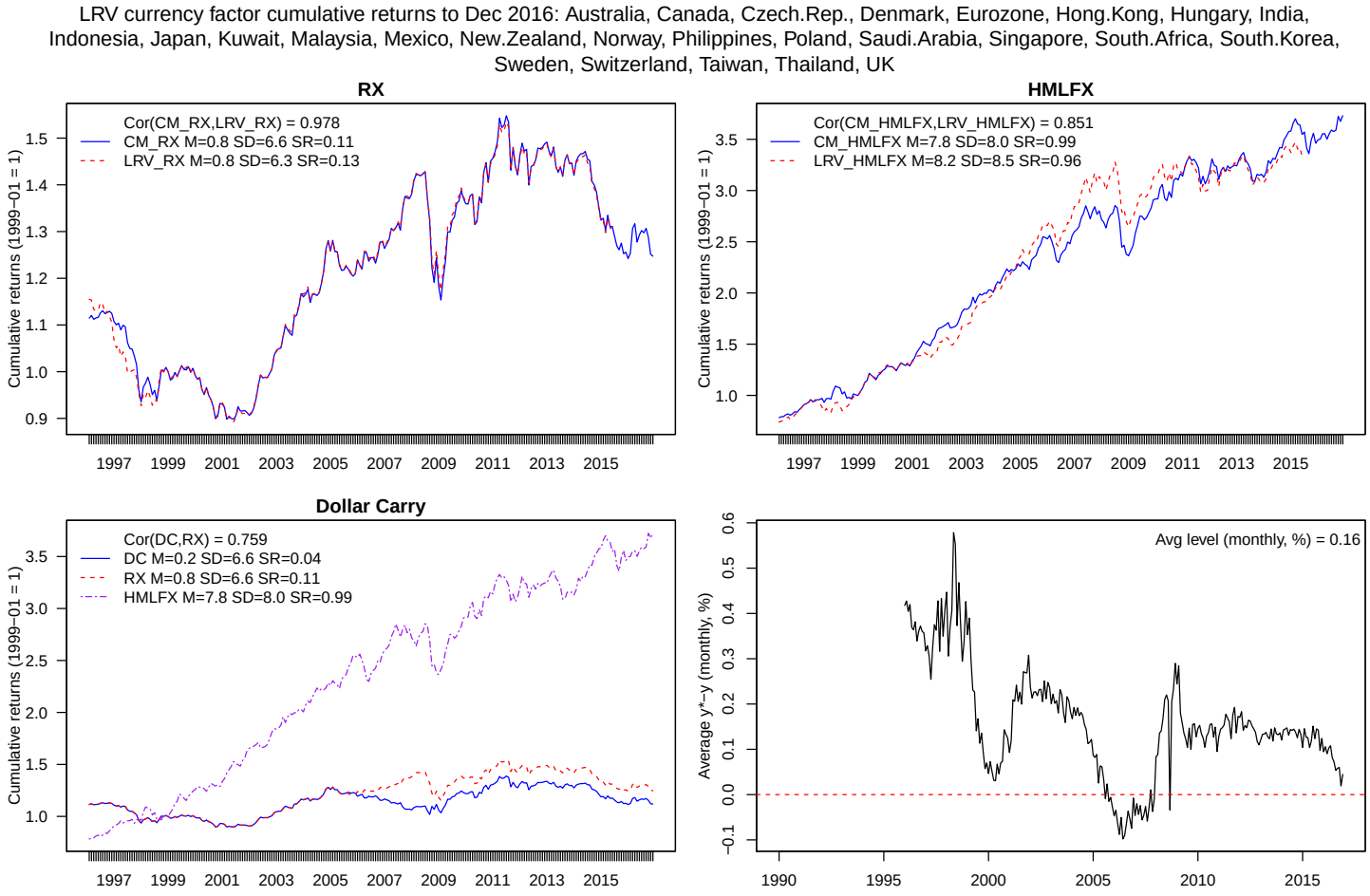


Figure A5: This figure shows cumulative returns for the dollar factor RX, the currency carry factor $HMLFX$ and the dollar carry factor *Dollar Carry*. The factors are constructed for LRV full country sample countries. The top two charts show our version of the RX and $HMLFX$ factors versus the same two factors as downloaded from Lustig and Verdelhan's websites. The lower right hand chart shows the average rate differential between foreign currencies and the dollar, i.e. $y^* - y$ where y^* (y) is the foreign (dollar) monthly nominal yield (not annualized).

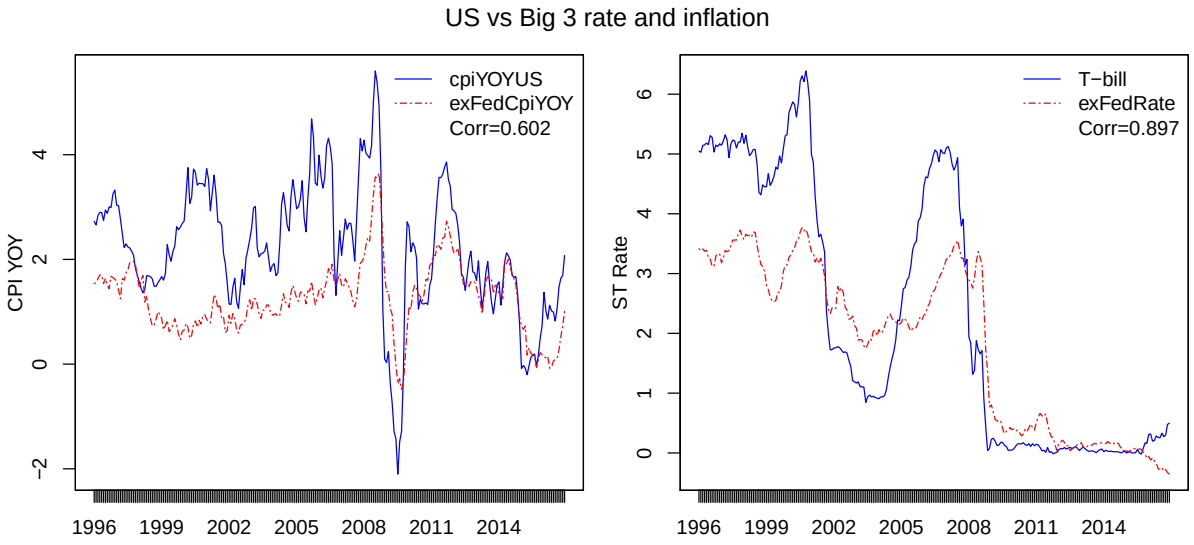


Figure A6: This figure compares the US short-term interest rate and year-over-year CPI versus the respective averages calculated for the Eurozone, Bank of England and Bank of Japan. Data are monhtly.

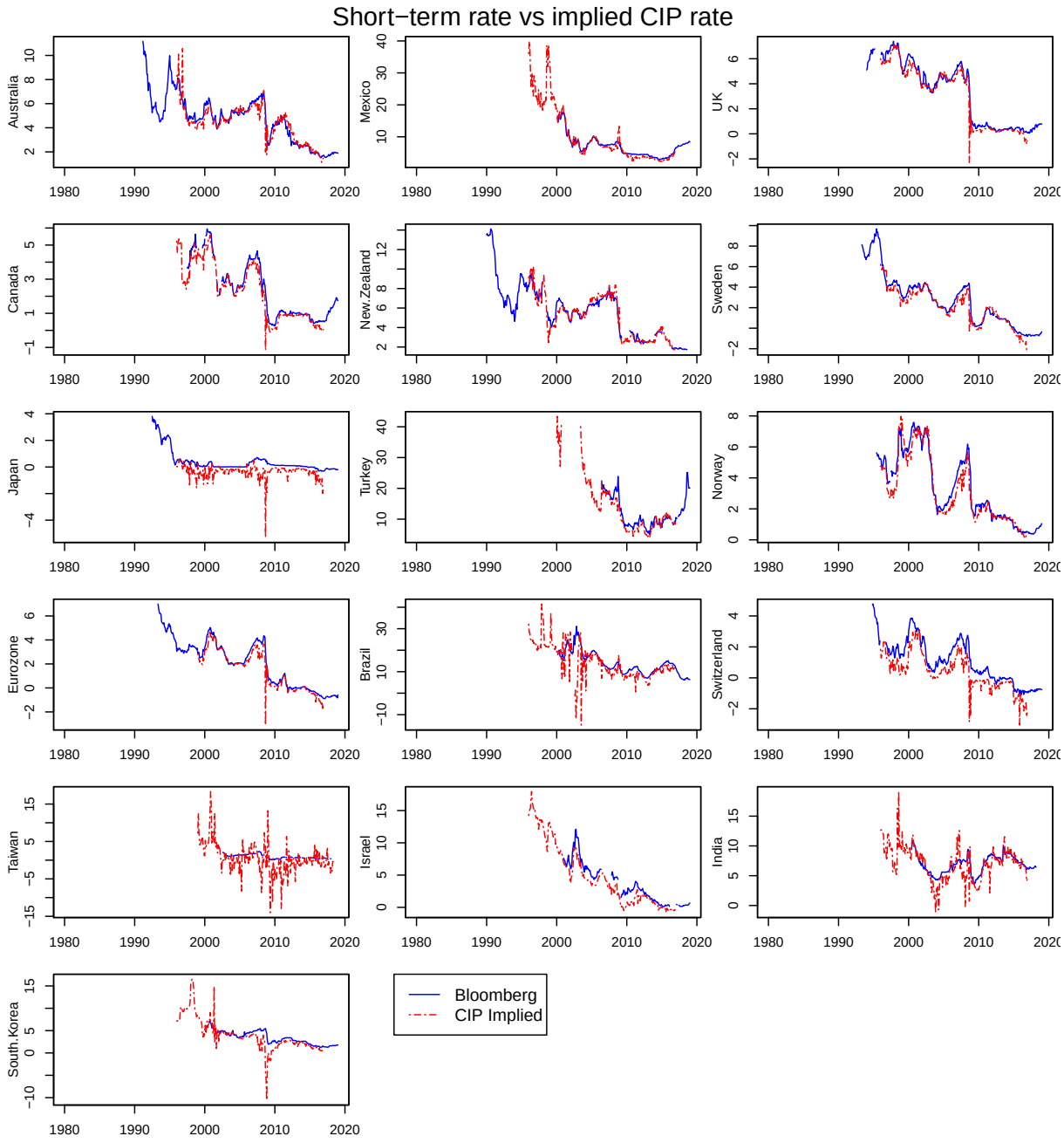


Figure A7: For the countries for which we have Prattle data, we plot the local currency short-term interest rate obtained from Bloomberg against the implied local currency one-month interest rate calculated from the one-month currency forward under the assumption that covered interest parity holds.

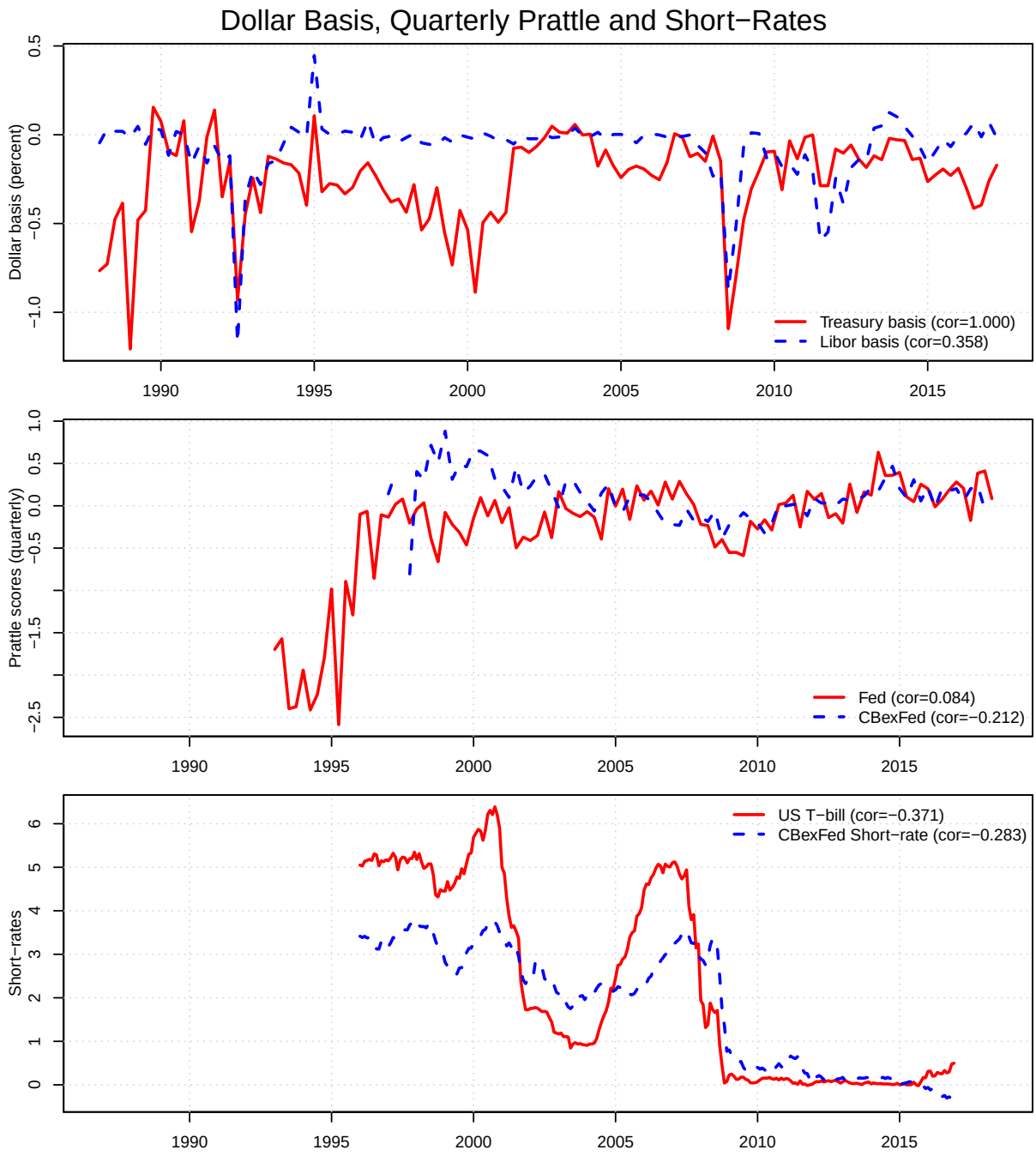


Figure A8: The first panel of this figure shows the Treasury dollar basis and Libor basis from Jiang et al. (2018). The second panel shows the Fed and CBexFed Prattle scores averaged within a quarter and shown over the same time range as the dollar basis for comparison. The third panel shows the T-bill rate and the average short-rate for Bunds, the Bank of England and the Bank of Japan. Correlations of each series with the Treasury dollar basis are shown in parentheses.

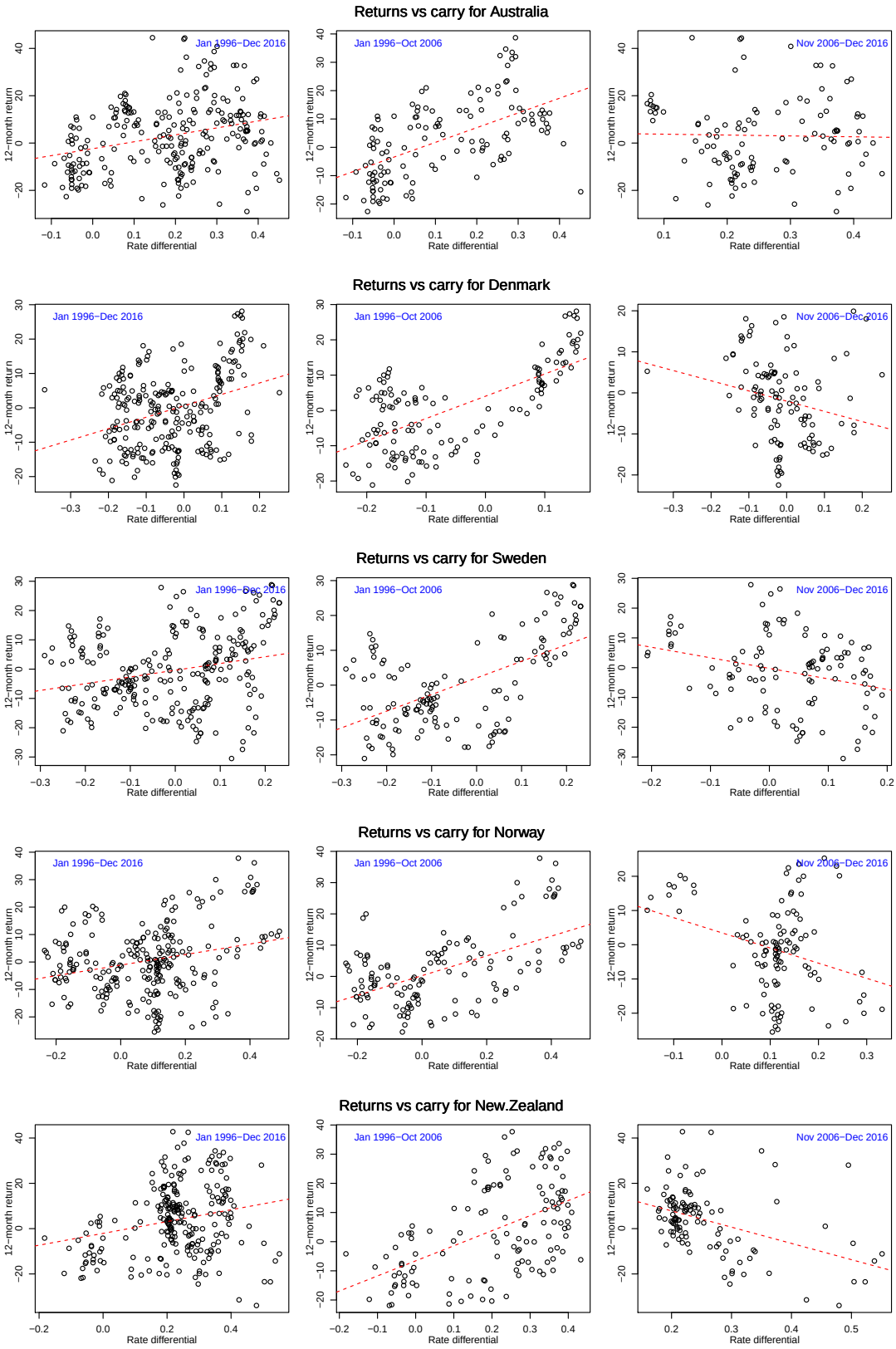


Figure A9: Next twelve month returns versus current interest rate differential (*carry*).

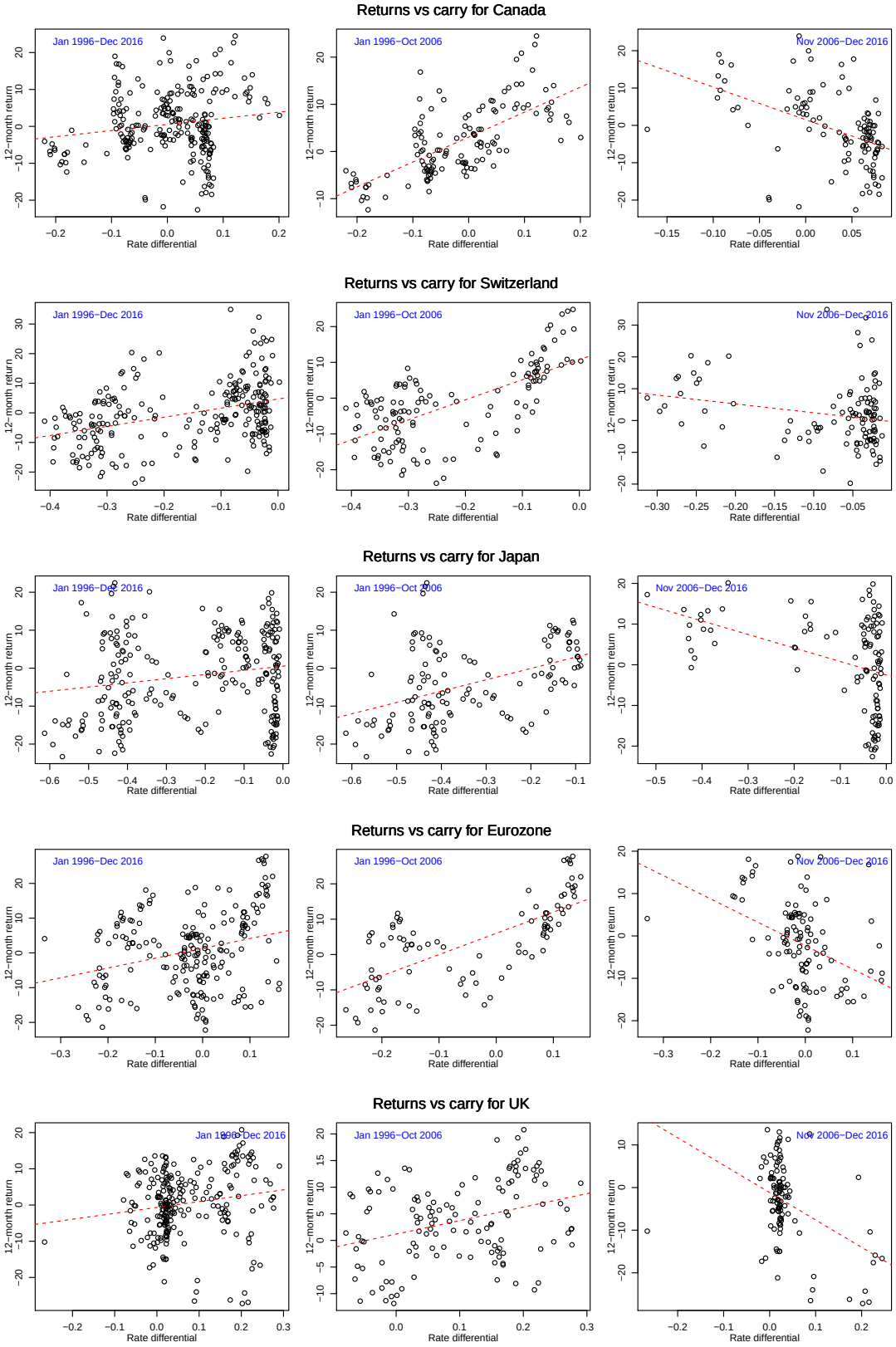


Figure A10: Next twelve month returns versus current interest rate differential (*carry*).

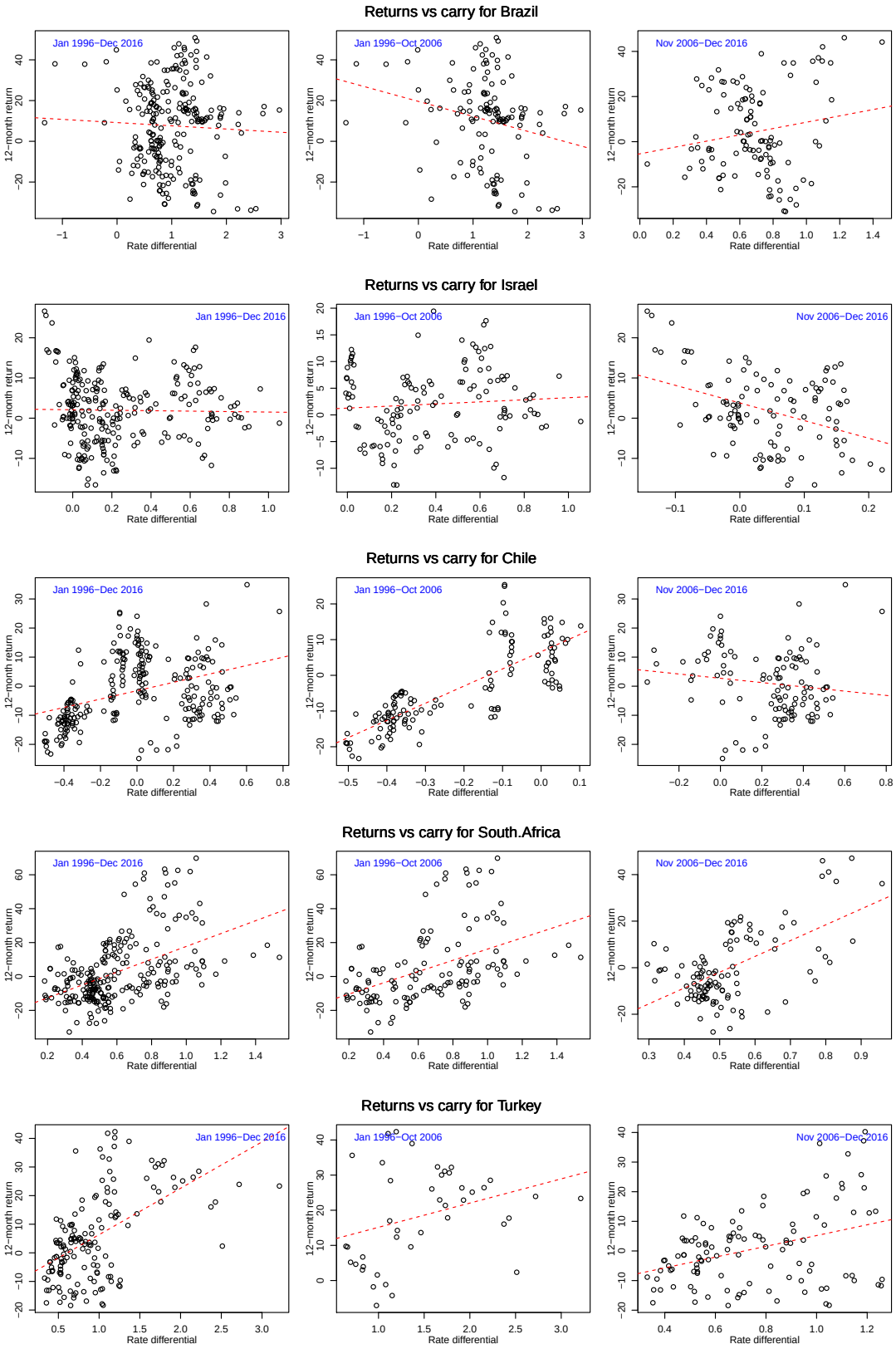
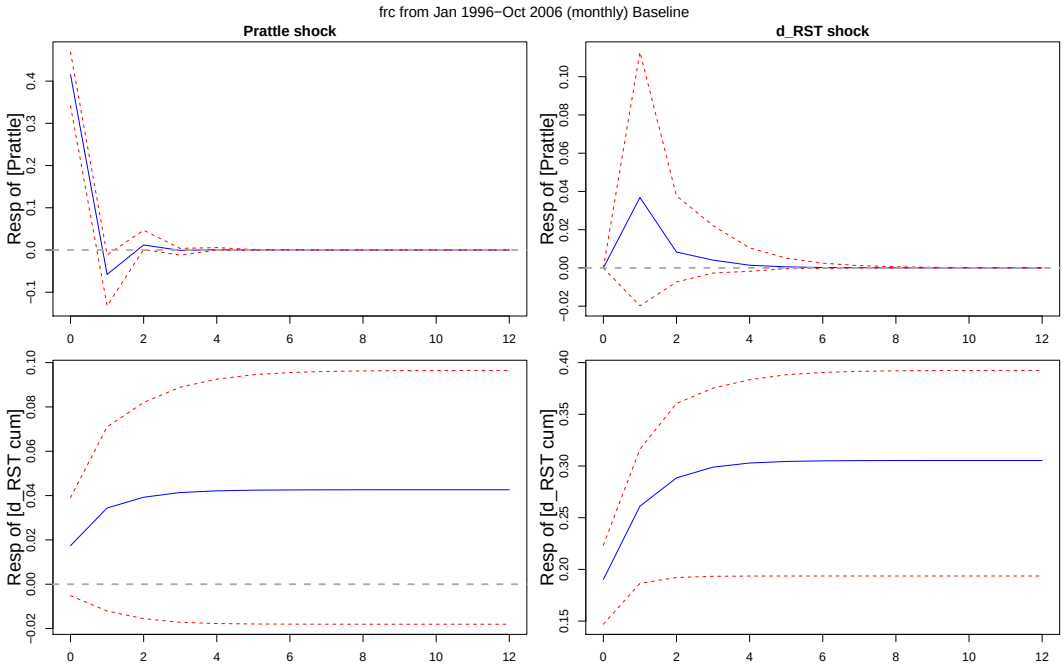


Figure A11: Next twelve month returns versus current interest rate differential (*carry*).

Fed: VARs of Prattle and Short-Rate – Early Subperiod



Fed: VARs of Prattle and Short-Rate – Late Subperiod

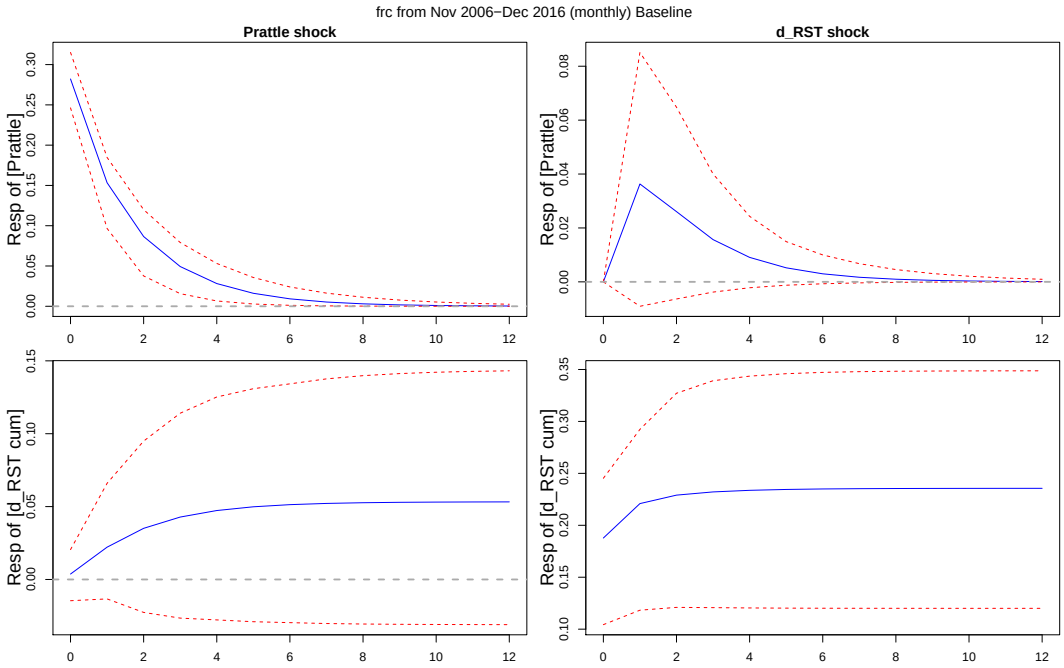
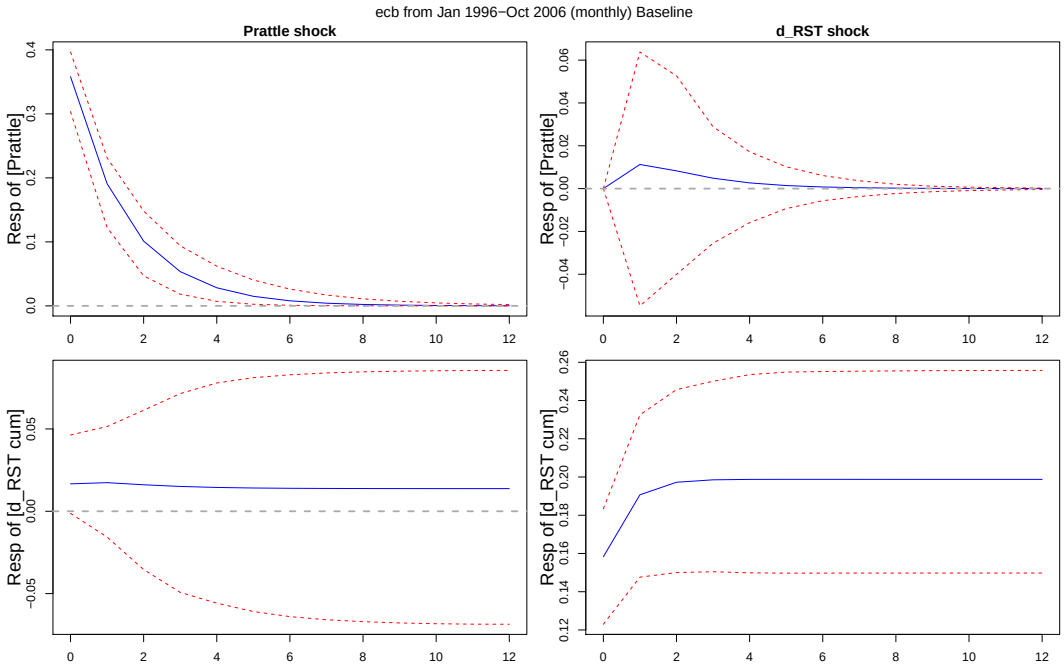


Figure A12: The VAR contains the Prattle score and the difference in the short-rate, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

ECB: VARs of Prattle and Short-Rate – Early Subperiod



ECB: VARs of Prattle and Short-Rate – Late Subperiod

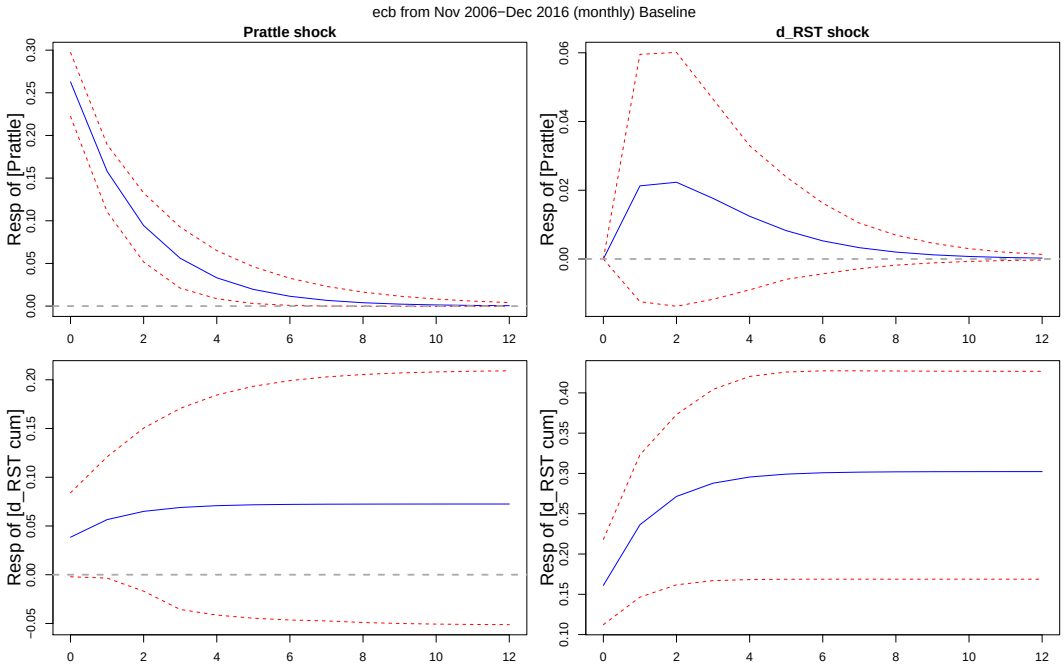
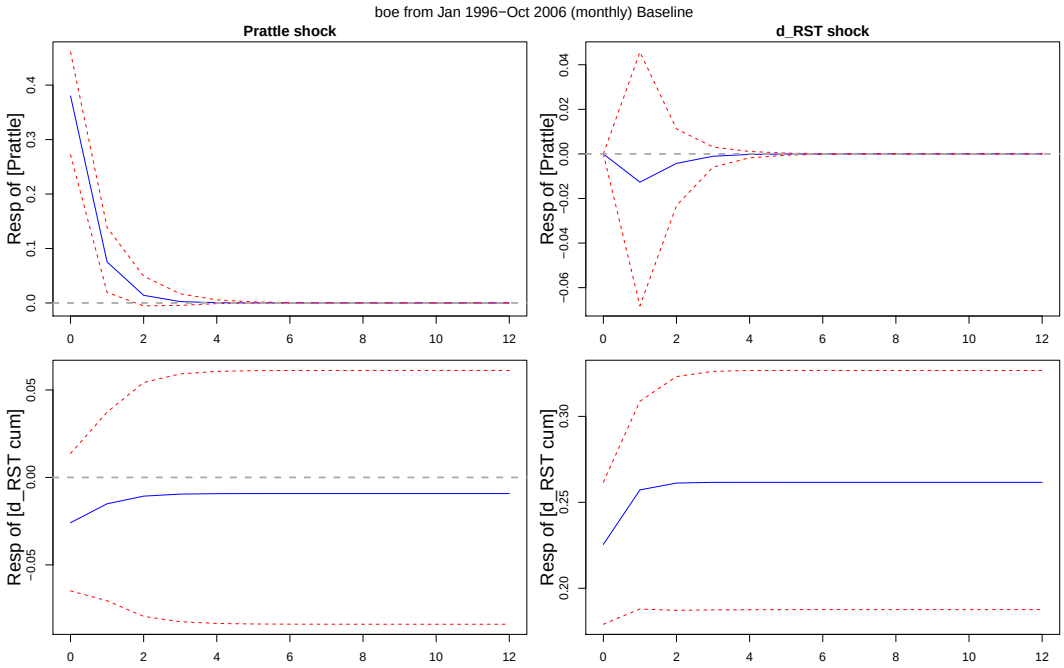


Figure A13: The VAR contains the Prattle score and the difference in the short-rate, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

BofE: VARs of Prattle and Short-Rate – Early Subperiod



BofE: VARs of Prattle and Short-Rate – Late Subperiod

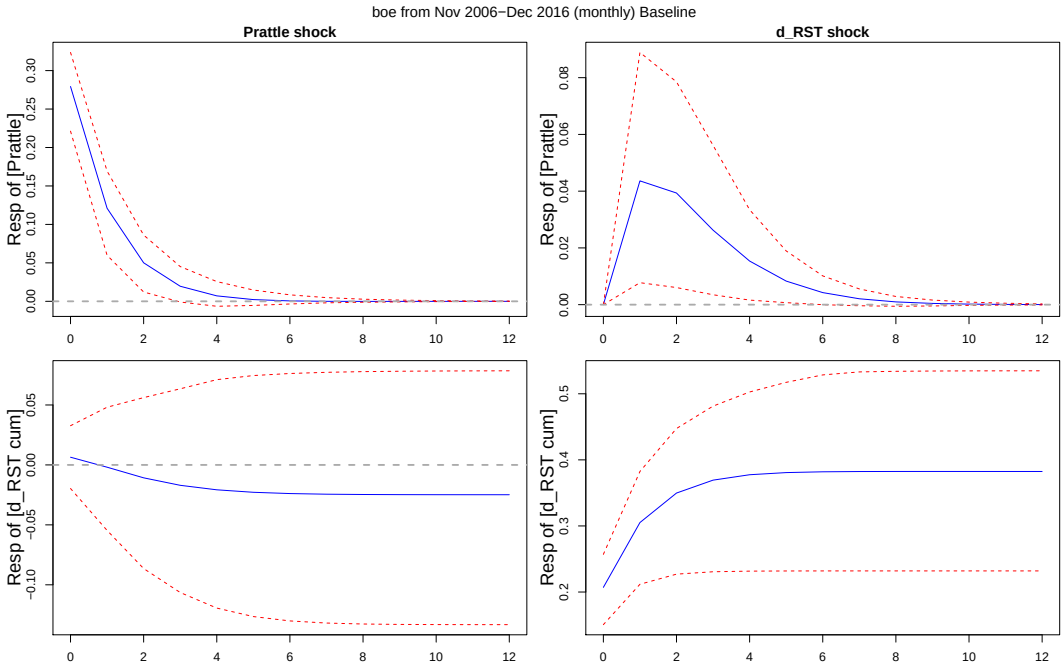
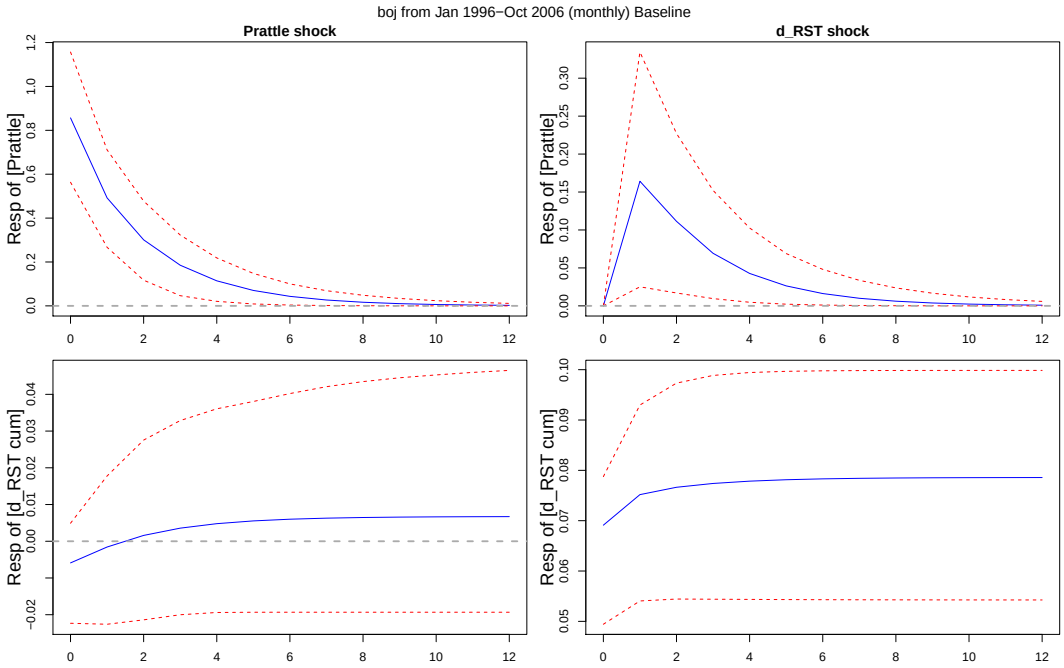


Figure A14: The VAR contains the Prattle score and the difference in the short-rate, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

BoJ: VARs of Prattle and Short-Rate – Early Subperiod



BoJ: VARs of Prattle and Short-Rate – Late Subperiod

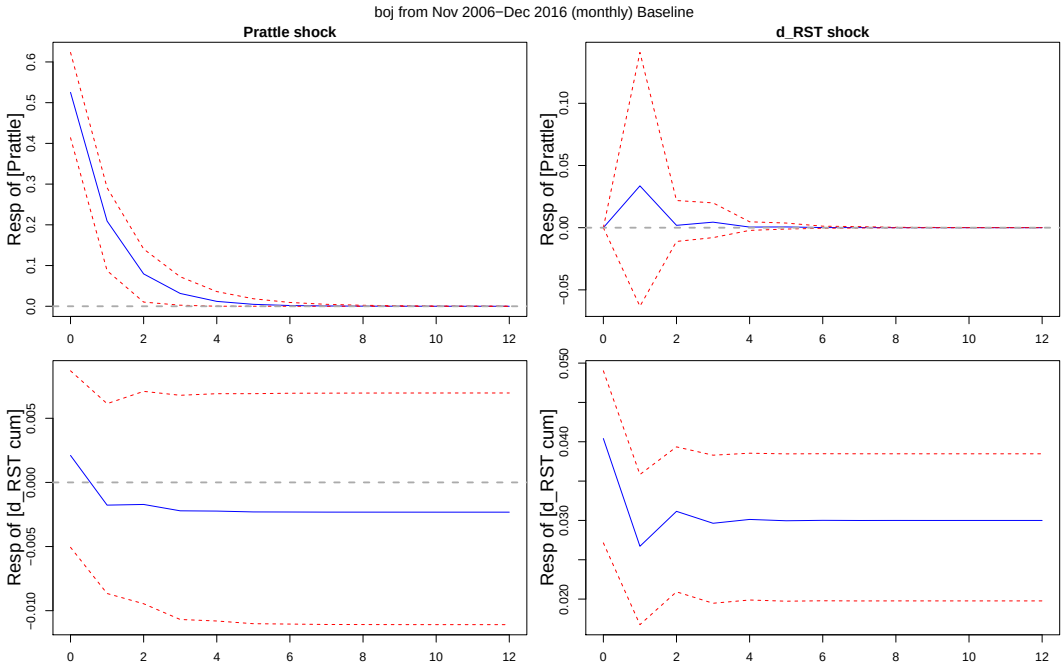


Figure A15: The VAR contains the Prattle score and the difference in the short-rate, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

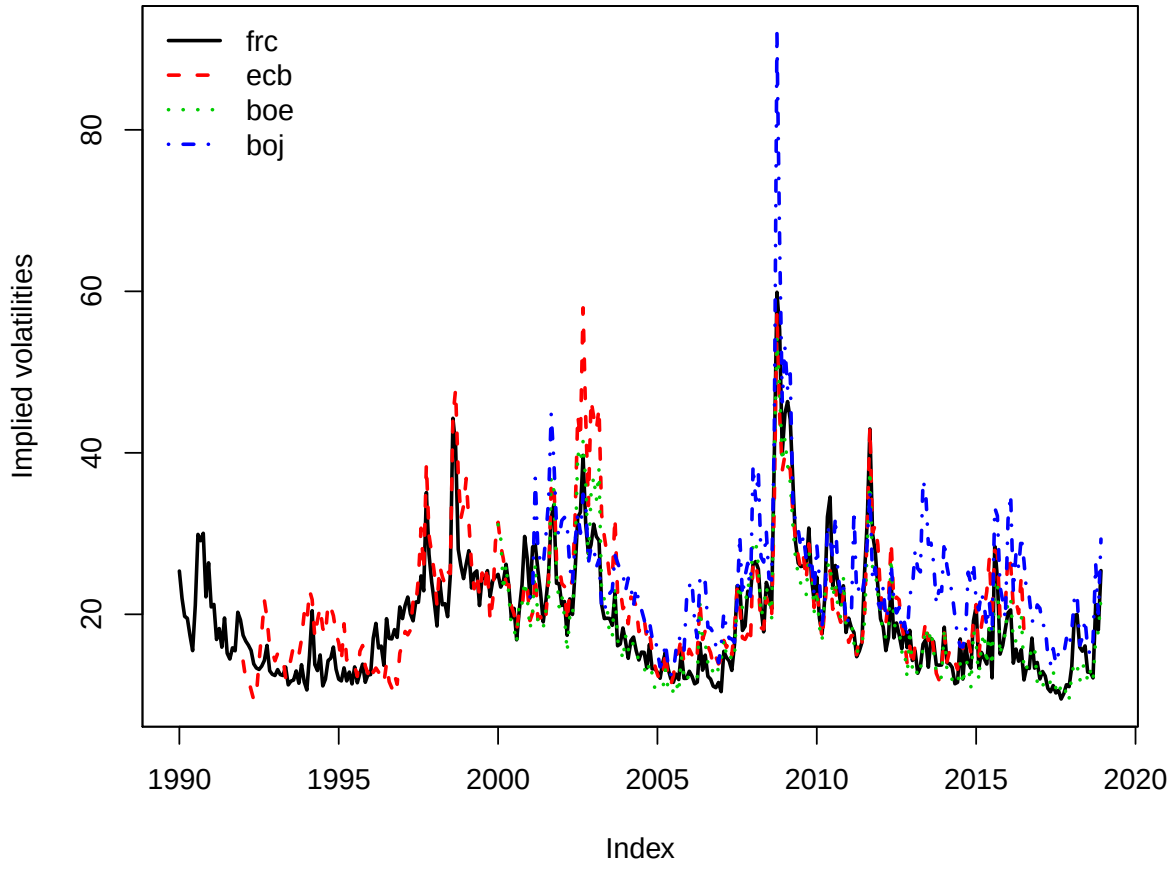
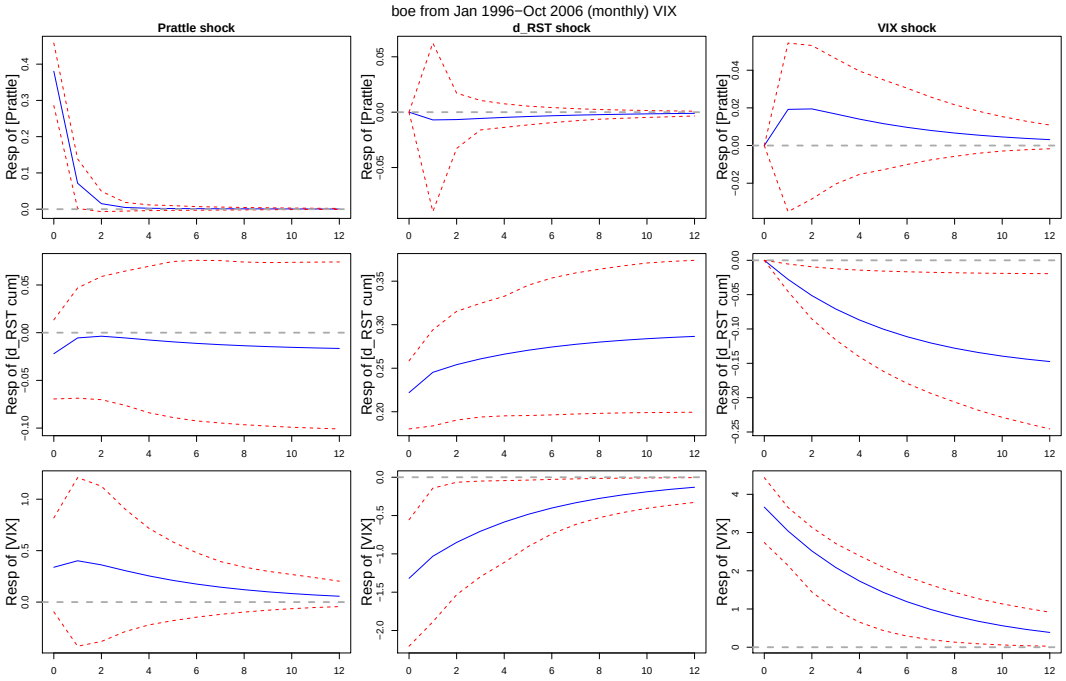


Figure A16: This figure shows the VIX (SP500 implied volatility), VDAX (DAX), VFTSE (FSTE) and VNKY (Nikkei) indexes. Data are obtained from Bloomberg.

BofE: VARs of Prattle, Short-Rate and VIX – Early Subperiod



BofE: VARs of Prattle, Short-Rate and VIX – Late Subperiod

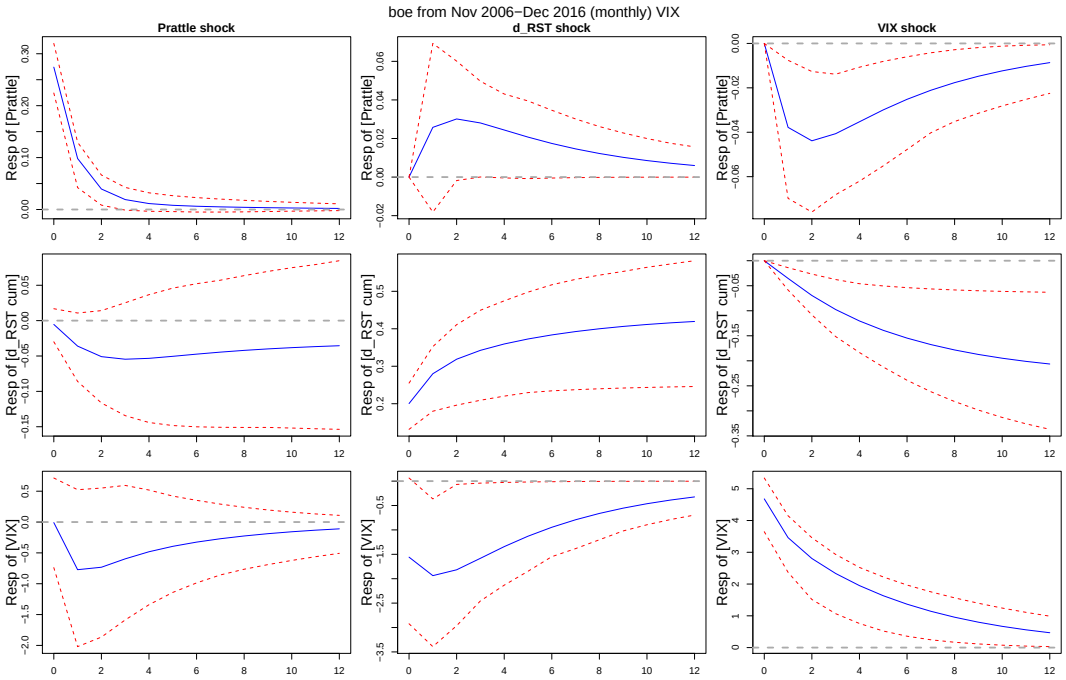
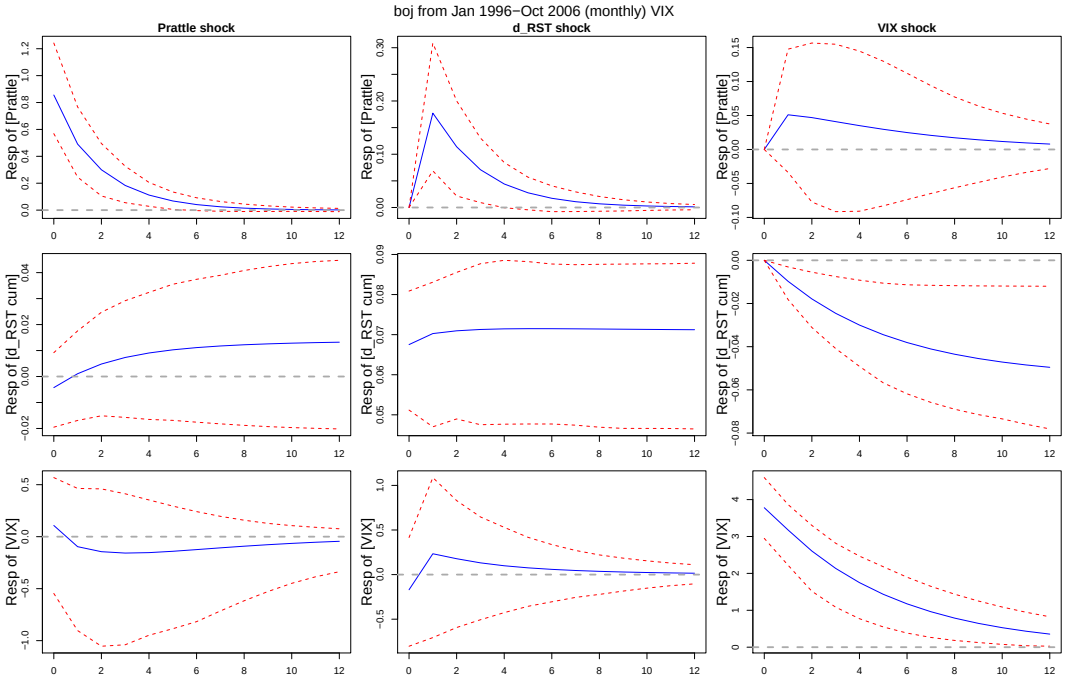


Figure A17: The VAR contains the Prattle score, the difference in the short-rate and the VIX, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

BoJ: VARs of Prattle, Short-Rate and VIX – Early Subperiod



BoJ: VARs of Prattle, Short-Rate and VIX – Late Subperiod

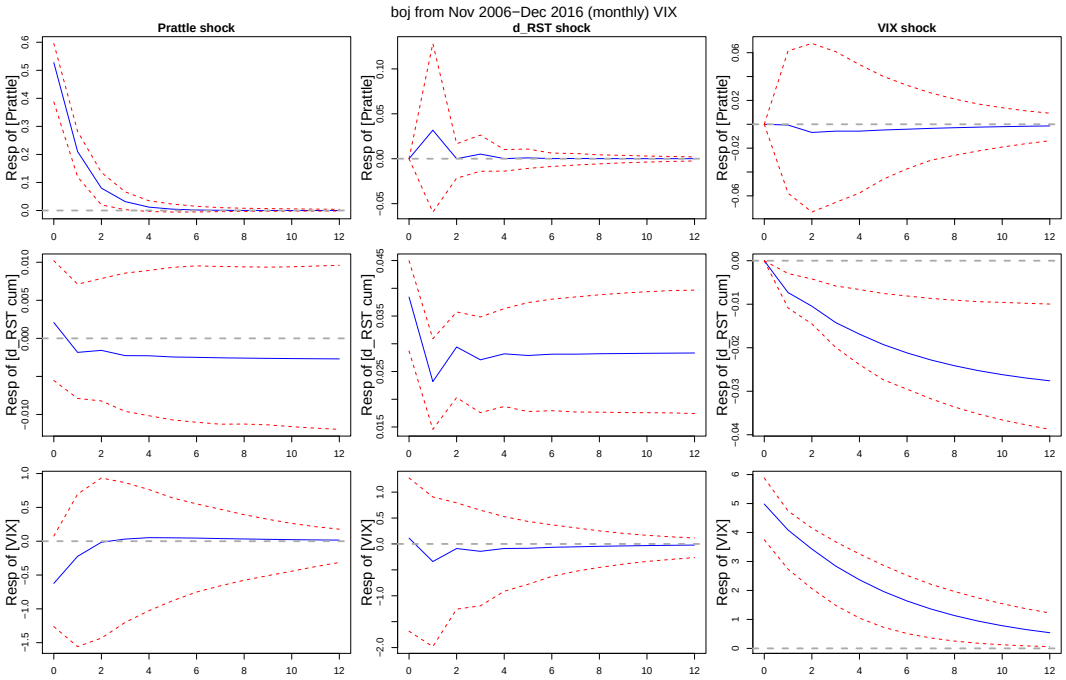
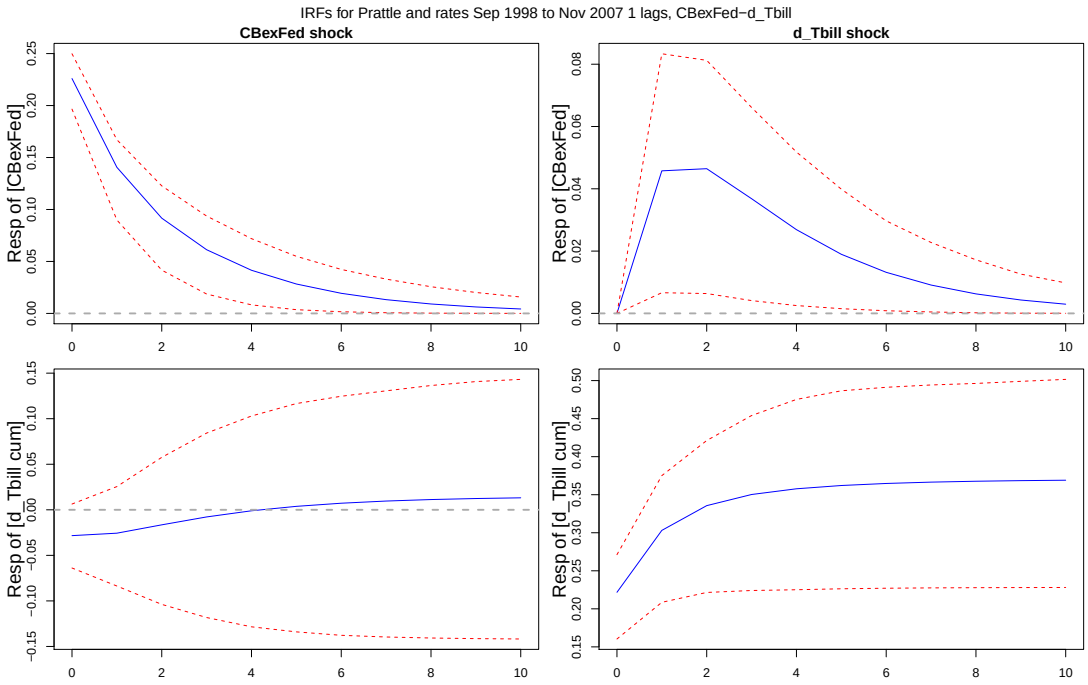


Figure A18: The VAR contains the Prattle score, the difference in the short-rate and the VIX, in that order. Impulse responses are calculated using a Cholesky decomposition of the residual covariance matrix. Impulse responses for the change in the short-rate are cumulative. Other impulse responses are non-cumulative. Each time step is one month.

CBexFed Prattle and Change in T-bill – Early Subperiod



CBexFed Prattle and Change in T-bill – Late Subperiod

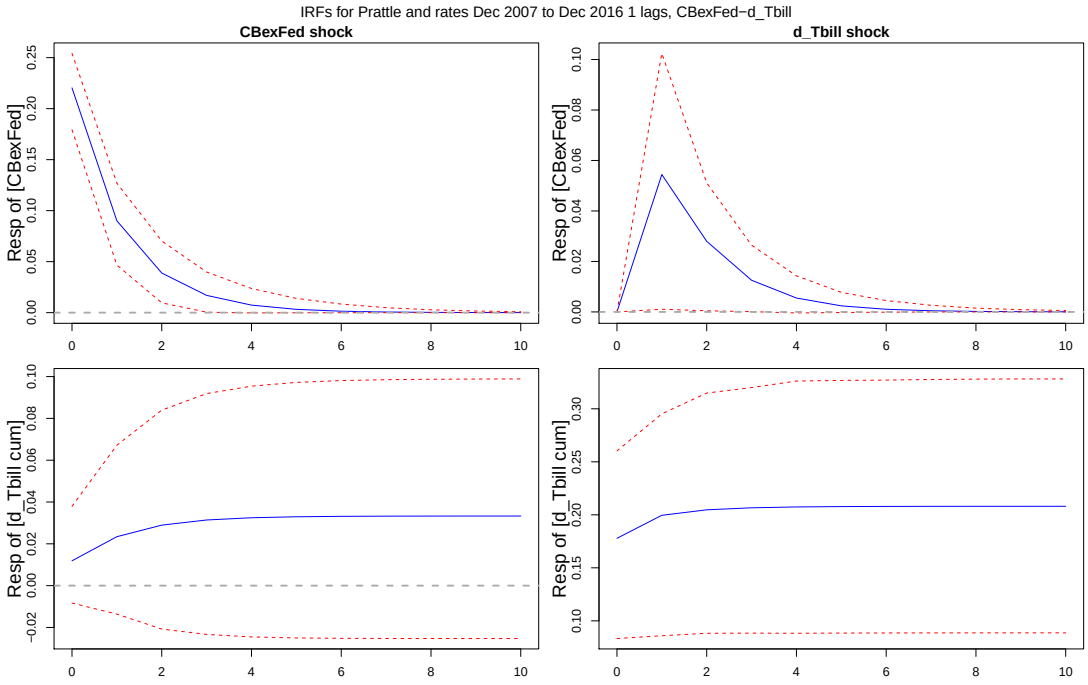
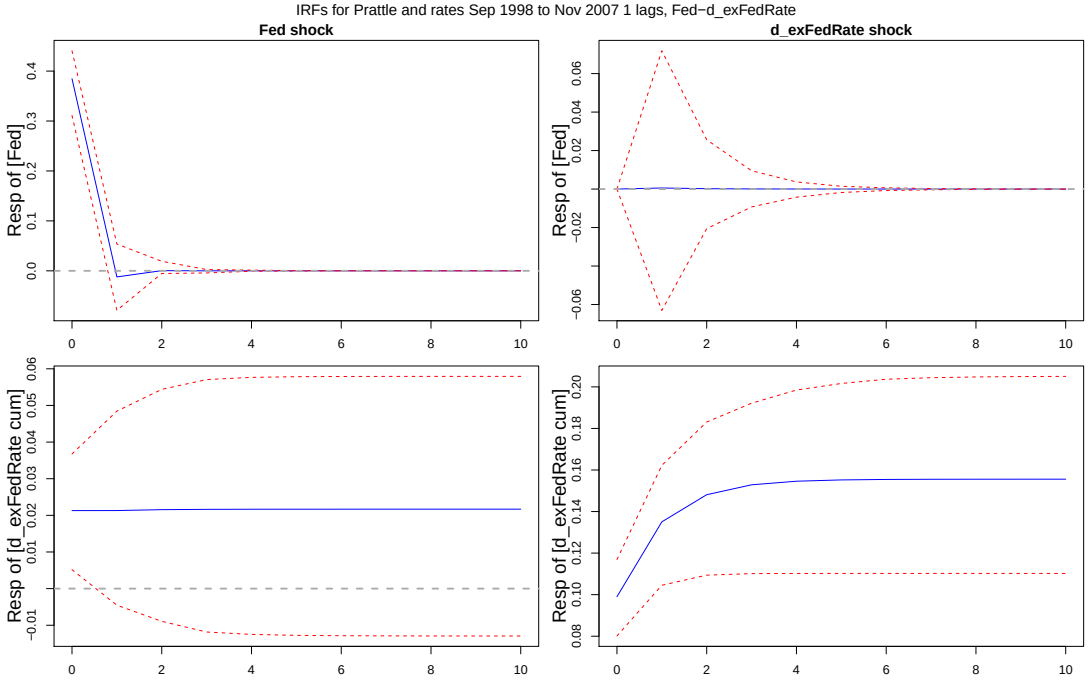


Figure A19: Impulse responses from a monthly vector autoregression. The ordering of the impulses is indicated by the column labels in the figure. The rows correspond to the variable responses to the impulse indicated by the column label. Impulses are computed to orthogonalized shocks using a Cholesky decomposition of the residual covariance matrix.

Fed Prattle and Change in exFedRate – Early Subperiod



Fed Prattle and Change in exFedRate – Late Subperiod

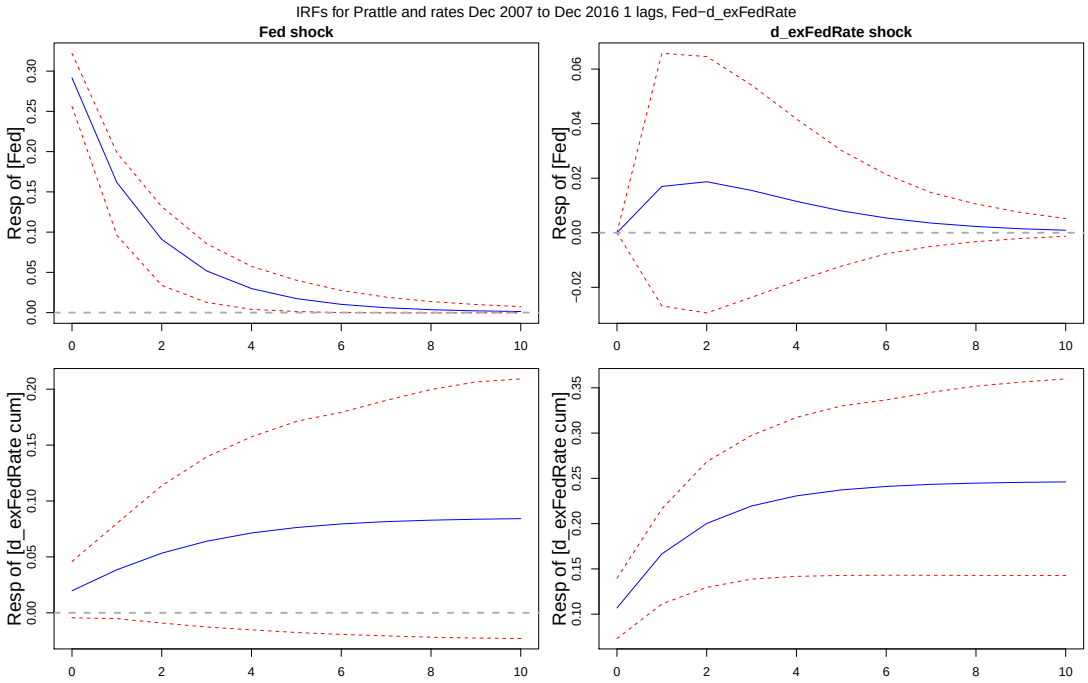


Figure A20: Impulse responses from a monthly vector autoregression. The ordering of the impulses is indicated by the column labels in the figure. The rows correspond to the variable responses to the impulse indicated by the column label. Impulses are computed to orthogonalized shocks using a Cholesky decomposition of the residual covariance matrix.

RMSEs for 12-month returns

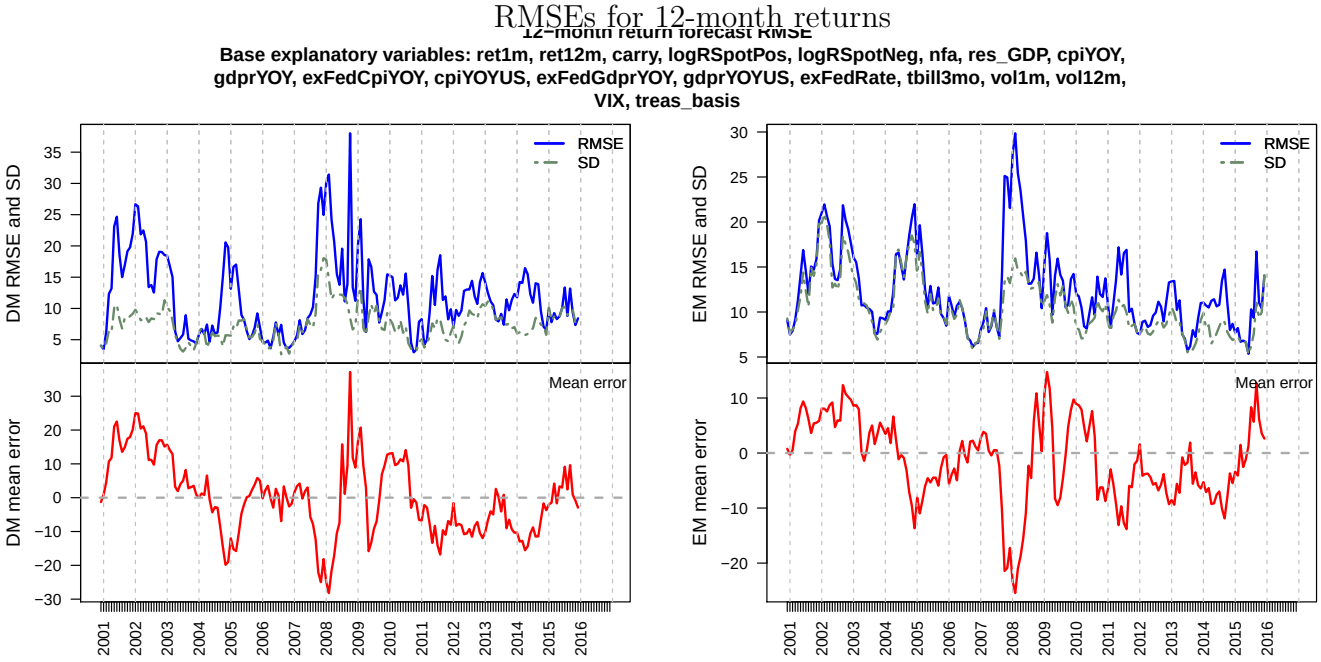


Figure A21: 12-month return forecast RMSEs computed for the cross-section of each month's forecast errors from the rolling elastic net models. Superimposed on these is the cross-sectional standard deviation of the forecast error (labeled *SD*). Below the RMSE and SD chart is a plot of the mean forecast errors in each month. The DM results are shown on the left, and the EM results on the right.

Table A1 Panel A: Monthly country-level regression of the forward 12 month change in the short-term domestic interest rate on explanatory variables. The columns correspond to the Fed (frc), ECB, Bank of England (boe), and Bank of Japan (boj) respectively over the early or late subsample. VIX_l12 is the average VIX over the prior year. For the ECB, the short-term rate is the yield on six-month bunds. Standard errors using Newey-West with variable lag selection are shown in parentheses.

Regression of the forward 12 month change in the short-term domestic interest rate on lagged explanatory variables

	Dependent variable:							
	12-month change in short-rate							
	frc		ecb		boe		boj	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
gdprYOY	0.226	0.074	0.081	−0.019	−0.188	−0.083	0.0003	0.007
	(0.166)	(0.051)	(0.222)	(0.047)	(0.396)	(0.094)	(0.052)	(0.005)
cpiYOY	−0.470	−0.354**	−0.515	−0.427	0.516	−0.239	−0.054	−0.033
	(1.277)	(0.154)	(1.018)	(0.573)	(0.338)	(0.252)	(0.074)	(0.034)
Constant	0.376	0.079	0.722	0.179	−0.407	0.121	−0.026	−0.084***
	(2.443)	(0.192)	(1.793)	(0.611)	(1.271)	(0.319)	(0.079)	(0.022)
Start	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006
End	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016
Observations	118	110	116	110	118	110	118	110
Adjusted R^2	0.065	0.232	0.168	0.278	0.108	0.071	0.052	0.130
Note:								*p<0.1; **p<0.05; ***p<0.01

Table A1 Panel B: Monthly country-level regression of the forward 12 month change in the short-term domestic interest rate on explanatory variables. The columns correspond to the Fed (frc), ECB, Bank of England (boe), and Bank of Japan (boj) respectively over the early or late subsample. VIX_l12 is the average VIX over the prior year. For the ECB, the short-term rate is the yield on six-month bunds. Standard errors using Newey-West with variable lag selection are shown in parentheses.

Regression of the forward 12 month change in the short-term domestic interest rate on lagged explanatory variables

	Dependent variable:							
	12-month change in short-rate							
	frc		ecb		boe		boj	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VIX	−0.028	0.022***	0.006	0.035***	−0.027	0.005	0.0001	−0.003
	(0.315)	(0.006)	(0.033)	(0.009)	(0.036)	(0.057)	(0.004)	(0.002)
VIX_l12	−0.156	0.004	0.038	0.009	0.098	0.102*	−0.024	0.001
	(0.961)	(0.016)	(0.060)	(0.023)	(0.097)	(0.059)	(0.027)	(0.005)
nfa	−0.185	−0.035***	−0.044	−0.183**	−0.005	−0.038	0.021	0.018***
	(0.123)	(0.010)	(0.096)	(0.072)	(0.073)	(0.031)	(0.015)	(0.007)
res_GDP	14.876	2.331***	−0.846	1.903***	−1.208**	1.602*	−0.030	−0.034***
	(13.189)	(0.497)	(0.754)	(0.331)	(0.589)	(0.903)	(0.028)	(0.008)
gdprYOY	0.190	0.022	0.204**	−0.013	−0.412	−0.153	0.001	−0.004
	(1.172)	(0.047)	(0.085)	(0.040)	(0.461)	(0.153)	(0.040)	(0.004)
cpiYOY	−0.285	−0.114***	−1.045***	−0.315***	0.686	0.047	−0.069	−0.010
	(1.151)	(0.043)	(0.315)	(0.109)	(0.559)	(0.574)	(0.074)	(0.037)
Constant	−7.863	−3.247***	2.762	−8.616***	0.682	−7.773***	0.199	−0.322
	(20.933)	(0.820)	(2.371)	(1.807)	(2.311)	(2.963)	(0.563)	(0.393)
Start	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006
End	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016
Observations	107	99	82	99	107	99	107	99
Adjusted R^2	0.656	0.759	0.707	0.831	0.236	0.685	0.283	0.458
Note:							*p<0.1; **p<0.05; ***p<0.01	

Table A2 Panel A: Monthly country-level regression of the forward 12 month average Prattle measure on explanatory variables. The columns correspond to the Fed (frc), ECB, Bank of England (boe), and Bank of Japan (boj) respectively over the early or late subsample. VIX_l12 is the average VIX over the prior year. Standard errors using Newey-West with variable lag selection are shown in parentheses.

Regression of the forward 12 month average Prattle measure on lagged explanatory variables

	Dependent variable:							
	Prattle score (12-month forward average)							
	frc		ecb		boe		boj	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
gdprYOY	0.012	0.093***	0.064***	0.031***	0.060	0.057	−0.242**	0.001
	(0.035)	(0.023)	(0.022)	(0.011)	(0.072)	(0.063)	(0.120)	(0.022)
cpiYOY	0.061	−0.073	−0.262***	−0.138***	0.166**	−0.059	−0.197	0.041
	(0.069)	(0.051)	(0.081)	(0.038)	(0.078)	(0.125)	(0.229)	(0.060)
Constant	−0.334***	−0.013	0.675***	−0.042	0.068	0.372	0.010	−0.011
	(0.117)	(0.094)	(0.184)	(0.076)	(0.202)	(0.598)	(0.179)	(0.133)
Start	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006
End	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016
Observations	118	110	116	110	117	110	118	110
Adjusted R^2	0.129	0.474	0.692	0.754	0.165	0.728	0.370	0.016
Note:								*p<0.1; **p<0.05; ***p<0.01

Table A2 Panel B: Monthly country-level regression of the forward 12 month average Prattle measure on explanatory variables. The columns correspond to the Fed (frc), ECB, Bank of England (boe), and Bank of Japan (boj) respectively over the early or late subsample. VIX_l12 is the average VIX over the prior year. Standard errors using Newey-West with variable lag selection are shown in parentheses.

Regression of the forward 12 month average Prattle measure on lagged explanatory variables

	Dependent variable:							
	Prattle score (12-month forward average)							
	frc		ecb		boe		boj	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VIX	0.001	0.001	0.002	0.002*	0.007	0.004***	−0.009	−0.008
	(0.003)	(0.001)	(0.003)	(0.001)	(0.005)	(0.001)	(0.010)	(0.006)
VIX_l12	−0.018**	−0.031***	−0.011	−0.005	−0.0004	−0.020**	0.102**	−0.002
	(0.007)	(0.009)	(0.007)	(0.005)	(0.014)	(0.009)	(0.043)	(0.016)
nfa	−0.012	0.00002	−0.007	0.017**	−0.020**	0.006*	−0.041	0.023
	(0.009)	(0.003)	(0.008)	(0.007)	(0.008)	(0.003)	(0.031)	(0.036)
res_GDP	0.273	0.821***	0.301***	0.277***	0.158*	0.103***	0.135*	−0.069
	(0.406)	(0.170)	(0.070)	(0.063)	(0.091)	(0.022)	(0.076)	(0.168)
gdprYOY	0.024	−0.023	0.045***	0.013***	0.032	0.017	−0.171**	−0.012
	(0.027)	(0.023)	(0.007)	(0.005)	(0.040)	(0.017)	(0.074)	(0.022)
cpiYOY	0.034	−0.063***	−0.255***	−0.089***	0.136***	−0.033***	0.007	0.073
	(0.041)	(0.015)	(0.035)	(0.014)	(0.040)	(0.010)	(0.137)	(0.165)
Constant	−0.280	0.198	−0.117	−0.396**	−0.460***	0.479**	−2.176**	0.407
	(0.384)	(0.249)	(0.244)	(0.164)	(0.171)	(0.233)	(0.862)	(5.605)
Start	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006	Jan 1996	Nov 2006
End	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016	Oct 2006	Dec 2016
Observations	107	99	82	99	107	99	107	99
Adjusted R^2	0.551	0.881	0.938	0.927	0.414	0.903	0.504	0.257
Note:							*p<0.1; **p<0.05; ***p<0.01	

Table A3: The tables show the factor betas and adjusted R^2's from regressing monthly currency returns on LRV full-sample factor returns in the period Jan 1996–Dec 2016 for the developed market sample. Significance at the 1%, 5% and 10% levels is indicated with ***, **, *, using Newey-West standard errors with auto lag selection. "%RX" refers to the percentage of the R^2 that is due to only to RX (i.e. $100 \times (R^2$ *with only* $RX)/R^2$). "%DC" reports the percent increase in R^2 (i.e. $100 \times [(R^2$ *with* $DC)/R^2] - 100$) when the dollar carry factor (from the LRV DM country set) is included as a regressor. The "Mean" row shows the average value in each column.

Full sample DM country betas

	Country	RX	HMLFX	R2	%RX	%DC
1	Japan	0.797***	-0.738***	0.343	25.4	0.17
2	Switzerland	1.393***	-0.556***	0.664	77.4	0.54
3	Denmark	1.421***	-0.388***	0.779	89.2	0.28
4	Eurozone	1.495***	-0.382***	0.825	91.5	0.022
5	Sweden	1.518***	-0.307***	0.742	94.2	0.13
6	Norway	1.413***	-0.135*	0.653	98.9	-0.0038
7	UK	0.814***	-0.120	0.351	97.6	-0.71
8	New.Zealand	1.533***	0.050	0.624	100	-0.21
9	Canada	0.799***	0.175***	0.465	95.5	-0.41
10	Australia	1.480***	0.178**	0.689	98.5	-0.074
11	Mean	1.266	-0.222	0.614	86.8	-0.0

Table A4: The tables show the factor betas and adjusted R^2's from regressing monthly currency returns on LRV full-sample factor returns in the period Jan 1996–Dec 2016 for the emerging market sample. Significance at the 1%, 5% and 10% levels is indicated with ***, **, *, using Newey-West standard errors with auto lag selection. "%RX" refers to the percentage of the R^2 that is due to only to RX (i.e. $100 \times (R^2 \textit{ with only } RX)/R^2$). "%DC" reports the percent increase in R^2 (i.e. $100 \times [(R^2 \textit{ with } DC)/R^2] - 100$) when the dollar carry factor (from the LRV DM country set) is included as a regressor. The "Mean" row shows the average value in each column. Countries not included in remainder of paper are marked with (x) and are also excluded from the "Mean" calculation.

Full sample EM country betas

	Country	RX	HMLFX	R2	%RX	%DC
1	Croatia	1.394***	-0.350***	0.699	90.9	-0.068
2	Czech.Rep.	1.583***	-0.288***	0.652	95.4	1.1
3	Morocco	1.085***	-0.276***	0.76	90.7	1.5
4	Tunisia	1.011***	-0.273***	0.71	89.4	-0.17
5	Iceland (x)	1.046***	-0.096	0.275	99.9	-0.45
6	Kuwait (x)	0.204***	-0.048***	0.38	92.6	3.9
7	Nigeria (x)	0.037	-0.036	-0.00731	52.8	36
8	Taiwan (x)	0.508***	-0.032	0.469	100	0.098
9	South.Korea	1.299***	-0.031	0.336	101	-0.075
10	Singapore	0.778***	-0.029	0.688	100	-0.12
11	Kazakhstan (x)	0.072	-0.025	-0.00604	37	31
12	Hungary	1.649***	-0.014	0.677	100	0.29
13	China	0.057**	-0.005	0.0348	110	-6.2
14	Peru	0.365***	-0.004	0.21	102	12
15	Hong.Kong	0.016**	-0.001	0.0266	113	-15
16	Saudi.Arabia (x)	0.001	0.001	-0.00764	50.4	26
17	Egypt (x)	0.044	0.011	-0.00472	14	45
18	Argentina (x)	0.204**	0.034	0.000625	761	116
19	Israel	0.520***	0.034	0.183	101	5.4
20	Ghana (x)	0.053	0.058	-0.00415	42.4	11
21	Ukraine (x)	0.327	0.083	0.045	105	-5.9
22	Kenya	0.262***	0.124	0.0616	86.7	-6.1
23	Thailand	0.822***	0.128	0.291	98.2	7.7
24	Russia	0.942***	0.128	0.293	99.1	9.6
25	Poland	1.555***	0.143**	0.659	99.2	0.087
26	India	0.557***	0.157***	0.354	93	0.37
27	Malaysia	0.845***	0.186*	0.472	96.5	-0.19
28	Philippines	0.560***	0.197***	0.297	89.8	2.1
29	Chile	0.752***	0.249**	0.3	90.8	-0.52
30	Colombia	0.777***	0.300***	0.259	88.2	1.3
31	Brazil	0.997***	0.474***	0.209	84.3	0.76
32	Mexico	0.497***	0.630***	0.459	52.3	0.5
33	South.Africa	1.23***	0.65***	0.482	80.6	0.054
34	Turkey	0.814***	0.681***	0.49	75.8	2.3
35	Indonesia	1.109**	0.792***	0.288	77.5	10
36	Mean	0.859	0.144	0.396	92.2	1.1

Table A5: Panel regressions for 1-month contemporaneous returns for the DM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

1-month contemporaneous returns forecasts for DM across time periods

	One-month return (contemporaneous)				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret12m	0.089***	0.109***	0.096***	0.108***	0.095***
vol1m	−0.449	−0.305	0.233	−0.243	0.197
vol12m	0.737***	1.126**	0.863**	1.047**	0.800**
VIX	−0.032	0.007	−0.092**	−0.002	−0.096**
logRSpotPos	0.018	−0.003	0.064***	0.002	0.062***
logRSpotNeg	−0.003	0.030**	−0.006	0.032**	−0.008
nfa	0.001	0.002	−0.002	0.014	−0.001
res_GDP	0.002	0.090**	−0.009	0.089*	−0.007
cpiYOY	0.235***	0.266***	0.232*	0.229**	0.208
gdprYOY	0.068*	0.091	0.042	0.082	0.044
exFedCpiYOY	−0.046	−0.080	0.572	0.246	0.664
cpiYOYUS	−0.780***	−0.085	−1.394***	0.015	−1.417***
exFedGdprYOY	0.055	0.059	0.040	0.015	0.098
gdprYOYUS	−0.086	−0.468**	0.042	−0.492**	−0.008
carry	−0.377	−1.468	−4.006**	−0.865	−3.880**
exFedRate	0.266	1.379**	0.985*	1.344**	0.860
T-bill	0.115	−0.097	−0.733*	−0.065	−0.655
treas_basis	1.059	−0.125	1.221	−0.256	1.426
Fed				−0.744*	−0.899
CBexFed				1.086*	0.025
Start	*Oct*96	*Oct*96	*Nov*06	*Feb*97	*Nov*06
End	*Dec*16	*Oct*06	*Dec*16	*Oct*06	*Dec*16
Observations	2,394	1,174	1,220	1,039	1,220
Adjusted R^2	0.164	0.169	0.214	0.178	0.217

Note: *p<0.1; **p<0.05; ***p<0.01
Std. errors clustered by time.

Table A6: Panel regressions for 1-month contemporaneous returns for the EM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

1-month contemporaneous returns forecasts for EM across time periods

	One-month return (contemporaneous)				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret12m	0.064***	0.060***	0.072***	0.052***	0.069***
vol1m	−2.676***	−3.273***	−1.701**	−2.327**	−1.679*
vol12m	0.953***	1.184***	0.872***	1.273***	0.826***
VIX	−0.053**	−0.027	−0.090***	−0.025	−0.101***
logRSpotPos	0.0005	−0.001	0.022***	−0.003	0.021***
logRSpotNeg	0.021**	0.040***	0.008	0.039***	0.007
nfa	−0.001	−0.001	0.013**	−0.001	0.013**
res_GDP	−0.004	0.014	−0.002	−0.002	−0.002
cpiYOY	0.120***	0.152***	0.128***	0.161***	0.123***
gdprYOY	0.008	0.001	0.029	0.018	0.017
exFedCpiYOY	−0.315	−0.575	0.350	0.224	0.382
cpiYOYUS	−0.318**	0.138	−0.771***	0.144	−0.789***
exFedGdprYOY	0.124	0.128	0.146	0.061	0.185
gdprYOYUS	−0.240**	−0.374***	−0.312	−0.312**	−0.323
carry	−0.069	−0.318	0.267	−0.249	0.345
exFedRate	0.372	1.022***	0.406	1.030**	0.378
T-bill	−0.125	−0.371**	−0.253	−0.356**	−0.277
treas_basis	0.448	−0.195	0.909	0.222	0.939
Fed				−0.405	−0.363
CBexFed				0.834	−0.775
Start	$Oct96$	$Oct96$	$Nov06$	$Feb97$	$Nov06$
End	$Dec16$	$Oct06$	$Dec16$	$Oct06$	$Dec16$
Observations	5,379	2,407	2,972	2,122	2,972
Adjusted R^2	0.162	0.153	0.188	0.135	0.191

Note: *p<0.1; **p<0.05; ***p<0.01
Std. errors clustered by time.

Table A7: Panel regressions for 1-month forward returns for the DM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

1-month forward returns forecasts for DM across time periods

	One-month return				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret1m	−0.070	0.008	−0.118**	0.007	−0.126**
ret12m	−0.007	0.0003	−0.00005	0.003	−0.001
vol1m	−0.747	−1.191	−0.953	−1.905*	−1.007
vol12m	0.901***	0.682	0.693*	0.888	0.601*
VIX	0.068**	0.005	0.127***	−0.024	0.119**
logRSpotPos	0.010	0.001	−0.009	−0.011	−0.011
logRSpotNeg	−0.002	−0.006	−0.067**	0.0001	−0.070***
nfa	0.0004	0.019*	−0.006	0.017	−0.005
res_GDP	0.001	−0.020	−0.0003	−0.031	0.002
cpiYOY	0.086	0.219**	−0.154	0.234*	−0.189
gdprYOY	0.097**	0.091	0.107**	0.052	0.111**
exFedCpiYOY	−0.127	0.632	0.836	0.731	0.982*
cpiYOYUS	−0.453**	−0.721**	−0.736**	−0.639**	−0.782**
exFedGdprYOY	0.197	0.188	0.179	0.245	0.269
gdprYOYUS	−0.118	−0.245	−0.250	−0.263	−0.328
carry	0.577	0.737	−1.134	0.262	−0.977
exFedRate	0.258	−0.409	0.580	−0.008	0.395
T-bill	0.036	−0.121	−0.087	−0.212	0.027
treas_basis	4.501***	−0.317	8.064***	0.681	8.385***
Fed				0.453	−1.378**
CBexFed				1.045	0.024
Start	$Oct96$	$Oct96$	$Nov06$	$Feb97$	$Nov06$
End	$Nov16$	$Oct06$	$Nov16$	$Oct06$	$Nov16$
Observations	2,384	1,174	1,210	1,039	1,210
Adjusted R^2	0.111	0.083	0.190	0.091	0.198

Note: *p<0.1; **p<0.05; ***p<0.01
Std. errors clustered by time.

Table A8: Panel regressions for 1-month forward returns for the EM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

1-month forward returns forecasts for EM across time periods

	One-month return				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret1m	0.028	0.046	−0.001	−0.035	−0.002
ret12m	−0.006	−0.004	−0.006	−0.008	−0.006
vol1m	−0.502	−0.353	−0.677	−0.298	−0.657
vol12m	0.488***	0.481***	0.407*	0.733***	0.395*
VIX	0.054**	−0.010	0.099***	−0.034	0.097***
logRSpotPos	−0.002	−0.003	−0.002	−0.009	−0.002
logRSpotNeg	0.007	0.001	−0.036*	−0.001	−0.036*
nfa	0.002	−0.007**	0.004	−0.009**	0.004
res_GDP	0.0001	0.019	0.007	0.004	0.007
cpiYOY	0.050**	0.069**	0.027	0.076**	0.026
gdprYOY	0.064***	0.043	0.053**	0.062*	0.050**
exFedCpiYOY	−0.438*	−0.263	0.136	0.333	0.176
cpiYOYUS	−0.012	−0.076	−0.301	−0.140	−0.310
exFedGdprYOY	0.099	0.159	0.058	0.177	0.089
gdprYOYUS	−0.152	−0.190	−0.137	−0.201*	−0.155
carry	0.648***	0.797***	1.070**	1.162***	1.078**
exFedRate	−0.120	−0.650*	0.056	−0.486	−0.017
T-bill	0.196	0.047	0.258	−0.036	0.314
treas_basis	3.812***	0.666	6.043***	1.102	6.151***
Fed				0.829**	−0.483
CBexFed				1.071	0.216
Start	$Oct96$	$Oct96$	$Nov06$	$Feb97$	$Nov06$
End	$Nov16$	$Oct06$	$Nov16$	$Oct06$	$Nov16$
Observations	5,354	2,407	2,947	2,122	2,947
Adjusted R^2	0.069	0.036	0.135	0.074	0.135
Note:					*p<0.1; **p<0.05; ***p<0.01
					Std. errors clustered by time.

Table A9: Panel regressions for 12-month forward returns for the DM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

12-month forward returns forecasts for DM across time periods

	12-month return				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret1m	−0.286**	−0.035	−0.212*	−0.013	−0.283***
ret12m	0.071	−0.066	0.207***	−0.067	0.176**
vol1m	5.701**	1.388	4.680**	1.044	3.093
vol12m	2.993***	3.883**	5.023***	1.622	3.762**
VIX	0.139	0.123	0.344***	0.078	0.221**
logRSpotPos	−0.088	0.099	−0.300***	0.015	−0.301***
logRSpotNeg	−0.107*	−0.226***	−0.209*	−0.193***	−0.243***
nfa	−0.020	0.172***	−0.105	0.196***	−0.092
res_GDP	0.002	−0.390**	−0.121**	−0.681***	−0.082
cpiYOY	1.362	1.604***	0.886	1.504***	0.656
gdprYOY	0.502**	0.465	0.043	0.431	0.137
exFedCpiYOY	−0.319	3.631**	3.369	4.834**	3.770**
cpiYOYUS	−2.153***	−4.059***	−2.171*	−4.006***	−2.411**
exFedGdprYOY	1.314**	1.760*	−0.189	1.544*	0.304
gdprYOYUS	−2.357***	−2.341***	1.545	−2.205***	0.983
carry	11.178**	12.776***	−9.402	18.309***	−11.441
I(carry ∗Fed)				−3.984	1.874
I(carry ∗CBexFed)				−8.939**	−4.809
exFedRate	1.999	−1.955	−9.018***	−1.976	−9.320***
T-bill	0.141	−0.405	9.926***	0.143	9.157***
treas_basis	15.736***	18.542***	−6.373**	18.897***	−5.785**
Fed				0.330	−5.226**
CBexFed				−2.462	−12.678***
Start	$Oct96$	$Oct96$	$Nov06$	$Feb97$	$Nov06$
End	$Dec15$	$Oct06$	$Dec15$	$Oct06$	$Dec15$
Observations	2,274	1,174	1,100	1,039	1,100
Adjusted R^2	0.292	0.656	0.487	0.654	0.542
Note:					*p<0.1; **p<0.05; ***p<0.01
					Std. errors clustered by both.

Table A10: Panel regressions for 12-month forward returns for the EM sample across different time periods. Columns (1-3) show the baseline model in all time periods. Columns (4-5) show the baseline model augmented with QE indicators in the two subsamples. Columns (6-7) show the baseline model augmented with central bank sentiment measures in the two subsamples. The $cpiYOY$, $vol1m$ and $vol12$ series have been winsorized at the 1% level when they appear as right hand side variables. The $vol1m$ and $vol12m$ variables are not winsorized when they appear on the left hand side. Standard errors are clustered by month and country. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

12-month forward returns forecasts for EM across time periods

	12-month return				
	Base			Central bank	
	(1)	(2)	(3)	(4)	(5)
ret1m	−0.167*	−0.165	−0.162	−0.187	−0.252***
ret12m	0.026	−0.013	0.059	−0.018	0.035
vol1m	4.655***	5.999***	1.204	6.690***	1.294
vol12m	2.645***	4.154***	2.997***	3.981***	2.612***
VIX	0.129*	−0.056	0.419***	−0.058	0.277***
logRSpotPos	−0.026	−0.043	0.010	−0.126**	−0.011
logRSpotNeg	−0.003	0.014	−0.158**	0.055	−0.192***
nfa	0.050*	−0.034	−0.011	−0.043	−0.013
res_GDP	−0.066	0.221	0.144*	0.060	0.119*
cpiYOY	0.461***	0.453***	0.494**	0.666***	0.533**
gdprYOY	0.532***	0.309*	0.544***	0.451**	0.396**
exFedCpiYOY	−2.526**	0.672	1.583	−0.457	1.434
cpiYOYUS	−0.254	−0.313	−1.173	−0.226	−1.110
exFedGdprYOY	0.551	1.381*	−0.445	1.117	−0.043
gdprYOYUS	−1.497**	−1.482**	−0.164	−1.253*	−0.257
carry	3.349**	3.343	1.403	3.997**	0.563
I(carry ∗Fed)				2.091	−6.971
I(carry ∗CBexFed)				−2.241	−12.527**
exFedRate	1.124	−0.773	−9.484***	−0.554	−9.616***
T-bill	−0.048	−1.053	9.347***	−0.562	8.874***
treas_basis	8.839***	9.507***	−5.672**	13.855***	−5.046**
Fed				0.444	−1.358
CBexFed				−3.069*	−5.666**
Start	$Oct96$	$Oct96$	$Nov06$	$Feb97$	$Nov06$
End	$Dec15$	$Oct06$	$Dec15$	$Oct06$	$Dec15$
Observations	5,046	2,377	2,669	2,101	2,669
Adjusted R^2	0.183	0.318	0.406	0.332	0.452

Note: *p<0.1; **p<0.05; ***p<0.01
Std. errors clustered by both.