Market Perceptions of International Monetary Policy Dependence*

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—PRELIMINARY AND INCOMPLETE—

Abstract

This paper uses data on overnight indexed swap contracts to measure unexpected changes in policy interest rates by nine different central banks. It then adopts an event-study approach to estimate the effects of these monetary policy surprises on the term structure of interest rates in all nine countries using daily frequency data. While many papers have estimated the effects of monetary policy surprises on the term structure of interest rates in individual countries, notably the US, this is the first paper to consider the cross-country effects of monetary policy surprises for all major industrialized countries. We find surprisingly broad cross-country spillovers from monetary policy surprises. US monetary policy shocks can affect the term structure of interest rates around the world, but the same is true for monetary policy shocks in other countries, in particular the euro area and the UK. We also document some more local effects, whereby regional trade and financial linkages can lead to particularly strong monetary policy dependencies.

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1 Introduction

The availability of high-frequency data and new financial instruments that allow investors to take positions on the future path of short-term interest rates has opened up a new and powerful approach to identifying the effects of monetary policy shocks on asset prices. The recent literature on this topic began with the paper of Kuttner (2001), who was the first author to use federal funds futures quotes to measure the surprise component of Federal Open Market Committee (FOMC) announcements concerning the federal funds rate. Kuttner then regressed daily changes in the term structure of interest rates on these monetary policy surprises, to assess the strength of the transmissions mechanism of monetary policy shocks onto longer-term interest rates.

Since then, a great many papers have adopted this same approach, including Faust, Swanson and Wright (2004) and Bernanke and Kuttner (2005). Similar approaches have been applied in foreign countries (e.g. Moessner and Gravelle (2001) and Brand, Buncic and Turunen (2006)) and also to cross-country spillovers, but only for pairs of countries, or for the effects of US surprises on other countries. For example, Ehrmann and Fratzscher (2003) and Ehrmann, Fratszcher and Rigobon (2005) measure effects of U.S. and euro-area surprises on both money markets. And Hausman and Wongswan (2006) estimated the impact of US monetary policy surprises on interest rates and other asset prices around the globe.[1]

This paper is a systematic study of the effects of monetary policy surprises on the term structure of interest rates for nine major economies (eight countries and the euro area), covering the vast majority of the industrialized world's output. We study both the effects of policy shocks on the term structure in that

[1] In addition, the event-study approach can be used to identify the effects of monetary policy shocks on exchange rates. This has been considered by authors including Andersen, Bollerslev, Diebold and Vega (2003), Kearns and Manners (2006) and Coleman and Karagedikli (2010). But exchange rate effects of monetary policy shocks are beyond the scope of the current paper.

country and in all the other countries. To measure monetary policy surprises, we use overnight indexed swap (OIS) contracts. OIS contracts are relatively new financial instruments that allow investors to bet on the average level of overnight interest rates over the maturity of the contract. They are very similar to federal funds futures contracts—the only material difference is that federal funds futures contracts are bets on the overnight interest rate for a particular calendar month, rather than for a fixed maturity from the time that the contract is entered into, which is the case for OIS.

OIS contracts now trade in many countries, while there is no direct analog of the federal funds futures contract in any country outside the US. As all major central banks now announce their decisions about monetary policy at regularly scheduled meetings, OIS contracts allow us to measure the deviations of these policy decisions from expectations, assuming that term premia do not vary from day to day.

We can then regress changes in the term structure of interest rates on these surprises to measure the effects of monetary policy shocks on both domestic and foreign interest rates. This assumes that announcement-day changes in one-month OIS rates represent only monetary policy surprises. The assumption seems reasonable, but we can also instead use identification-through-heteroskedasticity as proposed by Rigobon (2003) and Rigobon and Sack (2003, 2004) to estimate the effects of monetary policy shocks on interest rates, assuming only that the variance of monetary policy shocks is higher on policy-announcement days than on other days—a very mild assumption indeed.

Our paper contributes to the literature on cross-country interest rate linkages, but focuses on the effects of the central bank in one country announcing a surprise policy action (or inaction) on interest rates in other countries. To the extent that market participants change their expectations of future monetary

policy or term premia in their own country when they learn of policy surprises in other countries, we will observe cross-country interest rate responses. In principle, market participants may perceive such interdependencies for a number of reasons. One channel is that tightening of policy in one country could lead its exchange rate to appreciate, stimulating aggregate demand in its trading partners and motivating policymakers in those other countries to firm their stance of monetary policy as well. Alternatively, rising rates in one country could induce portfolio shifts into the assets of that country, driving foreign interest rates up too. Market participants may also think that central banks have private information about the state of the global or regional business cycle. Seeing an action by one central bank would lead these market participants to update their beliefs about the state of the economy, and also about likely policy actions of other central banks. Finally, tightening of policy in one country could lead other central banks to follow suit, even in the absence of any potential capital flows or private information, as part of a strategy of international policy coordination.

Of course, much has been written on the subject of cross-country interest rate linkages. Some authors, such as Chinn and Frankel (2005), consider the time series relationships among international interest rates. Bergin and Jorda (2004) estimate a model in which the monetary policy decisions of one central bank are a function of explanatory variables in that country and other countries. Kulish and Rees (2011) model the high correlation of international interest rates with US rates of the same maturity. Closer to our approach in this paper, other authors adopt an event-study methodology in which the effects of monetary policy surprises are measured at high frequency (e.g. Ehrmann and Fratzscher (2003) and Ehrmann, Fratszcher and Rigobon (2005)). Craine and Martin (2008) focus on the US and Australian yield curve responses to monetary policy surprises in each country. But none of these papers uses OIS rates

to measure monetary policy expectations and more importantly none of them considers as wide a range of countries as we have in this paper. Our paper uses an event-study methodology to measure the transmission of monetary policy shocks to domestic and foreign interest rates essentially around the entire industrialized world.

We find that domestic interest rates are sensitive to monetary policy shocks, which is not surprising. But we also find considerable evidence of spillover effects of monetary policy surprises. The spillovers that we find are not just from the US to other countries. Monetary-policy surprises in the euro area and other countries also have global and regional effects. This builds on the findings of Chinn and Frankel (2005) and Ehrmann and Fratzscher (2004) who find that the euro area has had more effect on global interest rates since monetary union than it did before. But our result is more stark—the effects of euro-area monetary policy surprises are if anything larger than those of US policy shocks. And we find that monetary policy surprises in other countries, such as the UK, also impact term structures around the world, while there are special regional linkages as well, in particular between Australia and New Zealand.

The plan for the remainder of this paper is as follows. Section 2 describes OIS contracts and the data. Section 3 contains the regression results. As a robustness check, section 4 gives the results using identification-through-heteroskedasticity. Section 5 concludes.

2 The data and empirical work

The empirical work presented in this paper is based on three datasets.

The first data set consists of quotes on OIS contracts at maturities of 1, 3, and 6 and 12 months in the US, UK, Euro area, Japan, Canada, Sweden, Switzerland, Australia and New Zealand. An OIS rate of maturity h months

is a bet between two parties on the average level of short-term interest rates over the next h months. No money changes hands at the time the contract is entered into. At maturity of the contract, the party holding a short position makes a payment to the party holding a long position of $k(f_h - r_h)$ where f_h is the OIS rate, r_h is the realized average overnight interest rate over the life of the contract, and k is a constant. Under risk-neutrality, the OIS rate is the conditional expectation of the average overnight interest rate over the life of the contract. The data are available at the daily frequency and span January 2002 to April 2011.

The second data set consists of zero-coupon yield curves at the daily frequency estimated from nominal sovereign government bond yields of the different countries, constructed as described in Gürkaynak, Sack, and Wright (2007) and Wright (2011). These data are likewise available at the daily frequency for the same nine countries, though in this version of the paper, for five countries, the available data end in May 2009.

The third data set contains released values of macroeconomic data and the survey expectations about these releases, giving us data release surprises at a daily frequency. This version of the paper has US, US, Swedish and some euro area countries' data but the historical coverage is uneven.

We also collected the dates of scheduled policy meetings by the central banks of these nine countries.[2] OIS quotes then allow monetary policy surprises to be measured as the difference between the one-month OIS rates before and after the policy meeting. None of the central banks in question has a meeting for setting interest rates more often than once a month. All of them change interest rates only at these policy meetings, except perhaps under very unusual circumstances.

[2] Settlement conventions for OIS contracts differ across countries (Credit Suisse First Boston (2001)). But for most countries, the start date for an OIS contract is one or two days after the trade date. This means that an OIS rate from the day before a monetary policy announcement should not be in any way affected by the pre-announcement policy interest rate.

Consequently, the difference between the one-month OIS rate before and after the policy meeting is a very close approximation to the deviation of the overnight interest rate after the policy meeting from what had been expected previously.

For the U.S., an alternative approach to measuring monetary policy surprises is to use Federal Funds futures, as proposed by Kuttner (2001). But the use of OIS allows surprises to be measured for foreign countries as well. The correlation between US monetary policy surprises measured using Federal Funds futures and using OIS is 97.6 percent. Figure 1 shows that the Federal Funds futures and OIS-based US monetary policy surprises line up along the 45-degree line. This provides a good cross-check for OIS-based surprises.

It is central to this paper that we interpret the announcement-day change in one-month OIS quotes as reflecting monetary policy surprises alone, and not the effect of other economic news on expected interest rates. In principle, other factors could indeed affect one-month OIS rates. For example, data indicating stronger-than-expected employment or spending growth could drive short-term OIS rates higher. However, it seems unlikely that central bank policy decisions would react much to data that only become available within the day before the policy decision is announced. This would require the policy committee to be very nimble in responding to incoming news, and it seems more realistic that members have decided on their preferences earlier than this. Indeed, policy decisions are finalized some time before they are announced—for example, the Bank of Canada announces its decision the morning after it is actually reached. If policymakers do not change the upcoming decision in response to the incoming news, and they do not react to it until the next policy meeting which is at least one month away, then the data should not affect the one-month OIS rate.

One might nonetheless still worry that meeting-day changes in one-month OIS rates could be slightly contaminated by factors other than the policy an-

nouncement. More importantly, one might be concerned that the policy announcement is not just a decision about short-term interest rates but also guidance about the future path of policy. To address both of these concerns, we also consider an approach involving identification through heteroskedasticity. In this approach, all that is needed is that the volatility of the monetary policy shocks is bigger on policy announcement days than on other days—a very weak requirement.

Table 1 shows summary statistics for the monetary policy surprises. Most central banks have some large negative policy surprises: the largest surprise easings all occurred in late 2008 and early 2009. Judging by the interquartile range, the UK, Sweden and Switzerland have the most unpredictable policy, while the euro area and Japan have the most predictable policy. In the case of Japan, this is of course because the policy interest rate was essentially stuck at the zero bound for the whole sample period. But even for countries with comparatively big monetary policy surprises, the shocks rarely exceed 20 basis points in absolute magnitude.

3 Regression Results

The regressions that we run in this paper are of the form

$$y_{j,h,t} - y_{j,h,t-1} = \alpha + \beta_{ij}(h) MPS_{i,t} + \varepsilon_t \tag{1}$$

where $y_{j,h,t}$ denotes the interest rate on day t at maturity h for country j, $MPS_{i,t}$ is the monetary policy surprise in i country on day t, and the regression is run over all days for which there is a monetary policy announcement in country i. Thus the coefficient $\beta_{ij}(h)$ measures the effect of a surprise monetary policy tightening in country i on the interest rate at maturity h of country j. For

maturities h of up to one year, we use OIS rates; at longer maturities, we instead use zero-coupon government bond yields. Of course, the monetary policy announcements by different central banks come out at very different times of the day. In constructing the monetary policy surprises and yield changes in equation (1), we ensure that both of these bracket the time of the policy announcement.[3]

Tables 2-5 report the results where the yields on the left-hand-side of equation (1) are three-month OIS, one-year OIS, two-year bond yields, and ten-year bond yields, respectively. The tables report the number of observations and R-squared values for each regression; the number of observations differ because some central banks have more frequent policy meetings than others, and because of missing data. Tables 2-5 give the estimated effects of monetary policy surprises in each country on OIS rates and yields in that country and in all other countries, for a total of 81 parameter estimates for each table.

Not surprisingly, monetary policy surprises in each country affect short-term interest rates in that country; entries along the diagonal are large and significant. But in Tables 2-4, we also see that monetary policy surprises have substantial effects on short-term interest rates in other countries. For example, taking the effects of monetary policy shocks on one-year OIS rates, out of the 72 cross-country responses estimated in Table 4, 21 are statistically significant at the 5 percent level. Surprise tightenings of policy in the US are estimated to raise one-year OIS rates in most other countries; significantly so for Europe and Switzerland (at the 5 percent level) and Canada, the UK and Sweden (at the 10 percent level). But other countries' monetary policy surprises can also have wide-ranging effects on global yields. A surprise tightening by the ECB leads one-year OIS rates to rise significantly in all countries except Canada and

[3] When using Federal Funds futures to measure monetary policy surprises, Gürkaynak, Sack and Swanson (2005) show that doing the same analysis with intraday data in a tight window around the policy announcement does not change point estimates much compared to daily data, but increases precision. However, we do not have a history of intradaily OIS data.

Switzerland (using the 5 percent significance level). A surprise tightening by the Bank of England leads one-year OIS rates to rise significantly in all countries except Canada, New Zealand and the US. Thus monetary policy shocks have significant cross-country spillovers, and the effects are, if anything, greater for ECB and some other non-US policy shocks than they are for FOMC surprises.

Australia and New Zealand respond to surprises each other's policy surprises (and to some extent to Japan, which does not have much to offer in terms of policy surprises). While these two countries have limited effects on global interest rates, their regional proximity and trade and financial ties make policy surprises in one country elicit a response in the other country as well. This is consistent with the effect Coleman and Karagedikli (2010) find for the New Zealand-Australian dollar exchange rate in response to Australian macroeconomic data surprises.

It is interesting to note that the cross-country effects increase as the maturity of the OIS contract lengthens. There is very little cross country effects in one month OIS rates (not shown). The effects are larger and more significant for three months OIS rates (Table 2), often peak at around six months (not shown), and remain large for one year OIS rates (Table 3). This is natural as it implies that market participants do not expect a policy surprise in another country to have an effect on monetary policy in their own country within a month. Indeed, there may not be a policy meeting in their own country within that horizon. Instead, market participants foresee changes in the expected policy path in their country over a three or six month horizon.

It is also not surprising that the responses of three-month Japanese OIS rates were essentially zero, as Japan was continuously stuck at the zero lower bound during the entire sample period.

Monetary policy surprises also have cross-country effects on ten-year bond

yields. Surprise tightenings of policy in the US are estimated to significantly raise ten-year yields in Australia and Switzerland. ECB surprise policy changes have even broader-reaching effects on long-term yields in other countries, as they significantly raise ten-year yields in Australia, Switzerland, Japan, New Zealand and Sweden.

It is important to note, however, that even if surprise tightenings in one country raise the term structure of interest rates in another country, this does not necessarily mean that the overall effect of the policy shock is contractionary for that other country—the impact on the exchange rate must also be taken into account. The surprise tightening would tend to lead the currency of the other country to depreciate, which is in turn expansionary for it. Thus the overall effect of the surprise tightening on the other country depends on the relative magnitudes of the interest rate and exchange rate impacts.

3.1 Monetary Policy Surprises and Data Surprises

Researchers including Ehrman and Fratzscher (2005) have noted that euro area news announcements have much smaller effects on asset prices than corresponding US announcements. This may seem puzzling, given that the two economies are roughly of comparable size. In Tables 6 and 7, we report the results of regressions of daily changes in OIS rates onto macroeconomic data surprises in the US and abroad. We run this regression for all days, setting the surprise for a particular announcement type to zero if that announcement does not come out on that day.[4] The US data surprises have, in some cases, significant effects on foreign interest rates.[5] In contrast, data surprises in the euro area and elsewhere do not have much effect on interest rates in other countries. This confirms and

[4] For the US, surprises are defined as actual released value less the expectation from the Money Market Services/Action Economics survey. For other countries, surprises are defined as actual released value less the expectation from the Bloomberg survey.

[5] This is documented in more detail in Andersen et al. (2007) and Faust et al. (2007).

extends the result of Ehrmann and Fratzscher (2005).

We are thus left with a marked contrast between the effects of macroeconomic data surprises and the effects of monetary policy surprises. For macroeconomic data surprises, spillovers onto foreign interest rates go mainly from the US to the rest of the world. Meanwhile, for monetary policy surprises, both US and non-US monetary policy surprises have effects on term structures around the world. The broadest impacts seem to come from euro area monetary policy surprises. One possible partial explanation may be that news for the euro area as a whole actually does have a substantial effect on asset prices after all, but the effect is hard to detect for news other than monetary policy announcements because macroeconomic data for the euro area (other than ECB interest rate and monetary aggregates announcements) come out first at the national and even subnational level. Because of the release calendar, each national release, which we measure, may contain a small amount of information about the euro area aggregate. Also, euro area (and indeed about all national releases other than the US) tend to have larger revisions than the US ones, making the signal to noise ratio smaller. Another possible partial explanation is that Switzerland, the UK and Sweden have much stronger trade linkages with the euro zone than they do with the US. This should naturally enhance the impact of euro zone monetary policy shocks on their interest rates.[6] Finally, it is worth pointing out that the timing of policy meetings is such that it is much more likely for an ECB policy meeting to occur in the few days before a Bank of England or Swiss National Bank policy meeting than for the converse to occur. If there is some implicit policy coordination, or perceived pressure for one central bank to adopt a similar stance to neighboring central bank, then the ECB might have

[6] Denmark is an extreme example of this. Although Denmark does not use the euro, it has adopted a fixed exchange rate vis-a-vis the euro, because of the trade and other linkages between Denmark and the euro zone. This fixed exchange rate system effectively forces Denmark to adopt the same interest rate policy as the ECB.

something of a "first mover advantage" relative to the Bank of England and Swiss National Bank.

3.2 Impacts of Quantitative Easing

This paper is concerned with measuring the stance of monetary policy using the short-term interest rate. However, monetary policy has recently been stuck at the zero lower bound in some of the countries that we consider. This has been true for over a decade in Japan, but also for a few years in some other countries in the aftermath of the 2008 financial crisis. The Bank of Japan, the Federal Reserve and the Bank of England have all engaged in large scale asset purchases, or quantitative easing, to provide further support to demand in their economies.

It is interesting to note some anecdotal evidence that quantitative easing surprises can have effects on interest rates in other countries, and that these spillovers are not purely from the US to abroad. This is independent evidence that does not depend on measuring policy surprises from OIS, providing additional credence to the main point of this paper that the US monetary policy is not the only mover and shaker in global markets. The announcements of large scale unsterilized domestic government bond purchases by the Bank of England and Federal Reserve on March 5, 2009 and March 18, 2009 came as large surprises to market participants.[7] Table 8 lists the changes in ten-year domestic-currency government bond yields around the world on these two announcement days. As is well known, ten-year yields declined substantially in the UK on March 5 and in the US on March 18. But it is noteworthy that both announcements were accompanied by substantial, though smaller, declines

[7] The timeline for quantitative easing in the United Kingdom is discussed by Joyce et al. (2010). In February 2009, the Bank of England 's Inflation Report gave a strong indication that quantitative easing was likely. But the size of the program that was announced in March came as a surprise to market participants.

in interest rates in nearly all other industrialized countries. In analyzing the effects of policy interest rates surprises, we found a pattern of spillovers that are not merely from the US other countries. This pattern appears to have applied to these two big quantitative easing surprises as well.

3.3 The Influence of Outliers and Robust Regressions

Most of the monetary policy surprises in our dataset are small, but a few are large. This accentuates the concern that one ought to have about the possible influence of outliers. However, we prefer to avoid a hands-on judgmental process of deciding which observations are representative and which ought to be deleted because they may be atypical. Instead, we adopt a more "automatic" robust regression approach in which no observation is allowed to have too much influence on the parameter estimates. Specifically, we estimate equation (1) using an M-estimator (Huber (1964)) with a Tukey biweight loss function.

As an illustration, Table 9 shows these robust regression estimates of the impacts of monetary policy surprises on one-year OIS rates. These are generally quite similar to those in Table 3, where OLS was used instead. Monetary policy spillovers are quite common and in many cases emanate from outside of the US. We continue to find this result when using M-estimation to estimate the effects of monetary policy surprises on three-month OIS rates or on two- or ten-year government bond yields.

Our findings about monetary policy interdependencies do not appear to be driven by outliers. Robust regression, however, shows that the few significant negative coefficients in the OLS results, which did not make any theoretical sense, are due to outliers. Hence, the main findings of the paper are robust to controlling for outliers while the few odd findings are statistical flukes.

4 Identification through Heteroskedasticity

We interpret the coefficient estimates in equation (1) as measuring the effects of monetary policy surprises on interest rates. As discussed earlier, we believe the institutional fact that policy decisions are generally made only at meetings that are scheduled at least one month apart means that one-day changes in one-month OIS rates on policy announcement days ought to reflect only policy surprises, not the effects of other news released within that one-day window. However, in a concern that there is still some small effect of other news, we also consider the approach of identification through heteroskedasticity.

This moreover means that we can measure monetary policy surprises from changes in somewhat longer-term OIS rates. This is useful because, over the sample period, the central banks that we consider sometimes/always release a statement along with their monetary policy decisions. The wording of this statement may affect expectations about subsequent changes in the stance of monetary policy (Gürkaynak, Sack and Swanson (2005)). This is part of the monetary policy surprise that is not reflected in one-month OIS rates; but may be reflected in quotes on longer-term OIS contracts.

Specifically, we assume that the change the 3-month OIS rate for country i, $y_{i,3,t}$ depends on country i's monetary policy shock, $MPS_{i,t}$, which is now treated as unobservable, and other shocks, u_t, such that

$$y_{i,3,t} - y_{i,3,t-1} = MPS_{i,t} + u_t \tag{2}$$

We also assume that the interest rate at maturity h for country j, $y_{j,h,t}$, depends on country i's monetary policy shock $MPS_{i,t}$, and other shocks, u_t such that

$$y_{j,h,t} - y_{j,h,t-1} = \gamma MPS_{i,t} + \theta u_t \tag{3}$$

Let the variances of the unobservable monetary-policy and other shocks be $\sigma^2_{MPS,1}$ and $\sigma^2_{u,1}$, respectively, on announcement days, and $\sigma^2_{MPS,2}$ and $\sigma^2_{u,2}$ on non-announcement days. Then the variance-covariance matrix of $(y_{j,h,t} - y_{j,h,t-1}, y_{i,3,t} - y_{i,3,t-1})'$ will be

$$\begin{bmatrix} \gamma^2\sigma^2_{MPS,1} + \theta^2\sigma^2_{u,1} & \gamma\sigma^2_{MPS,1} + \theta\sigma^2_{u,1} \\ \cdot & \sigma^2_{MPS,1} + \sigma^2_{u,1} \end{bmatrix} \tag{4}$$

and

$$\begin{bmatrix} \gamma^2\sigma^2_{MPS,2} + \theta^2\sigma^2_{u,2} & \gamma\sigma^2_{MPS,2} + \theta\sigma^2_{u,2} \\ \cdot & \sigma^2_{MPS,2} + \sigma^2_{u,2} \end{bmatrix} \tag{5}$$

on announcement and non-announcement days, respectively. We estimate the sample variance-covariance matrices of $(y_{j,h,t} - y_{j,h,t-1}, y_{i,3,t} - y_{i,3,t-1})$ on both announcement and non-announcement days and then estimate the six parameters by minimizing the distance between the sample variance-covariance matrices and the parameters in (4) and (5) by just-identified GMM. Of particular interest is γ: the effect of a unit monetary policy shock in country i on yields in country j. The identifying assumption is simply that the monetary policy shock variance is different on announcement than on non-announcement days $\left(\sigma^2_{MPS,1} \neq \sigma^2_{MPS,2}\right)$. That seems a very mild assumption indeed.

Tables 10 and 11 report the results of this exercise, measuring the impact of the monetary policy surprises in one country on three-month OIS rates/two-year zero coupon bond yields in the other country, respectively. Comparing equations (2) and (3), $\gamma = 1$ if we are considering the own-country impact of shocks ($i = j$) and if the horizon is $h = 3$ months. Thus, by construction, the

impact of the monetary policy surprise on the three-month OIS rate in that same country is equal to 1 (the diagonal elements in Table 10). But the impact of the monetary policy surprise on the two-year yield in that same country is not necessarily equal to 1 (the diagonal elements in Table 11).

In Tables 10 and 11, as in the earlier results, foreign spillovers of monetary policy shocks are common. Surprise tightenings of monetary policy in the US drive foreign interest rates up significantly for a number of other countries. But the same is true for UK policy surprises and also, to a still greater extent, for euro-area monetary policy surprises.

5 Conclusions

In this paper, we have used OIS contracts to measure the effects of monetary policy surprises on the term structures of interest rates around the industrialized world. We have found that monetary policy surprises have cross-border effects on the term structure of interest rates. This is true not only for monetary policy surprises in the US, but also for surprises emanating from other countries, notably the euro area and the UK. Thus, whether because of exchange rate effects, portfolio balance channels, or perceptions of international monetary policy coordination, news about the policy decisions of one central bank has implications for the configuration of interest rates around the globe.

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Table 1: Summary statistics of Monetary Policy Surprises

Country	Number	Mean	IQR	St. Dev	Min	Max
Australia	102	-0.2	2.4	8.3	-53.3	+18.2
Canada	61	-0.9	2.0	8.2	-42.8	+21.0
Switzerland	42	-2.5	4.5	8.6	-29.3	+19.5
EU	113	+0.1	2.1	4.0	-30.9	+10.0
Japan	116	-0.6	0.2	1.3	-5.3	+9.2
New Zealand	73	-0.4	1.7	7.9	-29.1	+19.3
Sweden	53	-1.9	3.0	11.1	-55.0	+20.5
UK	111	-0.9	3.9	9.4	-82.5	+20.3
US	76	-1.5	1.6	8.4	-59.1	+17.8

Notes: This table reports summary statistics for the monetary policy surprises for all nine countries. Surprises are constructed as the one-day changes in one-month OIS quotes bracketing the respective central bank policy announcements. The sample period is from January 2002 to April 2011. The summary statistics are number of observations, mean, inter-quartile range (IQR), standard deviation, minimum, and maximum. The right five columns of the table are all measured in basis points.

Table 2: Estimated Effects of Monetary Policy Shocks on Three-Month OIS Rates

Policy Shock In ↓	Three Month OIS Rate In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	1.126***	-0.047	0.148***	-0.026*	-0.019	0.400***	0.0453	0.103	0.006
	(0.097)	(0.032)	(0.044)	(0.014)	(0.018)	(0.131)	(0.088)	(0.064)	(0.029)
N	102	92	102	102	94	101	90	102	102
R^2	0.85	0.03	0.23	0.02	0.03	0.40	0.01	0.13	0.00
Canada	0.180	0.701***	-0.200**	0.303*	0.036**	0.159**	0.253	0.072	0.147
	(0.110)	(0.107)	(0.091)	(0.179)	(0.015)	(0.062)	(0.222)	(0.089)	(0.120)
n	61	61	61	61	57	61	61	61	61
R^2	0.09	0.71	0.27	0.35	0.19	0.22	0.06	0.06	0.18
Switzerland	0.067	-0.144	0.905***	-0.157	-0.07	-0.044	-0.146	0.574	-0.084
	(0.119)	(0.224)	(0.107)	(0.220)	(0.024)	(0.075)	(0.261)	(0.559)	(0.109)
n	42	38	41	42	36	42	34	42	42
R^2	0.03	0.05	0.82	0.06	0.01	0.02	0.04	0.17	0.04
EU	0.275***	0.581***	-0.147	0.821***	0.048**	0.196**	0.827***	0.400***	0.231
	(0.076)	(0.222)	(0.122)	(0.092)	(0.021)	(0.076)	(0.242)	(0.155)	(0.152)
n	112	105	113	113	101	111	96	113	113
R^2	0.18	0.46	0.02	0.64	0.19	0.11	0.29	0.04	0.11
Japan	-0.524	0.136	-0.122	0.387	0.764***	-0.187	-0.209	-0.123	0.532
	(0.854)	(0.256)	(0.176)	(0.264)	(0.083)	(0.478)	(0.258)	(0.307)	(0.562)
n	116	109	112	116	116	116	104	116	116
R^2	0.01	0.00	0.00	0.06	0.61	0.00	0.00	0.00	0.02
New Zealand	0.089**	0.013	0.005	0.032**	0.018	0.844***	0.039	0.012	-0.007
	(0.042)	(0.027)	(0.020)	(0.021)	(0.012)	(0.168)	(0.026)	(0.021)	(0.027)
n	73	67	73	73	69	73	64	73	73
R^2	0.08	0.00	0.00	0.01	0.07	0.66	0.00	0.00	0.00
Sweden	0.108	0.184	-0.046	0.267**	0.014	0.066	0.765***	0.053	0.085
	(0.062)	(0.114)	(0.056)	(0.107)	(0.012)	(0.044)	(0.111)	(0.128)	(0.059)
n	53	49	52	53	53	53	52	53	53
R^2	0.19	0.17	0.01	0.41	0.03	0.06	0.71	0.03	0.13
UK	0.118***	0.066**	0.246***	0.083***	0.004	0.021	-0.004	0.861***	0.021
	(0.021)	(0.030)	(0.080)	(0.027)	(0.003)	(0.015)	(0.077)	(0.030)	(0.020)
n	111	101	111	111	102	109	96	111	111
R^2	0.15	0.03	0.36	0.04	0.06	0.00	0.00	0.93	0.01
US	-0.097	0.127	0.274	0.112	0.113	0.101	0.258	0.172	0.910***
	(0.087)	(0.153)	(0.113)	(0.093)	(0.083)	(0.067)	(0.194)	(0.173)	(0.039)
n	76	73	76	76	70	75	65	76	76
R^2	0.02	0.02	0.10	0.06	0.08	0.01	0.12	0.08	0.97

Notes: Results from regressions of daily changes in three-month OIS rates onto monetary policy surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 3: Estimated Effects of Monetary Policy Shocks on One-Year OIS Rates

Policy Shock In ↓	One Year OIS Rate In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	1.121***	-0.074	0.063*	0.042	-0.032	0.643***	-0.055	0.168*	0.042
	(0.185)	(0.046)	(0.035)	(0.051)	(0.026)	(0.179)	(0.052)	(0.088)	(0.035)
N	102	52	102	102	84	101	92	102	102
R^2	0.65	0.02	0.04	0.02	0.05	0.49	0.01	0.10	0.01
Canada	0.401***	0.534**	-0.151**	0.144	0.064*	0.203**	0.206	0.040	0.163
	(0.097)	(0.266)	(0.047)	(0.134)	(0.035)	(0.085)	(0.324)	(0.108)	(0.119)
N	61	35	61	61	50	61	55	61	61
R^2	0.25	0.29	0.07	0.07	0.16	0.14	0.07	0.01	0.09
Switzerland	0.164	0.078	0.885***	0.010	-0.080	-0.021	0.044	0.287	-0.063
	(0.215)	(0.243)	(0.165)	(0.191)	(0.038)	(0.060)	(0.352)	(0.419)	(0.071)
N	42	21	42	42	32	42	36	42	42
R^2	0.04	0.01	0.61	0.00	0.21	0.00	0.00	0.06	0.02
EU	0.376***	0.219*	-0.051	0.473***	0.084**	0.215***	0.779***	0.372**	0.634***
	(0.135)	(0.128)	(0.124)	(0.159)	(0.037)	(0.063)	(0.244)	(0.148)	(0.204)
n	112	58	113	113	92	111	98	113	84
R^2	0.07	0.04	0.00	0.09	0.08	0.03	0.36	0.04	0.20
Japan	-0.516	0.343	0.007	0.071	0.709***	-0.272	-0.054	-0.278	0.552
	(1.021)	(0.272)	(0.168)	(0.165)	(0.181)	(0.696)	(0.196)	(0.431)	(0.415)
n	116	68	114	116	110	116	105	116	116
R^2	0.01	0.02	0.00	0.00	0.22	0.00	0.00	0.01	0.02
New Zealand	0.097*	-0.046	0.059	0.141**	0.028*	0.777***	0.064	0.072	0.139
	(0.051)	(0.062)	(0.049)	(0.063)	(0.015)	(0.179)	(0.057)	(0.066)	(0.088)
n	73	35	73	73	65	73	64	73	73
R^2	0.02	0.01	0.01	0.05	0.03	0.38	0.01	0.01	0.05
Sweden	0.151**	0.091	-0.017	0.021	0.043**	0.119**	0.574**	0.004	0.003
	(0.073)	(0.071)	(0.039)	(0.138)	(0.017)	(0.058)	(0.233)	(0.172)	(0.036)
n	53	29	53	53	44	53	53	53	53
R^2	0.08	0.05	0.00	0.00	0.09	0.09	0.45	0.00	0.00
UK	0.223***	0.061	0.273***	0.166***	-0.031***	0.002	0.128***	0.631***	-0.001
	(0.043)	(0.055)	(0.083)	(0.028)	(0.009)	(0.049)	(0.043)	(0.045)	(0.024)
n	111	56	111	111	90	109	98	111	111
R^2	0.11	0.02	0.30	0.09	0.06	0.00	0.07	0.62	0.00
US	-0.020	0.274*	0.414***	0.400**	0.125	0.117	0.405*	0.577*	0.708***
	(0.197)	(0.154)	(0.144)	(0.162)	(0.082)	(0.125)	(0.220)	(0.305)	(0.104)
n	76	38	76	76	65	75	67	76	76
R^2	0.00	0.26	0.14	0.17	0.07	0.01	0.16	0.17	0.58

Notes: Results from regressions of daily changes in one-year OIS rates onto monetary policy surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 4: Estimated Effects of Monetary Policy Shocks on Two-Year Bond Yields

Policy Shock In ↓	Two-Year Yield In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	0.845***	0.052	0.138	0.096**	-0.005	0.072	-0.121*	0.054	0.109
	(0.089)	(0.052)	(0.101)	(0.041)	(0.043)	(0.080)	(0.070)	(0.053)	(0.071)
n	78	102	77	101	75	78	77	100	102
R^2	0.57	0.01	0.03	0.04	0.00	0.01	0.05	0.01	0.03
Canada	0.540***	0.416**	0.228**	0.057	0.011	0.363**	0.235	0.021	-0.147
	(0.077)	(0.182)	(0.095)	(0.119)	(0.076)	(0.153)	(0.155)	(0.068)	(0.187)
n	43	61	42	61	43	43	42	60	61
R^2	0.49	0.18	0.19	0.01	0.00	0.19	0.21	0.00	0.04
Switzerland	0.060	0.000	0.067	0.069	0.050	-0.106	-0.036	0.109	0.153
	(0.252)	(0.118)	(0.128)	(0.126)	(0.032)	(0.192)	(0.191)	(0.172)	(0.137)
n	33	42	33	42	33	33	33	42	42
R^2	0.00	0.00	0.01	0.01	0.05	0.02	0.00	0.02	0.04
EU	0.602***	0.160*	0.200***	0.340***	-0.055	0.603***	0.615***	0.270**	-0.297*
	(0.148)	(0.096)	(0.059)	(0.080)	(0.064)	(0.177)	(0.116)	(0.123)	(0.180)
n	87	111	84	113	83	86	85	113	113
R^2	0.18	0.01	0.03	0.11	0.01	0.13	0.34	0.03	0.04
Japan	-0.086	0.170	-0.011	0.389	0.524***	0.310	0.316	-0.157	0.600
	(0.696)	(0.271)	(0.335)	(0.502)	(0.153)	(0.334)	(0.260)	(0.195)	(0.463)
n	83	116	79	114	83	83	79	113	116
R^2	0.00	0.00	0.00	0.01	0.18	0.00	0.01	0.00	0.01
New Zealand	0.191***	0.051	0.080*	0.107*	-0.013	0.718**	0.175**	0.092	0.068
	(0.074)	(0.083)	(0.043)	(0.063)	(0.017)	(0.283)	(0.071)	(0.078)	(0.137)
n	56	73	55	73	56	56	55	73	73
R^2	0.09	0.01	0.03	0.03	0.00	0.23	0.05	0.02	0.01
Sweden	0.187*	0.095*	0.068	0.241*	0.014	0.084	0.379**	-0.003	-0.082
	(0.106)	(0.053)	(0.045)	(0.044)	(0.026)	(0.111)	(0.157)	(0.147)	(0.108)
n	41	53	40	53	40	41	40	53	53
R^2	0.13	0.04	0.04	0.27	0.01	0.02	0.33	0.00	0.02
UK	0.194***	0.069**	-0.028	0.093**	-0.017	-0.062	0.065**	0.248***	0.042
	(0.049)	(0.032)	(0.035)	(0.040)	(0.021)	(0.037)	(0.025)	(0.053)	(0.040)
N	85	111	83	111	83	85	83	111	110
R^2	0.11	0.01	0.00	0.02	0.01	0.01	0.03	0.18	0.00
US	0.287***	0.240	-0.118	0.367***	0.043	0.116	0.425**	0.343	0.455***
	(0.072)	(0.190)	(0.158)	(0.130)	(0.043)	(0.080)	(0.204)	(0.214)	(0.109)
N	59	76	58	76	57	59	58	76	76
R^2	0.15	0.09	0.01	0.13	0.01	0.03	0.19	0.09	0.19

Notes: Results from regressions of daily changes in two-year zero-coupon government bond yields onto monetary policy surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 5: Estimated Effects of Monetary Policy Shocks on Ten-Year Yields

Policy Shock In ↓	Ten-Year Yield In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	0.306***	0.014	-0.10	0.071**	-0.071*	0.037	-0.048	-0.017	0.108
	(0.067)	(0.063)	(0.037)	(0.030)	(0.039)	(0.071)	(0.062)	(0.042)	(0.098)
n	78	102	77	101	75	78	77	100	102
R^2	0.13	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.02
Canada	0.145	0.008	0.106**	0.167*	0.130***	0.220***	0.194	-0.055	-0.250
	(0.122)	(0.111)	(0.046)	(0.095)	(0.047)	(0.052)	(0.129)	(0.042)	(0.194)
n	43	61	42	61	43	43	42	60	61
R^2	0.05	0.00	0.08	0.08	0.13	0.16	0.12	0.01	0.07
Switzerland	0.359	0.017	0.060	-0.008	0.028	-0.054	-0.06	0.120	0.165
	(0.253)	(0.087)	(0.079)	(0.108)	(0.068)	(0.155)	(0.207)	(0.089)	(0.210)
n	33	42	33	42	33	33	30	42	42
R^2	0.14	0.00	0.02	0.00	0.01	0.01	0.01	0.03	0.03
EU	0.355**	-0.130*	0.145**	0.289**	0.164***	0.255***	0.368*	0.010	-0.394
	(0.143)	(0.112)	(0.065)	(0.120)	(0.030)	(0.081)	(0.196)	(0.143)	(0.277)
n	87	111	84	113	83	86	85	113	113
R^2	0.05	0.01	0.04	0.07	0.06	0.05	0.11	0.00	0.04
Japan	-0.052	0.147	0.101	-0.130	0.298	0.081	-0.417**	-0.511*	0.340
	(0.346)	(0.256)	(0.235)	(0.366)	(0.216)	(0.200)	(0.169)	(0.268)	(0.353)
n	83	116	79	114	83	83	79	113	116
R^2	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.02	0.00
New Zealand	0.095	-0.038	0.066**	0.080	0.015	0.241***	0.126**	0.064	0.031
	(0.078)	(0.095)	(0.030)	(0.049)	(0.018)	(0.071)	(0.057)	(0.078)	(0.142)
n	56	73	55	73	56	56	55	73	73
R^2	0.02	0.00	0.02	0.02	0.00	0.15	0.04	0.01	0.00
Sweden	0.116*	0.081	0.129***	0.209***	0.085	-0.007	0.245***	0.025	0.055
	(0.065)	(0.069)	(0.024)	(0.043)	(0.052)	(0.053)	(0.070)	(0.090)	(0.153)
n	41	53	40	53	40	41	40	53	53
R^2	0.05	0.05	0.10	0.17	0.12	0.00	0.28	0.00	0.01
UK	0.237***	-0.021	-0.025	-0.014	0.042**	0.017	-0.008	0.054	-0.034
	(0.077)	(0.034)	(0.021)	(0.027)	(0.017)	(0.022)	(0.028)	(0.041)	(0.054)
n	85	111	83	111	83	85	83	111	111
R^2	0.13	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00
US	0.227***	0.044	-0.006	0.311	0.056*	0.035	0.489**	0.286	0.152
	(0.068)	(0.095)	(0.112)	(0.205)	(0.032)	(0.064)	(0.221)	(0.193)	(0.101)
n	59	76	58	76	57	59	58	76	76
R^2	0.11	0.00	0.00	0.07	0.03	0.00	0.20	0.05	0.02

Notes: Results from regressions of daily changes in two-year zero-coupon government bond yields onto monetary policy surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 6: Estimated Effects of Macroeconomic Data Surprises on Three-Month OIS Rates

Data Surprise	Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
US Core CPI	1.028*	0.369	1.289	1.089*	0.193	0.680	1.051	1.081**	0.920
	(0.551)	(0.565)	(1.135)	(0.617)	(0.119)	(0.466)	(0.670)	(0.547)	(0.61)
US Initial Claims	-0.577**	-0.444**	-0.326	-0.277	-0.02	-0.340*	-0.343	-0.416**	-0.149
	(0.26)	(0.210)	(0.208)	(0.205)	(0.055)	(0.187)	(0.231)	(0.162)	(0.178)
US ISM/NAPM	0.829	0.942**	0.607	0.378	0.009	0.999*	0.503	0.922***	1.269**
	(0.711)	(0.395)	(0.457)	(0.243)	(0.082)	(0.517)	(0.497)	(0.332)	(0.574)
US NF Payrolls	0.680**	0.983***	0.595***	0.288	0.127	1.080***	0.792	0.599***	1.142***
	(0.292)	(0.360)	(0.210)	(0.238)	(0.084)	(0.284)	(0.564)	(0.220)	(0.255)
US Unemployment	0.134	0.037	-0.136	-0.162	-0.049	-0.710**	0.080	-0.035	-0.635**
	(0.295)	(0.282)	(0.64)	(0.212)	(0.054)	(0.311)	(0.593)	(0.269)	(0.255)
Sweden Core CPI	0.716*	0.552	-0.311	-0.034	0.108	0.671***	0.113	-0.29	0.101
	(0.405)	(0.358)	(0.582)	(0.271)	(0.067)	(0.251)	(0.388)	(0.292)	(0.339)
Sweden GDP	-0.399	-0.730	0.987	-0.309	0.012	-2.642	1.383	0.899	0.096
	(0.661)	(0.638)	(0.844)	(0.375)	(0.038)	(1.635)	(1.343)	(0.749)	(0.707)
UK Core RPI	-0.675	-0.082	-0.81	0.026	0.008	-0.299	0.031	0.574*	-0.104
	(0.449)	(0.395)	(0.988)	(0.181)	(0.044)	(0.829)	(0.438)	(0.347)	(0.253)
UK Avg. Earnings	-0.133	-0.314	-1.510*	-0.505*	-0.043	-0.224	-0.195	0.741**	-0.579**
	(0.345)	(0.232)	(0.824)	(0.301)	(0.035)	(0.415)	(0.361)	(0.372)	(0.251)
UK GDP	0.401	-0.766	-0.035	-0.019	-0.129	-1.360*	-1.912***	0.879	-0.172
	(0.474)	(0.859)	(1.181)	(0.24)	(0.144)	(0.716)	(0.395)	(0.668)	(0.493)
UK Retail Sales	0.442**	-0.805	0.43	0.233	-0.063	0.247	0.514	0.896	0.084
	(0.222)	(0.621)	(0.411)	(0.239)	(0.078)	(0.524)	(0.540)	(0.648)	(0.229)
UK Manuf. Prod.	-0.447	0.288	-0.532	-0.450*	0.116	0.38	0.260	0.256	0.067
	(1.118)	(0.297)	(0.303)	(0.233)	(0.094)	(0.506)	(0.459)	(0.345)	(0.281)
Spain CPI	0.887***	0.620**	-0.422	0.098	-0.071	-0.016	0.107	0.068	-0.124
	(0.281)	(0.273)	(0.337)	(0.316)	(0.099)	(0.223)	(0.265)	(0.224)	(0.352)
Italy CPI	-0.005	-0.144	0.539	-0.185	-0.043	-0.201	-0.150	0.055	0.452
	(0.241)	(0.432)	(0.83)	(0.172)	(0.044)	(0.315)	(0.245)	(0.198)	(0.563)
France CPI	-0.201*	0.109	0.578*	0.165	-0.172**	-0.685	-0.017	-0.478	0.487
	(0.113)	(0.236)	(0.311)	(0.153)	(0.068)	(0.554)	(0.312)	(0.313)	(0.345)
Germany CPI	-0.029	-0.880*	-0.417	0.104	-0.125	0.438**	-0.404	-0.371	0.645*
	(0.269)	(0.511)	(0.436)	(0.114)	(0.105)	(0.187)	(0.338)	(0.300)	(0.336)
Germany IFO	0.221	-1.269	0.483	0.527**	-0.024	0.227	-0.280	0.243	0.384
	(0.160)	(1.860)	(0.344)	(0.216)	(0.159)	(0.638)	(0.352)	(0.287)	(0.28)
EA M3	-0.025	0.996	0.253	-0.055	0.002	0.06	-0.025	0.32	-0.614
	(0.229)	(0.916)	(0.415)	(0.227)	(0.095)	(0.217)	(0.214)	(0.232)	(0.396)
N	1082	899	1062	1092	914	1060	833	1089	1093
R^2	0.03	0.04	0.02	0.03	0.01	0.04	0.02	0.03	0.04

Notes: Results from regressions of daily changes in three-month OIS rates onto macroeconomic data surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 7: Estimated Effects of Macroeconomic Data Surprises on One-Year OIS Rates

Data Surprise	Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
US Core CPI	2.222	2.313*	1.872**	1.402**	0.053	0.606	1.195	1.470**	1.888**
	(1.380)	(1.277)	(0.913)	(0.658)	(0.188)	(0.526)	(0.941)	(0.738)	(0.744)
US Initial Claims	-0.727*	-1.447***	-1.064***	-0.854***	-0.082	-0.508	-0.892***	-0.846***	-0.981***
	(0.388)	(0.533)	(0.242)	(0.292)	(0.103)	(0.314)	(0.289)	(0.291)	(0.317)
US ISM/NAPM	2.229**	1.856	1.635***	1.811***	0.411***	1.452*	1.620**	2.359***	2.950***
	(1.050)	(1.380)	(0.464)	(0.664)	(0.145)	(0.816)	(0.674)	(0.565)	(0.715)
US NF Payrolls	2.188***	4.570***	1.814***	2.062***	0.204	1.993***	1.750**	2.283***	4.289***
	(0.568)	(1.715)	(0.554)	(0.533)	(0.173)	(0.460)	(0.790)	(0.596)	(0.713)
US Unemployment	-0.317	1.174	-0.139	-0.517	-0.043	-0.943*	0.092	0.277	-0.929
	(0.546)	(1.028)	(0.500)	(0.387)	(0.237)	(0.511)	(0.983)	(0.795)	(0.810)
Sweden Core CPI	2.759***	11.360	-1.189	0.681	0.096	1.535**	3.618***	0.261	1.401
	(0.807)	(19.07)	(0.878)	(0.868)	(0.0911)	(0.764)	(0.828)	(0.970)	(0.868)
Sweden GDP	-0.459	-3.124***	0.033	-0.029	0.054	-2.806**	1.547	0.096	0.262
	(1.770)	(0.485)	(1.186)	(0.936)	(0.0712)	(1.291)	(2.000)	(1.249)	(2.100)
UK Core RPI	-0.288	-9.083***	-0.660	-0.177	-0.095	-0.752	-0.438	2.920***	0.136
	(0.680)	(0.626)	(1.121)	(0.603)	(0.109)	(1.486)	(0.776)	(0.748)	(0.970)
UK Avg. Earnings	-1.247	-0.327	-1.251*	-1.027**	0.179	0.525	0.389	0.724	-1.782**
	(1.032)	(0.734)	(0.708)	(0.443)	(0.216)	(0.833)	(0.823)	(0.677)	(0.763)
UK GDP	1.120		-0.899	-0.008	0.114	-0.286	-1.539**	1.620	0.059
	(1.638)		(1.514)	(0.579)	(0.131)	(1.037)	(0.627)	(1.177)	(1.230)
UK Retail Sales	1.180**	0.697	1.538*	0.490	-0.531**	0.207	1.126	2.414***	0.533
	(0.492)	(1.756)	(0.832)	(0.457)	(0.255)	(0.916)	(0.758)	(0.899)	(0.535)
UK Manuf. Prod.	-0.231	-17.730	-0.801	-1.246**	0.155	1.150	-1.006**	-0.120	-0.243
	(2.738)	(34.46)	(0.887)	(0.536)	(0.203)	(1.728)	(0.467)	(1.257)	(0.742)
Spain CPI	1.845***	7.927	0.179	0.500	-0.125	1.632***	0.068	0.803	0.461
	(0.609)	(8.741)	(0.502)	(0.647)	(0.089)	(0.421)	(0.609)	(0.748)	(0.744)
Italy CPI	0.032	2.648*	-1.192	-0.049	0.060	0.999**	-0.013	0.029	0.469
	(0.485)	(1.534)	(1.177)	(0.404)	(0.240)	(0.474)	(0.336)	(0.518)	(0.761)
France CPI	-0.026	3.540*	0.169	0.164	-0.269	-1.416	1.278*	-0.590	0.694
	(0.329)	(2.064)	(0.493)	(0.381)	(0.174)	(1.246)	(0.734)	(0.596)	(0.676)
Germany CPI	0.225	2.019	0.541	0.319	0.143	0.453	0.526	-0.126	1.636**
	(0.386)	(3.963)	(0.541)	(0.497)	(0.380)	(0.462)	(0.600)	(0.517)	(0.749)
Germany IFO	1.595***	2.744	1.343**	1.951***	0.223	1.668*	1.108**	1.187*	1.186*
	(0.530)	(1.900)	(0.583)	(0.447)	(0.353)	(0.997)	(0.474)	(0.669)	(0.704)
EA M3	-0.503	-0.738	-0.076	-0.051	-0.227	0.103	0.588	-0.591	-0.859
	(0.524)	(0.912)	(0.499)	(0.398)	(0.252)	(0.393)	(0.435)	(0.424)	(0.630)
N	1082	402	1084	1092	818	1061	843	1088	1093
R^2	0.06	0.10	0.06	0.07	0.01	0.05	0.07	0.06	0.09

Notes: Results from regressions of daily changes in one-year OIS rates onto macroeconomic data surprises. Heteroskedasticity-robust standard errors are given in parentheses.

Table 8: One-day changes in Ten-Year Yields around UK and US Quantitative Easing Announcements, March 2009 (Basis Points).

	March 5, 2009	March 18, 2009
Australia	-18	-29
Canada	-9	-21
Switzerland	-9	-1
EU	-20	-15
Japan	-0	+1
New Zealand	-4	+0
Sweden	-6	-11
UK	**-32**	-8
US	-20	**-52**

Notes: This table shows the daily change in zero-coupon yields from before to after the MPC announcement of large scale government bond purchases on March 5, 2009 and the corresponding FOMC announcement on March 18, 2009. Yield changes are shown in basis points.

Table 9: Effects of Monetary Policy Shocks on One-Year OIS Rates Estimated by Robust Regression

Policy Shock In ↓	One Year OIS Rate In:								
	Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	0.809***	-0.053	0.008	-0.025	0.005	0.124**	0.005	0.044	0.028
	(0.072)	(0.062)	(0.034)	(0.035)	(0.006)	(0.059)	(0.024)	(0.050)	(0.033)
Canada	0.070	0.270*	-0.057	-0.056	0.020	0.172***	0.058	-0.099	0.050
	(0.060)	(0.141)	(0.063)	(0.076)	(0.012)	(0.062)	(0.069)	(0.065)	(0.085)
Switzerland	-0.000	0.306***	0.726***	-0.003	0.053*	0.004	0.329***	0.003	-0.032
	(0.059)	(0.096)	(0.074)	(0.074)	(0.028)	(0.049)	(0.106)	(0.118)	(0.071)
EU	-0.013	0.102	0.070	0.787***	-0.002	0.098	0.352***	0.408**	-0.018
	(0.133)	(0.201)	(0.112)	(0.154)	(0.044)	(0.083)	(0.117)	(0.165)	(0.123)
Japan	0.182	0.287	-0.006	0.060	0.587***	0.141	-0.039	0.127	0.151
	(0.187)	(0.320)	(0.178)	(0.170)	(0.054)	(0.177)	(0.143)	(0.210)	(0.199)
New Zealand	0.111	-0.057	0.085***	0.138***	0.007	0.988***	0.067	0.064	0.158***
	(0.070)	(0.081)	(0.033)	(0.044)	(0.006)	(0.111)	(0.042)	(0.044)	(0.047)
Sweden	0.068	-0.086	0.003	0.170***	0.026	-0.073*	0.804***	0.077	-0.006
	(0.044)	(0.056)	(0.042)	(0.063)	(0.020)	(0.043)	(0.100)	(0.082)	(0.047)
UK	0.183***	-0.532***	0.052	0.144***	0.004	0.030	0.049	0.627***	0.012
	(0.055)	(0.134)	(0.048)	(0.035)	(0.007)	(0.057)	(0.044)	(0.080)	(0.034)
US	-0.171	0.711***	0.223**	0.597***	0.016	0.052	-0.002	0.650***	1.270***
	(0.123)	(0.096)	(0.088)	(0.095)	(0.013)	(0.095)	(0.102)	(0.160)	(0.112)

Notes: Results from regressions of daily changes in one-year OIS rates onto monetary policy surprises. The regressions are estimated using an outlier-robust M-estimator with biweight objective function. Standard errors are given in parentheses.

Table 10: Identification through Heteroskedasticity: Cross-country Effects of Monetary Policy Shocks on Three-Month OIS rates

Policy Shock In ↓	Effect In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	1	-0.06**	0.10***	-0.04**	-0.02**	0.36***	-0.01	0.07	-0.01
		(0.02)	(0.04)	(0.02)	(0.01)	(0.11)	(0.15)	(0.06)	(0.02)
Canada	0.15	1	-0.16	0.50	0.03	-0.09	0.33	0.04	0.34
	(0.20)		(0.10)	(0.47)	(0.03)	(0.11)	(0.41)	(0.14)	(0.33)
Switzerland	0.36	0.04	1	0.36	0.00	0.17***	0.20	-0.16	0.03
	(0.18)	(0.20)		(0.48)	(0.02)	(0.06)	(0.22)	(0.11)	(0.08)
EU	0.29**	0.65***	-0.12	1	0.05***	-0.13**	1.71	0.37***	0.31**
	(0.14)	(0.25)	(0.16)		(0.02)	(0.07)	(1.16)	(0.14)	(0.15)
Japan	1.20	0.30	-0.14	0.44	1	-1.06	9.56	-0.10	6.73*
	(0.74)	(0.44)	(0.37)	(0.33)		(2.04)	(17.55)	(0.41)	(3.61)
New Zealand	0.06**	0.02	0.02	0.01	0.02*	1	-0.05	0.00	0.01
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)		(0.15)	(0.02)	(0.03)
Sweden	0.19***	0.21	-0.13	0.31*	0.02*	-0.02	1	0.07	0.09
	(0.06)	(0.18)	(0.09)	(0.18)	(0.01)	(0.05)		(0.15)	(0.08)
UK	0.12***	0.10*	0.26**	0.06	0.01**	0.05	-0.13	1	0.03
	(0.03)	(0.06)	(0.11)	(0.05)	(0.01)	(0.04)	(0.25)		(0.03)
US	-0.05	-0.82	0.11	0.17	0.14**	-0.01	0.31	0.11**	1
	(0.06)	(3.69)	(0.07)	(0.12)	(0.05)	(0.04)	(0.22)	(0.04)	

Notes: This table shows the effect of a monetary policy surprise in one country on three-month OIS rates in other countries, using identification through heteroskedasticity, as described in section 4 of the text. Heteroskedasticity-robust standard errors are given in parentheses.

Table 11: Identification through Heteroskedasticity: Cross-country Effects of Monetary Policy Shocks on Two-Year yields

Policy Shock In ↓	Effect In: Australia	Canada	CH	EU	Japan	NZ	Sweden	UK	US
Australia	0.73***	0.02	0.05	0.05	-0.02	0.05	-0.13**	0.02	0.06
	(0.06)	(0.04)	(0.12)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Canada	0.46***	0.77***	0.31**	0.01	0.01	0.30	0.22	0.02	-0.12
	(0.14)	(0.27)	(0.16)	(0.17)	(0.30)	(0.31)	(0.29)	(0.10)	(0.31)
Switzerland	0.75***	0.16	0.12	0.13	0.03	0.07	0.25	0.23	0.13
	(0.26)	(0.20)	(0.23)	(0.09)	(0.05)	(0.30)	(0.25)	(0.24)	(0.16)
EU	0.55**	0.35***	0.15*	0.29***	-0.17	0.36	0.70	0.46	-0.06
	(0.27)	(0.09)	(0.09)	(0.10)	(0.10)	(0.46)	(0.08)***	(0.25)*	(0.35)
Japan	-1.19	-0.01	-4.14	0.70	0.66***	1.15	0.77*	-0.44	0.19
	(3.99)	(0.40)	(23.1)	(0.75)	(0.13)	(0.90)	(0.40)	(0.46)	(0.73)
New Zealand	0.19**	0.07	0.06	0.07	0.02	1.04**	0.25**	0.06	0.12
	(0.09)	(0.08)	(0.04)	(0.07)	(0.03)	(0.43)	(0.10)	(0.08)	(0.11)
Sweden	0.12	0.02	0.03	0.12	0.02	-0.19*	0.13	0.02	0.00
	(0.17)	(0.10)	(0.05)	(0.12)	(0.04)	(0.10)	(0.19)	(0.23)	(0.06)
UK	0.27***	0.09***	-0.04	0.06	-0.03	-0.11**	0.10***	0.29***	0.04
	(0.06)	(0.03)	(0.04)	(0.04)	(0.02)	(0.06)	(0.03)	(0.06)	(0.05)
US	0.47*	0.83***	-0.48	-0.04	0.07	-0.15	0.38	-0.01	0.46*
	(0.24)	(0.22)	(0.40)	(0.14)	(0.20)	(0.30)	(0.30)	(0.19)	(0.25)

Notes: This table shows the effect of a monetary policy surprise in one country on two-year zero-coupon government bond yields, using identification through heteroskedasticity, as described in section 4 of the text. Heteroskedasticity-robust standard errors are given in parentheses.

Fig. 1: OIS and FFF-based US monetary policy surprises