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Monthly Pass-Through Ratios*

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Abstract

This paper estimates monthly pass-through ratios from import prices to consumer prices in real time. Conventional time series methods impose restrictions to generate exogenous shocks on exchange rates or import prices when estimating pass-through coefficients. Instead, a natural experiment based on data releases defines our shock to foreign prices. Our estimation strategy follows an event-study approach based on monthly releases in import prices. Projections from a dynamic common factor model with daily panels before and after monthly releases of import prices define the shock. This information shock allows us to recover a monthly pass-through ratio. We apply our identification procedure to Swiss prices and find strong evidence that the monthly pass-through ratio is around 0.3. Our real-time estimates yield higher pass-through ratios than time series estimates.

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Introduction

What is the monthly pass-through from exchange rates to consumer prices? It is commonly recognized that when estimating the responsiveness of domestic prices to foreign prices, the pass-through coefficient varies across countries and time.[1] The vast empirical literature on exchange rate pass-through, however, relies on time series or cross country analysis that assumes the constancy of estimated coefficients for select samples with the latest available data.[2] Such analysis is useful for explaining the reduction in the average pass-through from high to low inflation regimes, but it offers little guidance how policymakers should act over different phases of the business cycle or respond to terms-of-trade shocks. Our aim is to mimic actual data environments used by policymakers in a real time setting and with this understand the dynamics of monthly estimates of the pass-through.

The paper's contribution is to present a new estimation strategy of the monthly pass-through based on a natural experiment of data releases in import prices. The empirical methodology is similar in spirit to event study

[1] See McCarthy (2000) for time series evidence. Bailliu and Fuji (2004), Choudhri and Hakura (2006), and Gagnon and Ihrig (2004) provide cross-country analysis.

[2] Exceptions are rolling regressions by Marazzi et al. (2005) and Baynesian techniques by Sekine (2006)

procedures used in empirical finance, see MacKinlay (1997) or Khotari and Warner (2005) for an overview. Our new measure of the pass-through ratio varies through information shocks driven by monthly releases in import prices. The pass-through ratio is defined as the projection's innovation in the change of consumer prices divided by the projection's innovation in the change of import prices. The projections are estimated using dynamic common factor procedures conditional on daily panels before and after the monthly release of import prices. The difference in the projections before and after the monthly release in import prices defines the innovations used to build monthly pass-through ratios.

Our empirical strategy differs from previous pass-through studies in three important respects. A first feature is that this study is the first to estimate the pass-through ratio using real-time data. This line of research is not only relevant for policymakers, but it underscores the importance of information settings when estimating the responsiveness of domestic prices to foreign price shocks. The importance of information settings has been previously emphasized by Orphanides (2001) for output-gap estimates and monetary policymaking, but has not been addressed for issues relevant for international economics.

A second feature of our estimation procedure concerns the specification of the shock to foreign prices. Our exogenous shock that drives the pass-through ratio is narrowly defined as the news event arising from the monthly release in import prices. We set the event window to be one day so that the information shock captures news only from the release of import prices. Previous event studies by Burstein, et al. (2007), Cunningham and Haldane (2002), and Kreinin (1977) use large exchange rate devaluations to define the exogenous shock to foreign prices. This is problematic in several respects. These event studies operate with a small number of observations. Further, their event windows span quarters rather than 24 hours. Large event windows muddle the causal influences for domestic prices. Last, the event studies assume that the change in the exchange rate is the shock itself. This assumption means that the anticipated change in the exchange rate is zero and that the exchange rate shock leaves all other variables unchanged.[3]

A third feature of our strategy is the use of common factor techniques.

[3]Macro-level studies by Shambaugh (2008) and McCarthy (2000) have tried to resolve the exogeneity problem by imposing short or long-run restrictions in a VAR setup. Micro-level studies for a particular sector or industry have had greater success in creating sufficient controls, but they lack the breadth. See Mennon (1995) and Goldberg and Knetter (1997) for a review of micro-level studies.

This estimation procedure allows us to incorporate jointly micro and macro information. Further, the technique based on broad panels incorporates cross-sectional and time series information. Last, the data reduction technique generates an anticipated component based on real-time information before the release of import prices. The anticipated component enables us to generate an import price shock without having to impose any model-based restrictions.

Exchange rate pass-through is traditionally defined as the responsiveness of domestic prices to exchange rate movements. Sekine (2006) notes that the pass-through literature has divided exchange rates' impact on domestic prices into two stages. The first stage is defined as the influence of exchange rate fluctuations on import prices and the second is the impact of import price movements on consumer prices. This paper focuses on the latter stage.[4] Although our estimation procedure could be used for the first stage, our preference for examining the second stage is to define the event window as narrowly as possible around the release date of import prices. This is done in order to construct an innovation conditional on new information from the

[4]Hereafter, when referring to pass-through, unless otherwise specified, we mean from import prices to consumer prices.

monthly release of cross-sectional information on import prices.

The empirical application is for Swiss prices. The Swiss case is of interest, because previous studies have consistently found no pass-through effect from exchange rates to consumer prices. The sample is from 1993:5 to 2008:4. During this period, annual inflation in the Consumer Price Index (CPI) averaged around 1% and the annual change in the nominal effective exchange rate was in the order of +/- 15%. These characteristics of low average inflation together with modest fluctuations in the exchange rate fit many OECD economies for the most recent decade.

Our estimates of the monthly pass-through ratio offer a rich set of empirical results. First, the monthly estimates based on real-time information yield a median pass-through ratio of around 0.3; a point estimate found to be larger than those estimated in previous studies for Switzerland. Second, the monthly pass-through ratios are dependent on the information breath of the panel and its real-time setting. Broader panels generate larger pass-through ratios than do smaller panels. Further, the volatility of monthly pass-through ratios is lower for real-time estimates than for conventional estimates that use non real-time information sets. These results suggest that information settings assumed in (conventional) time series studies may be too restrictive.

The paper is organized as follows. Section 1 defines the empirical strategy to identify the monthly pass-through from the annual change in import prices to the annual change in consumer prices. Section 2 discusses empirical issues concerning the selected sample and the daily panels. Section 3 presents the estimates of monthly pass-through ratios. Section 4 offers concluding remarks.

1. The Identification Scheme

The identification scheme to analyze the monthly estimate of the pass-through from import prices to CPI is similar to an event study approach used in empirical finance. The empirical strategy for a one-month information shock involves the following steps. The first step generates the projection for annual inflation in consumer and import prices conditional on information one-day before the release of the import prices. These projections are based on daily panels that encompass real-time information from financial variables and data releases. The projections are estimates from a dynamic common factor procedure by Forni *et al.* (2000) and builds on earlier work by Amstad and Fischer (2004, 2005). The second step re-estimates the projections for consumer prices and import prices based on a panel one day later that

includes cross-sectional information from the import price release. The third step constructs the innovation in the one-day difference in the projections for consumer prices and import prices. The fourth step builds the monthly pass-through ratio based on conditional information from the release in import prices. Below, the main steps of the estimation procedure are defined using the terminology of MacKinlay (1997).

Defining the Event: Import Price Releases

The monthly release of import prices is defined as the event with the kth event date $\tau_k = (j,\ t)$ corresponding to day j and month t in calendar time and $k = \{1,\cdots,\ K\}$. Cross-sectional information from import price releases offer a natural event date, whereas other variables used to calculate the monthly pass-through, such as exchange rates, do not.

Estimation

The empirical model relies on data reduction techniques that can handle real-time panels updated daily. We follow the estimation procedures of Forni *et al.* (2000), Cristadoro *et al.* (2005), and Altissimo *et al.* (2001). Below, we offer an informal outline of the estimation procedure and refer the reader to the individual papers for specific details.

As in Forni *et al*. (2000) and following their notation, we assume that the

factor structure has N variables in the generic panel, $\mathbf{x}_t = (x_{1,t}, x_{2,t}, \cdots, x_{N,t})'$, where our variables of interest are the monthly (ln) change in CPI prices, $x_{1,t}$, and the monthly (ln) change in import prices, $x_{2,t}$. The variables in the panel are first differenced when necessary for stationarity purposes. Next, monthly CPI inflation is assumed to be the sum of two unobservable components: a signal $x^*_{1,t}$ and a component capturing short-run dynamics, seasonality, measurement error, and idiosyncratic shocks, $e_{i,t}$

$$x_{1,t} \quad = \quad x^*_{1,t} + e_{1,t}. \tag{1}$$

The same assumptions in equation (1) apply for the monthly change in import prices, $x_{2,t}$, our second variable of interest. The signal uses available information (i.e., past and present information defined by the variables in the panels). Next, it is assumed that the variables in the daily panels can be represented as the sum of two stationary, mutually orthogonal, unobserved components. The first component is the common component, $\chi_{i,t}$, which is assumed to capture a high degree of co-movement between the variables in the panel. The second component is the idiosyncratic component, $\xi_{i,t}$. The common component is defined by q common factors, $u_{h,t}$, that are possibly loaded with different coefficients and (finite) lag structures, say of order s. Formally, Forni *et al.* (2005) specify $x_{i,t}$ as a generalized dynamic factor

model:

$$x_{i,t} = \chi_{i,t} + \xi_{i,t} = \Sigma_{h=1}^{q}\Sigma_{k=0}^{s} b_{i,h,k} u_{h,t-k} + \xi_{i,t}, \tag{2}$$

where $\xi_{i,t}$ is the idiosyncratic component and $\chi_{i,t} = x_{i,t}$ - $\xi_{i,t}$ is the common component.

The estimation procedure by Cristadoro *et al.* (2005) involves three steps. The first step estimates the common factors. In particular, the cross spectra for the common component of monthly inflation for CPI and import prices, $\chi_{1,t}$ and $\chi_{2,t}$, are estimated. The second step computes the implied covariances of $\chi_{1,t}$ and $\chi_{2,t}$ and the factors, by integrating the cross-spectra over a specified frequency band. The last step involves performing a linear projection of the common component on the present and the lags of the common factors:

$$\hat{\chi}_{1,t} = Proj[\chi_{1,t}|u_{h,t-k}, h = \{1, \cdots, q; k = 0, \cdots, s\}] \tag{3}$$

and

$$\hat{\chi}_{2,t} = Proj[\chi_{2,t}|u_{h,t-k}, h = \{1, \cdots, q; k = 0, \cdots, s\}]. \tag{4}$$

The projections, $\hat{\chi}_{1,t}$ and $\hat{\chi}_{2,t}$, are transformed to the annual change in the consumer and the import prices.[5] To generate the projections at time t,

[5]Our preference for the annualized change in prices stems from the observation that the

we apply the shifting procedure for the covariance matrix by Altissimo *et al.* (2001); see Appendix B.4 on filling in incomplete observations for unbalanced panels.[6] Altissimo *et al.* (2001) compute values of $\hat{\chi}_{i,t}$ g months ahead by individually shifting out each series in $x_{i,t}$ so that the most recent observation aligns g months ahead to form a balanced panel. Afterwards the generalized principal component is evaluated for the realigned $x_{i,t}$.

Pass-Through Ratios

The event study literature uses the term "abnormal returns" for the response measure to an examined event. This is defined as the actual ex-post return of the (financial) variable over the event window minus the normal return, i.e., the return that would be expected if the event did not take place. Instead of returns, we work with innovations of the projections. Thus, to identify the influence of new information from monthly releases in import prices, a measure of innovations for event date $\tau_k = (j, t)$ is needed. This is defined as the one-day difference in the projections of $\hat{\chi}_{1,t}$ and $\hat{\chi}_{2,t}$ around the release dates of import prices. More specifically, $\epsilon_{1,t}$ and $\epsilon_{2,t}$ are innovations from

pass-through ratios are more stable. Below we define the definition of the pass-through ratios.

[6] Giannone *et al.* (2008) offer an alternative procedure for forecasts of the common component based on the Kalman filter, which are qualitatively the same.

the projections for CPI and import prices conditional on the daily panel, $P_{j,t}$, before and after the release of import prices (for the month of $t-1$) on day j in month t:

$$\hat{\epsilon}_{1,t} = \hat{\chi}_{1,t|P_{j,t}} - \hat{\chi}_{1,t|P_{j-1,t}}, \quad (5)$$

$$\hat{\epsilon}_{2,t} = \hat{\chi}_{2,t|P_{j,t}} - \hat{\chi}_{2,t|P_{j-1,t}}. \quad (6)$$

In equations (5) and (6), import prices are released with a one-month delay and $P_{j-1,t}$ refers to the panel that does not include the import price release for month *t-1*, whereas the next day's panel $P_{j,t}$ does. The innovations are defined as the information attributed to the monthly release of import prices and the pass-through ratio for month t is defined as $\hat{\epsilon}_{1,t}/\hat{\epsilon}_{2,t}$.

2. Real-Time Data Panels with Import Prices

The largest panel spans from 1993:5 to 2008:4, covering 454 variables. Amstad and Fischer (2005) provide an overview of the individual series and their transformations. All series are from the data bank of the Swiss National Bank (SNB).

Empirical estimation requires a balanced panel at sample start but allows an unbalanced panel at sample end. The starting date, 1993:5, is chosen for

the following reasons. First, the date, 1993:5, coincides with a major revision in the CPI index and the beginning of the import price series. Second, the period 1990:1 to 1993:4 is excluded, because during this brief phase Swiss inflation averaged 5.5% and is not representative of the low inflation regime to test the responsiveness of domestic inflation to news from import price releases.[7]

The period 1993:5 to 2003:11 represents the estimation window. The projections conditional on daily panels before and after the release dates of the import prices begin 2003:12. The release dates for import prices for month t fall generally during the third week of month $t+1$. With this setup, the projection's innovations for CPI and import prices centered around 53 import price releases are examined for the period 2003:12 to 2008:4.

The main blocks of the panel are prices (178 series), money (9 series), financial (45 series), labor (14 series), survey (30 series), trade (98 series), consumption (16 series), and foreign (49 series) for a total of 434 variables. The block of import prices contains the aggregate index and 20 subindexes:

[7]Officially, the SNB does not recognize low or high inflation regimes. Structural break tests on inflation persistence are, however, one means for identifying regime shifts. Tests of this sort by Levin and Piger (2002) find a break in Swiss CPI in the second quarter of 1993.

17 components of finished products, agricultural goods, consumption goods, and semi-processed goods.

Several data transformations were necessary at the initial stages of estimation. The series were filtered in the following manner. First, to account for possible heteroskedasticity, logarithms were taken for nonnegative series that were not in rates or in percentage units. Second, to account for stochastic trends, the series were differenced if necessary.[8] Third, the series were taken in deviation from the mean and divided by their standard deviation to remove scalar effects.

3. Monthly Pass-Through Ratios

This section presents the monthly pass-through ratios based on a common factor model with 12 static factors and 2 dynamic factors.[9] First, we show that the real-time estimates of the pass-through ratios are found to be considerably larger than in previous studies. Next, robustness tests are considered.

[8]Each variable was first visually inspected for breaks. Those that suffered from realignment shifts (i.e., new variable definitions) were thrown out. In a second stage, tests for unit roots were performed to determine the proper order of integration.

[9]This specification and their forecasting and stability properties are discussed in detail in Amstad and Fischer (2008)

The results show that the estimates for the monthly ratios are sensitive to the panel's specification. Broad panels in real time yield the highest pass-through ratios. Last, we evaluate the role of persistence of the import price shock in two ways: the filtering of short-run information and the duration of the pass-through effect 6 to 12-months ahead.

Pass-Through Ratios in Real Time

Figure 1 shows the main variables that define the monthly pass-through ratios in real time from 2003:12 to 2008:4. The monthly projections of the annual change in import prices one day before the release of import prices rises steadily from -1.8% at sample begin to over 2.0% at sample end. Instead, the monthly projections of the annual change in consumer prices fluctuates around 1.0% over the sample. The import price shock (i.e., the one-day difference in the projections for the annual change in import prices before and after the monthly release in import prices) toggles between positive and negative values. The average absolute size of the shock to import prices is 0.079 with a variance of 0.004. A Jacque-Bera test is unable to reject the null that the import price shocks are normally distributed. Last, the monthly estimates of the pass-through ratio are almost always positive.

Table 1 presents simple correlations between the variables shown in Fig-

ure 1. The first two correlations show that the monthly fluctuations in the pass-through ratios, denoted as PTR in the table, are independent of annual changes in consumer prices or import prices. The correlations are low and insignificant at conventional levels. The same result holds for the correlations between the pass-through ratios and the price shocks. Instead, the correlations between prices and their respective shocks are positively correlated with each other. Both correlations are significant at the 5% level. The last set of correlations are autocorrelations of the pass-through ratios. They show that the level of persistence for the pass-through ratios is low. Only the first-order correlation at 0.2 is significant at the 5% level.

Next, to determine the importance of the size of the import price shocks, we plot in Figure 2 the pass-through ratios with respect to the import price shock. Despite considerable dispersion in the monthly point estimates, larger import price shocks are not linked with larger pass-through ratios. This independence result in the point estimates is confirmed by the statistical information on the pass-through ratios presented in Table 2. The average and the median pass-through ratio is around 0.3 for different samples based on the size of the import price shock. The monthly estimates of the pass-through ratios are normally behaved for samples that exclude import price

shocks smaller than 0.025 and the point estimates are significant at the 5% level for import price shocks greater than 0.1.

Low coefficient estimates are a common feature of previous pass-through studies for Switzerland. Studies by Choudri and Hakara (2006) and Gagnon and Ihrig (2004) are unable to reject the null of no pass-through effect. Their point estimate for the exchange rate pass-through to Swiss consumer prices for a sample period that includes the 1990s are around 0.07. Devereux and Yetman (2002) and Stulz (2007) estimate the exchange rate pass-through for Switzerland to be zero for the same inflation regime considered in Table 2.[10] In the next subsection, we show that different information assumptions for the panels explains the low time series estimates.

Tests of the Information Setting

Two robustness checks on the information settings of our panels and their effects on the the pass-through ratios are considered. Each test imposes a restriction on the panel and shows that real-time estimation for a broad panel generates the largest point estimates with a smaller degree of dispersion. The first test considers the role of estimation in non real time versus in real

[10]Stulz (2007) in separate estimates for the pass-through from import prices to consumer prices to be 0.21 for the sample 1993:5 to 2004:12.

time. To our knowledge, all pass-through studies work with latest available data. This type of information setting assumes that price setters have more information at their disposable than in the real time setting. Apart from uncertainty linked to the import price release, price setters struggle with incomplete information stemming from seasonal adjustment, data revisions, and measurement error in data collection.[11]

The monthly estimates of the pass-through ratio using latest available information are shown in Figure 3.[12] Although these average point estimates are in line with the real-time estimates of Figure 2, the real-time estimates have a lower variance. This result is documented in Panel A of Table 3. Particularly for small import price shocks, the estimates with latest available data are poorly estimated. However, even in the case for larger import price shocks, the point estimates of the pass-through ratio are never significant.

The second test considers the importance of information breadth on the pass-through ratios. Many empirical studies estimate the pass-through using only prices (i.e., exchange rates, import prices, and consumer prices). We re-

[11]In the literature on real time data, it is unclear whether latest available information results in improved forecasts. See the discussion in Croushore (2008).

[12]To generate a non real panel, we needed to drop the last three observations for the largest panel and thus present results for the period 2003:1 to 2008:1

estimate the pass-through ratios in real time for a panel that has only 179 CPI prices and its subcomponents plus import prices. Figure 4 shows that when we restrict the information set (i.e., excluding real variables, money variables, financial variables, and foreign variables) the median point estimate falls from 0.3 in the full (real time) panel to 0.1 in the CPI (real time) panel. As shown in Panel B of Table 3, the variance of pass-through ratios in the restricted panel is considerably larger than in the estimates with the full (real time) panel of Table 2.

The of Role of Persistence for Pass-Through Ratios

We conduct two further sensitivity tests of the pass-through ratios; both relate to the role of persistence. The first test considers the impact of filtering short-run information on the pass-through ratios. For this exercise, we again work with a real-time panel. We disregard short-run information in the cross-section by applying the band-pass filter at frequency $2\pi/12$ for all variables in the panel before projecting on import prices and consumer prices. This filter purges short-run information (i.e., at the annual frequency including measurement error, seasonality, etc.). Figure 5 shows that the pass-through ratios are nearly flat along the zero axis independent of the size of the import price shock. Panel A of Table 4 confirms the result that it is primarily short-

run shocks that define our pass-through ratios in Figure 2.

In Tables 2 and 3, we showed that the one-day information shock to import prices influences consumer prices in contemporaneous time. Next, we consider whether the same information shock influences future import prices and future consumer prices. Rather than projecting import prices and consumer prices around data releases to build the pass-through ratio at t, we now consider forecast innovations at time *t+6* and *t+12*. This forecasting exercise tells us something about the duration of the shock to import prices.[13]

Figures 6 and 7 show the monthly (forecasted) pass-through ratios for *t+6* and *t+12* using the full (real-time) panel. As expected the forecasted pass-through ratios are smaller and are estimated less precisely than the monthly ratios at t. In most cases, the pass-through ratios are non-negative, suggesting that the duration of the information shock is beyond one month.

In panel B of Table 4 statistics of the first four moments of the 6-month ahead forecasted ratios are shown. Panel C documents the same information for the 12-month ahead forecasted ratios. The median pass-through ratios

[13]This exercise is similar to VAR studies that examine the impulse response function for consumer prices to shocks on the exchange rate or import prices. Further, Taylor (2000) has noted that import prices are a good predictor of domestic inflation.

are around 0.13 for both forecast horizons. Independent of the size of the shocks, we are unable to reject the null hypothesis of a zero (forecasted) pass-through ratio. Both sets of forecasted ratios exhibit non normal behavior with strong evidence of skewness and kurtosis. In the case of the 6-month forecasts, non normal behavior disappears when we consider only the largest shocks (i.e., shocks larger than 0.1). Obviously, the precision of these monthly estimates depends heavily on the predictive strength of the dynamic common factor model. Hence, we are unable to determine if non normality of the monthly forecasted estimates stems from the forecasting model or from the information shocks.

4. Concluding Remarks

The paper presents monthly estimates of the pass-through ratio based on an identification scheme that relies on the real-time setting of data releases. The event-study procedure makes three contributions to the vast empirical literature on pass-through estimation. First, the pass-through ratios are estimated in real-time. Such an information setting is important for policy-makers, because it mimics the information domain that firms use to set their prices. In the real-time context, this means that price setters struggle with

data revisions, quoted financial variables, and incomplete information. Second, monthly releases in import prices and its subcomponents are a natural experiment for defining the exogenous shock from import prices to domestic prices. The shock arises from the information uncertainty linked to monthly data releases. Third, the estimation procedure uses a common factor model that is able to encompass a wide-body of information without having to impose controversial restrictions as in VAR models.

The proposed identification strategy for monthly pass-through ratios offers a richer set of empirical results. The application to Switzerland's low inflation environment yields three new findings. First, the median monthly estimate of the pass-through ratio is 0.3. This estimate, which is higher than those using conventional time series procedures, is robust across time and size of the import price shock. Second, the median monthly pass-through ratios are dependent on the information breath of the panel and its real-time setting. Larger panels generate larger pass-through ratios than do smaller panels. The sensitivity of pass-through estimates to variable choice in a VAR framework has been documented in numerous studies. Our procedure based on the common factor method shows that this result holds in the extreme for panels that have more than 450 variables. Third, the degree of monthly fluc-

tuations in the estimated pass-through ratios are smaller in a real-time setting than for conventional estimates that assume non real-time information. This result suggests that latest available data settings, as used in conventional time series studies, are inconsistent with the information uncertainties that firms face in setting prices.

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Figure 1: Prices, Pass-Through Ratio, and Import Price Shock

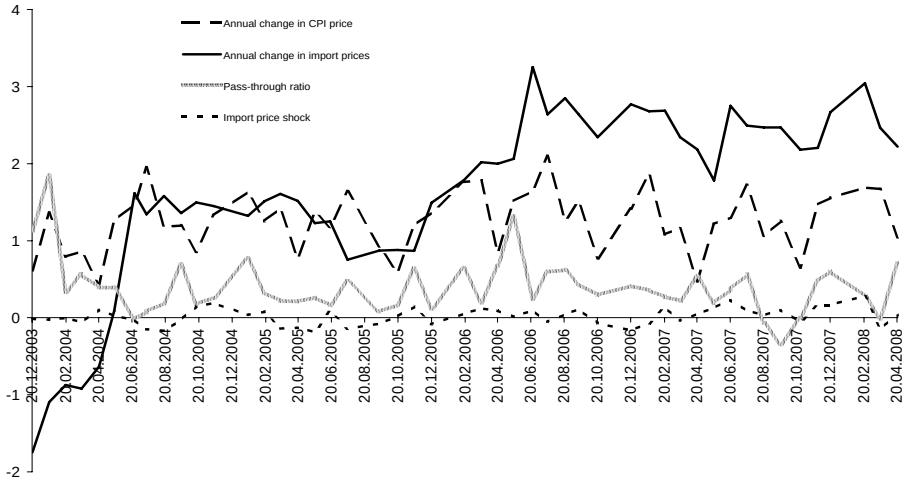

Figure 2: Pass-Through Ratio
Full Panel (real time) 2003:12 to 2008:4

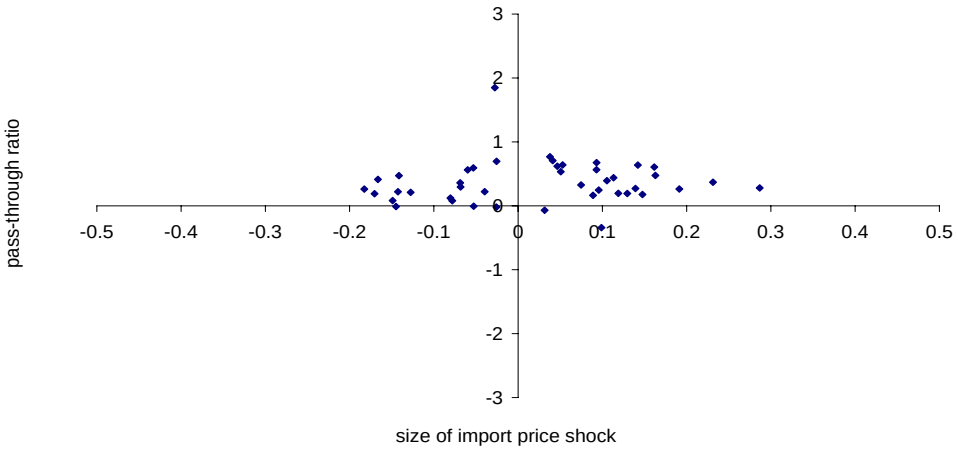

Figure 3: Pass-Through Ratio
Full Panel (no real time) 2003:1 2008:1

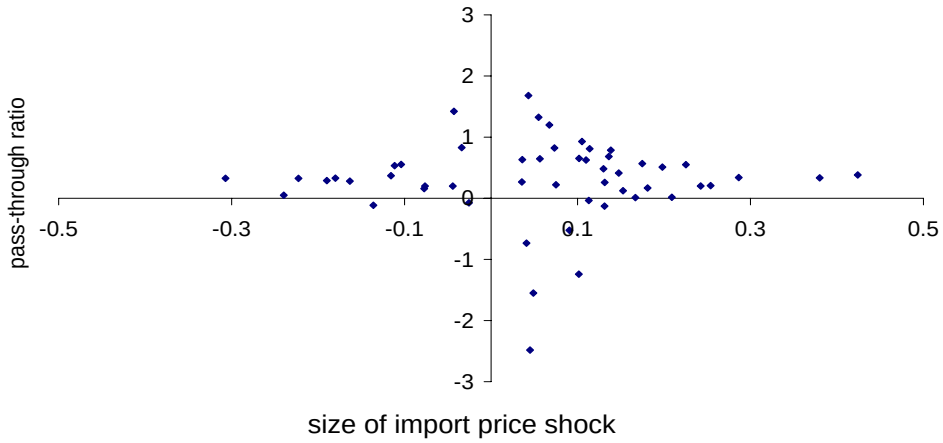

Figure 4: Pass-Through Ratio
CPI Panel (real time/balanced) 2003:12 to 2008:4

Figure 5: Pass-Through Ratio
Full Panel (real time and smoothed) 2003:12-2008:4

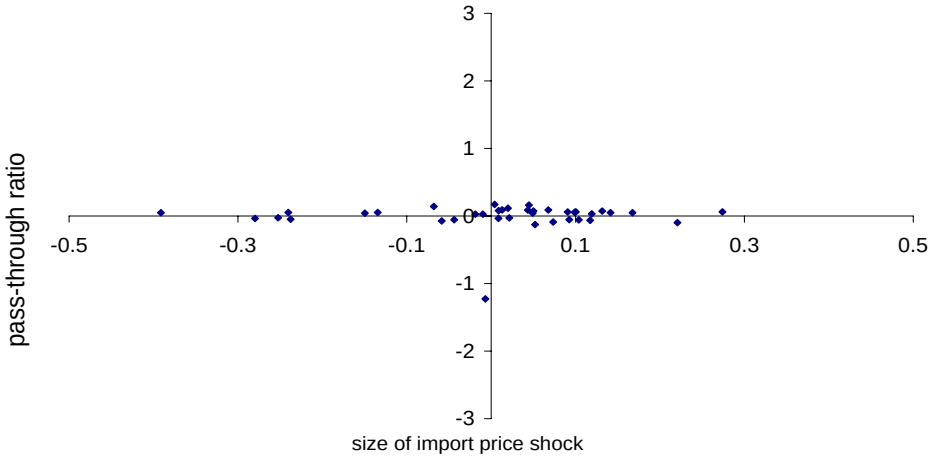

Figure 6: Pass-Through Ratio
6-month forecasts (real time) 2003:12 to 2008:4

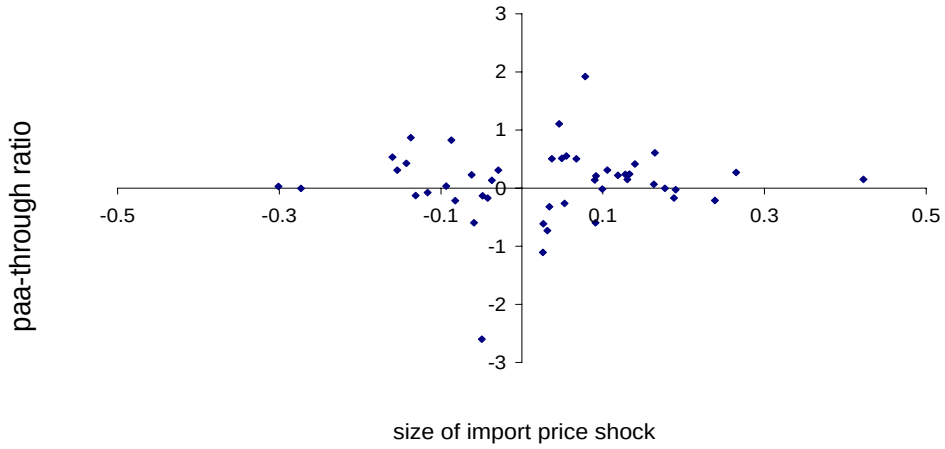

Figure 7: Pass-Through Ratios
12-month forecasts (real time) 2003:12 to 2008:1

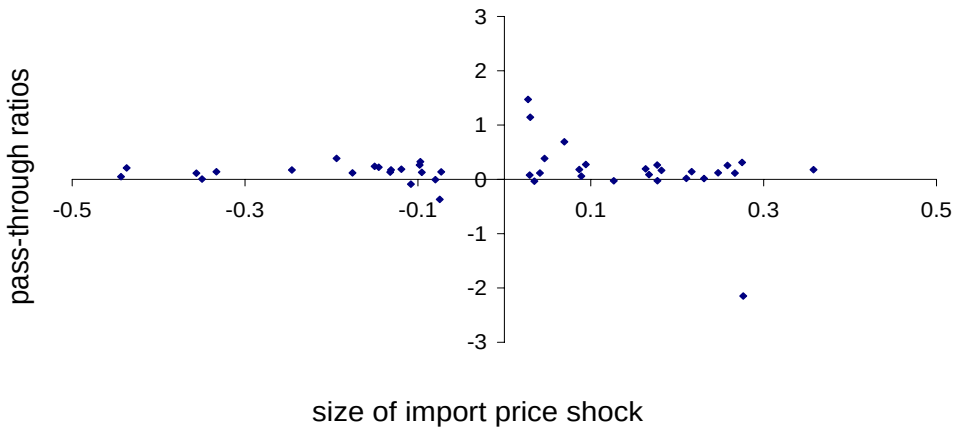

Table 1: Correlation Analysis

corr(annual change in CPI, PTR)	0.045
corr(annual change in import prices, PTR)	0.008
corr(annual change in CPI, import price shock)	-0.018
corr(PTR, import price shock)	0.059
corr(CPI shock, import price shock)	**0.848**
corr(annual change in CPI, annual change in import prices)	**0.424**
corr(PTR, PTR(-1))	**0.233**
corr(PTR, PTR(-2))	0.061

Notes: PRT denotes pass-through ratio; bold denotes significant at the 5% level.

Table 2: Pass-Through Ratios from 2003:12 to 2008:4 (real time full panel)

Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
median	0.327	0.295	0.280	0.277	0.324
average	0.293	0.365	0.313	0.307	0.357
variance	3.076	0.114	0.049	0.024	0.019
skewness	-3.180	1.844	-0.501	0.311	0.765
kurtosis	22.893	8.020	0.787	-0.164	0.009
NOB	53	43	35	20	8

Notes: Shock restrictions denote that only the pass-through ratios stemming from import price shocks greater than > x are considered. NOB denotes number of observations.

Table 3: Pass-Through Ratios (robustness tests)

Panel A:					
No real time (panel full) 2003:1 to 2008:1					
Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
median	0.334	0.328	0.331	0.331	0.289
average	1.443	0.285	0.348	0.311	0.275
variance	36.292	0.464	0.186	0.144	0.030
skewness	5.271	-1.647	-0.923	-1.978	0.107
kurtosis	27.634	5.523	3.966	7.579	-0.649
NOB	61	52	41	34	18
Panel B:					
Real time (panel CPI only) 2003:12 to 2008:4					
Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
median	0.100	0.100	0.100	0.090	0.090
average	-0.347	-0.017	-0.017	0.060	0.072
variance	68.684	0.738	0.738	0.120	0.112
skewness	-4.004	-5.244	-5.244	-1.298	-1.368
kurtosis	28.599	32.224	32.224	4.669	6.173
NOB	53	48	48	43	39

Notes: Shock restrictions denote that only the pass-through ratios stemming from import price shocks greater than > x are considered. NOB denotes number of observations.

Table 4: Pass-Through Ratios (smoothed and forecasted)

Panel A					
real time (panel full with smoothing) 2003:12 to 2008:4					
Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
median	0.050	0.032	0.060	0.128	0.161
average	0.369	0.006	-0.017	-0.128	-0.298
variance	4.720	0.020	0.071	0.302	0.647
skewness	5.407	-0.940	-4.200	-2.244	-1.732
kurtosis	34.838	20.922	19.518	5.107	NA
NOB	53	38	25	6	3
Panel B.					
6-month forecast					
Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
median	0.140	0.140	0.150	0.185	0.048
average	0.680	0.082	0.198	0.191	0.129
variance	13.786	0.409	0.201	0.073	0.066
skewness	5.921	-1.196	1.546	0.677	0.699
kurtosis	39.200	6.940	5.554	0.401	-0.270
NOB	53	47	35	22	11
Panel C					
12-month forecast					
restrictions on shock size	none	0.025	0.05	0.1	0.15
Size restrictions on the import price shock	none	> 0.025	> 0.05	> 0.1	> 0.15
average	0.155	0.141	0.085	0.058	0.048
variance	0.341	0.198	0.153	0.179	0.220
skewness	-0.197	-2.211	-4.799	-5.004	-4.605
kurtosis	6.679	16.836	27.876	26.768	22.332
NOB	53	47	41	31	25

Notes: Shock restrictions denote that only the pass-through ratios stemming from import price shocks greater than > x are considered. NOB denotes number of observations.