The pass-through from short-horizon to long-horizon inflation expectations

By James Yetman[1]

Abstract

This paper summarises ongoing work that investigates the pass-through from short-horizon and long-horizon inflation forecasts as a way to assess the anchoring of inflation expectations across a sample of 44 economies. It reports an overall decline in the pass-through, with the share of economies having anchored expectations increasing over time. Inflation targeting appears to have played a modest role in improved anchoring. Surprisingly, recent periods with low inflation out-turns are correlated with a decreased pass-through, suggesting that longer-term expectations remain well anchored.

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1. Introduction

Well anchored inflation expectations can play an important role in allowing central banks to pursue an activist monetary policy. One way to assess anchoring is to focus on long-horizon inflation forecasts: more stable forecasts may be indicative of better anchored expectations.

In many economies across the globe, long-horizon inflation forecasts appear to have become more stable over time. Graph 1 displays 6–10 year ahead CPI inflation forecasts collected by Consensus Economics twice a year for 44 economies for as long as they are available. Even for those with a history of high inflation, such as Russia and Turkey, they have tended to fall and stabilise over time.

A complementary way to demonstrate the increased stability of these long-horizon expectations is to compute their standard deviation. Graph 2 displays these for the same data based on five-year (10 observation) rolling samples. These are approximately flat or declining in nearly all cases.

While more stable long-horizon expectations could reflect improved anchoring, there are alternative explanations. For example, the nature of economic shocks could have changed: perhaps they could have become smaller, or less persistent, and this has contributed to a decline in intrinsic uncertainty about future inflation.

One way to disentangle the effects of improving anchoring from other explanations is to focus on how long-horizon expectations respond to specific shocks. Another is to focus on how expectations respond to news. Here we summarise results of ongoing work based on a third approach: the degree to which changes in short-horizon expectations pass through to long-horizon expectations.

This approach makes use of the fact that changes in short-horizon expectations encompass the effects of all types of shocks that influence inflation, including those affecting oil prices, exchange rates and wages. The more similarly long-horizon and short-horizon expectations react, the less well anchored are inflation expectations.

One paper taking a similar approach to ours is Buono and Formai (2018). They estimate an equation in the form $\pi_{it}^{e,l} = \alpha_{it} + \beta_{it}\pi_{it}^{e,s} + \varepsilon_{it}$ for four economies: the euro area, Japan, the United Kingdom and the United States, allowing for time-varying parameters. The left-hand side variable is a longer-horizon forecast, and the right-hand side variable is a short-horizon forecast.

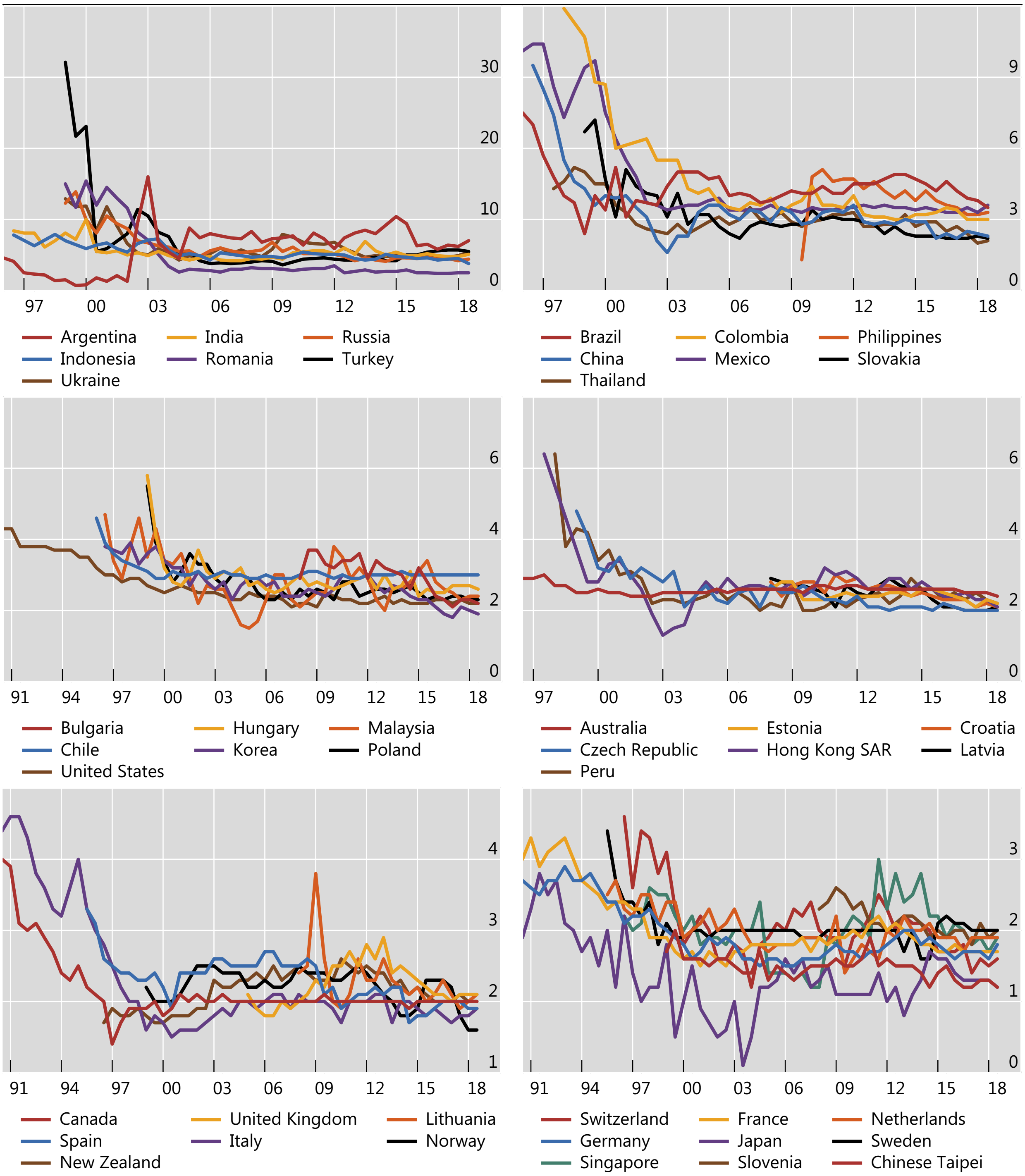
Our approach differs from theirs in several important respects. First, in terms of coverage: we include 44 economies instead of just four.[2] Second, we difference the forecast data, which is arguably necessary in our case since there is evidence of non-stationarity for at least some of our sample. Third, for the long-horizon forecasts we focus on the longest available, 6–10 years ahead, whereas they consider anywhere from two to five years ahead. Fourth, rather than estimating only economy by

[2] For an alternative approach applied to a similarly large set of economies using Consensus Economics forecasts, see Mehrotra and Yetman (2018), who model inflation expectations using a decay function on forecasts with horizons of up to 24 months, where forecasts monotonically diverge from an estimated anchor towards actual inflation as the forecast horizon shortens. They find that this model fits the data well, and indicates that inflation anchors have declined over time for most of the 44 economies in their sample. One limitation of their approach that the current approach addresses is that a 24-month horizon may be too short to assess the anchoring of long-term inflation expectations.

economy, we also consider panel estimation, which allows us to include interactive terms to try to explain what is behind the degree of anchoring and explain its evolution over time.

Long-term inflation forecasts

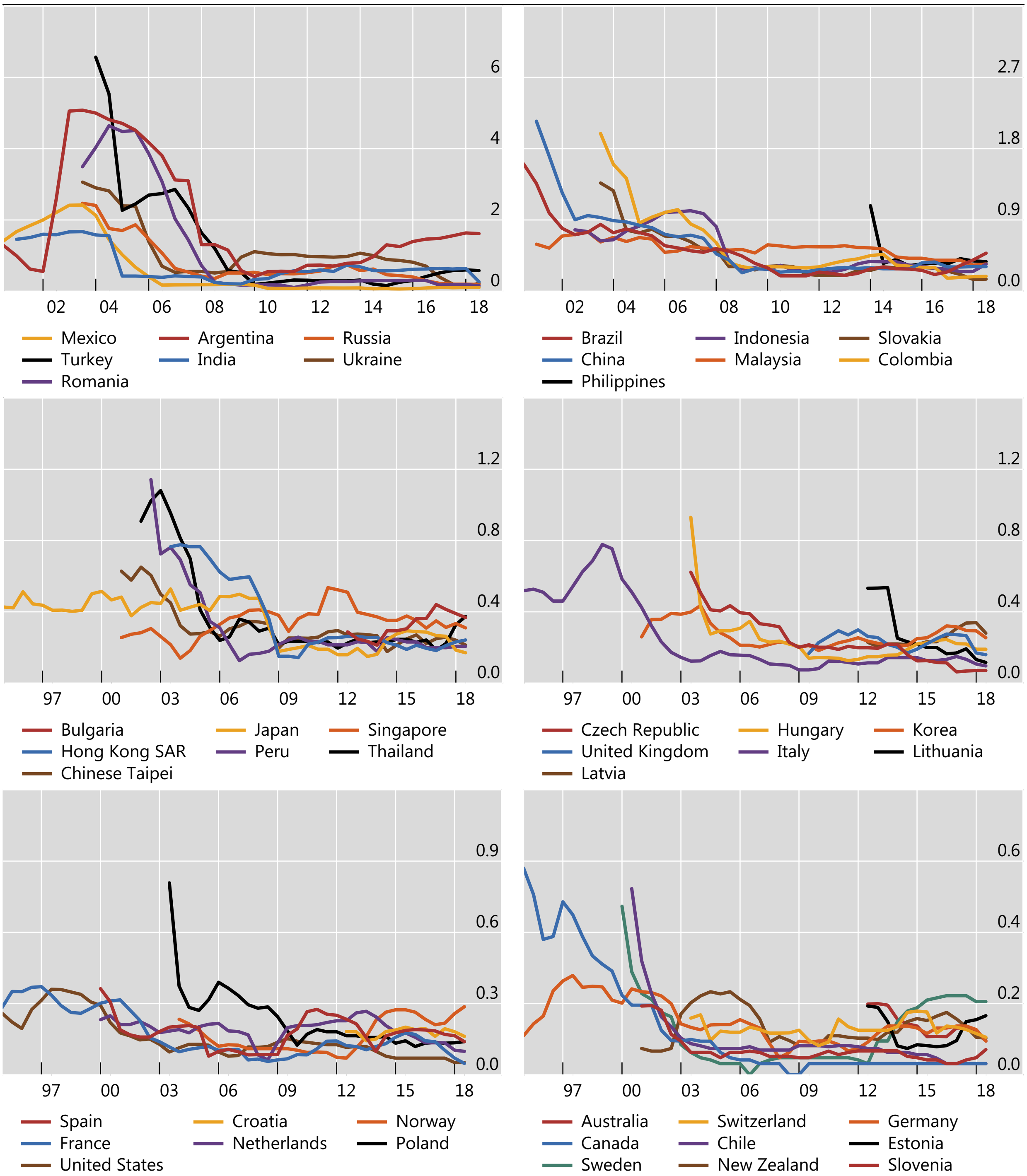
Graph 1



Source: Consensus Economics.

Five-year rolling standard deviation of long-term inflation forecasts

Graph 2



Source: Author’s calculations.

We find an overall decline in the pass-through from short-horizon expectations to long-horizon expectations over time in our sample. When we separate the sample into economies that are anchored, contained or unmoored in the spirit of Gefang et al (2012), we note that the share of economies with anchored expectations has steadily improved over the last three decades. We then look to see what might explain this improvement, adding interactive terms to our baseline regression. We find that inflation targeting appears to have played a modest role. However, variables associated with the recent period of low inflation out-turns – low policy rates, persistent deviations of inflation from target and low inflation itself – are correlated with a decline in the expectations pass-through, suggesting that longer-term expectations remain generally well anchored for now.

These questions are especially relevant in the post-Great Financial Crisis (GFC) era, where inflation outcomes have been persistently low in many economies. This work contributes to the existent body of literature investigating the effect of this on anchoring, including Strohsal et al (2016), Miccoli and Neri (2019), Grishchenko et al (2017), Galati et al (2011), Sussman and Zohar (2018), Conflitti and Cristadoro (2018), Garcia and Werner (2018) and Natoli and Sigalotti (2017).

2. Data and estimation

Our data are from Consensus Economics. Each month, Consensus Economics surveys panels of forecasters representing a large number of economies on their forecasts of around 8–10 economic variables for each of the current and next calendar years. In addition, twice per year, they also collect longer-term forecasts of a smaller set of variables for two, three, four, five and 6–10 years ahead. One variable that is nearly always included in these surveys is the percent change in consumer prices (or average annual percent change in the case of 6–10 year forecasts). The availability of these long-horizon inflation forecasts is summarised in Table 1.

For most economies, the shorter-term forecasts are available at the forecaster level, but only averages for the long-term forecasts. We use median short-term forecasts where possible in our study, and the averages published by consensus where not.

Our estimated relationship takes the general form:

$$\Delta\pi_{it}^{e,l} = \beta_i \Delta\pi_{it}^{e,s} + \varepsilon_{it} \,. \tag{1}$$

The change in the long-term forecast, $\Delta\pi_{it}^{e,l}$, is straightforward to compute. Given that these forecasts are of average inflation 6–10 years ahead of the forecast date, and the forecasts dates are only six months apart, the forecast periods overlap considerably. We simply use the change in the long-term forecasts from one forecast date to the next as our dependent variable.

Long-term inflation forecast availability					Table 1
Economy	Code	Start	End	Notes	AE or EME
Argentina	AR	October 1995	April 2018		EME
Australia	AU	April 1996	April 2018		AE
Brazil	BR	October 1995	April 2018		EME
Bulgaria	BG	September 2007	April 2018	March and September until April 2014	EME
Canada	CA	April 1990	April 2018		AE
Chile	CL	October 1995	April 2018		EME
China	CN	April 1996	April 2018		EME
Colombia	CO	October 1997	April 2018		EME
Croatia	HR	September 2007	April 2018	March and September until April 2014	EME
Czech Republic	CZ	September 1998	April 2018	March and September until April 2014	EME
Estonia	EE	September 2007	April 2018	March and September until April 2014	EME
France	FR	April 1990	April 2018		AE
Germany	DE	April 1990	April 2018		AE
Hong Kong SAR	HK	April 1997	April 2018		AE
Hungary	HU	September 1998	April 2018	March and September until April 2014	EME
India	IN	April 1996	April 2018	Forecasts for fiscal years (end 31/3)	EME
Indonesia	ID	April 1996	April 2018		EME
Italy	IT	April 1990	April 2018		AE
Japan	JP	April 1990	April 2018		AE
Korea	KR	April 1996	April 2018		AE
Latvia	LV	September 2007	April 2018	March and September until April 2014	EME
Lithuania	LT	September 2007	April 2018	March and September until April 2014	EME
Malaysia	MY	April 1996	April 2018		EME
Mexico	MX	October 1995	April 2018		EME
Netherlands	NL	April 1995	April 2018		AE
New Zealand	NZ	April 1996	April 2018		AE
Norway	NO	October 1998	April 2018		AE
Peru	PE	October 1997	April 2018		EME
Philippines	PH	April 2009	April 2018		EME
Poland	PL	September 1998	April 2018	March and September until April 2014	EME
Romania	RO	September 1998	April 2018	March and September until April 2014	EME
Russia	RU	September 1998	April 2018	March and September until April 2014	EME
Singapore	SG	April 1996	April 2018		AE
Slovakia	SK	September 1998	April 2018	March and September until April 2014	EME
Slovenia	SI	September 2007	April 2018	March and September until April 2014	EME
Spain	ES	April 1995	April 2018		AE
Sweden	SE	April 1995	April 2018		AE
Switzerland	CH	October 1998	April 2018		AE
Chinese Taipei	TW	April 1996	April 2018		EME
Thailand	TH	April 1997	April 2018		EME
Turkey	TR	September 1998	April 2018	March and September until April 2014	EME
Ukraine	UA	September 1998	April 2018	March and September until April 2014	EME
United Kingdom	GB	October 2004	April 2018		AE
United States	US	April 1990	April 2018		AE

Notes: unless otherwise stated, long-horizon forecasts are collected every April and October, and are for calendar years. For IN and GB there are also long-term for forecasts for the WPI and RPIX respectively, which we do not use. Forecasts for the euro area are also available beginning in 2003, but we instead focus on the constituent national economies (where available). The final column indicates whether an economy is classified as an advanced economy (AE) or an emerging market economy (EME) in later estimation.

We match these long-term forecasts with the change in the short-term forecasts, $\Delta\pi_{it}^{e,s}$, collected at the same time by Consensus Economics for the same economy, as follows. For each month, there are forecasts for each of the current and next calendar years. Between October and April of the following year, we compute the change in the forecast from October's forecast of the next year to April's forecast of the current year, which are forecasts of the same outcome, but with horizons of 15 months and nine months, respectively, relative to the completion of the year being forecast.

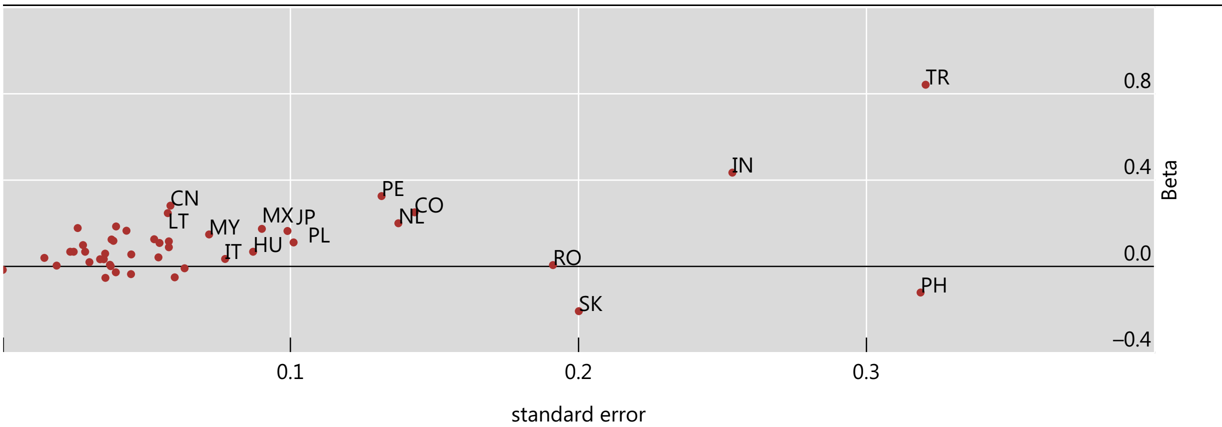
Between April and October, since these are in the same year, and there are forecasts for both the current and next year at each date, we have two possible short-term forecast measures available. The difference between the forecasts of next year's inflation compares horizons of 21 and 15 months, while the difference between the forecasts of this year's inflation compares horizons of nine and three months. We take the average of the two, which has the attractive property of matching, on average, the horizons of the short-term forecasts used to construct the change between October and April.

3. Results

3.1 Evidence of anchoring

We first estimate equation (1) by panel OLS. The model fits well, with an R-squared of 0.88. The coefficients vary widely from low negative numbers to 0.4 for India and 0.8 for Turkey. The standard errors of the estimates also vary widely, with the highest being 0.3 (for the Philippines).

Estimates Graph 3

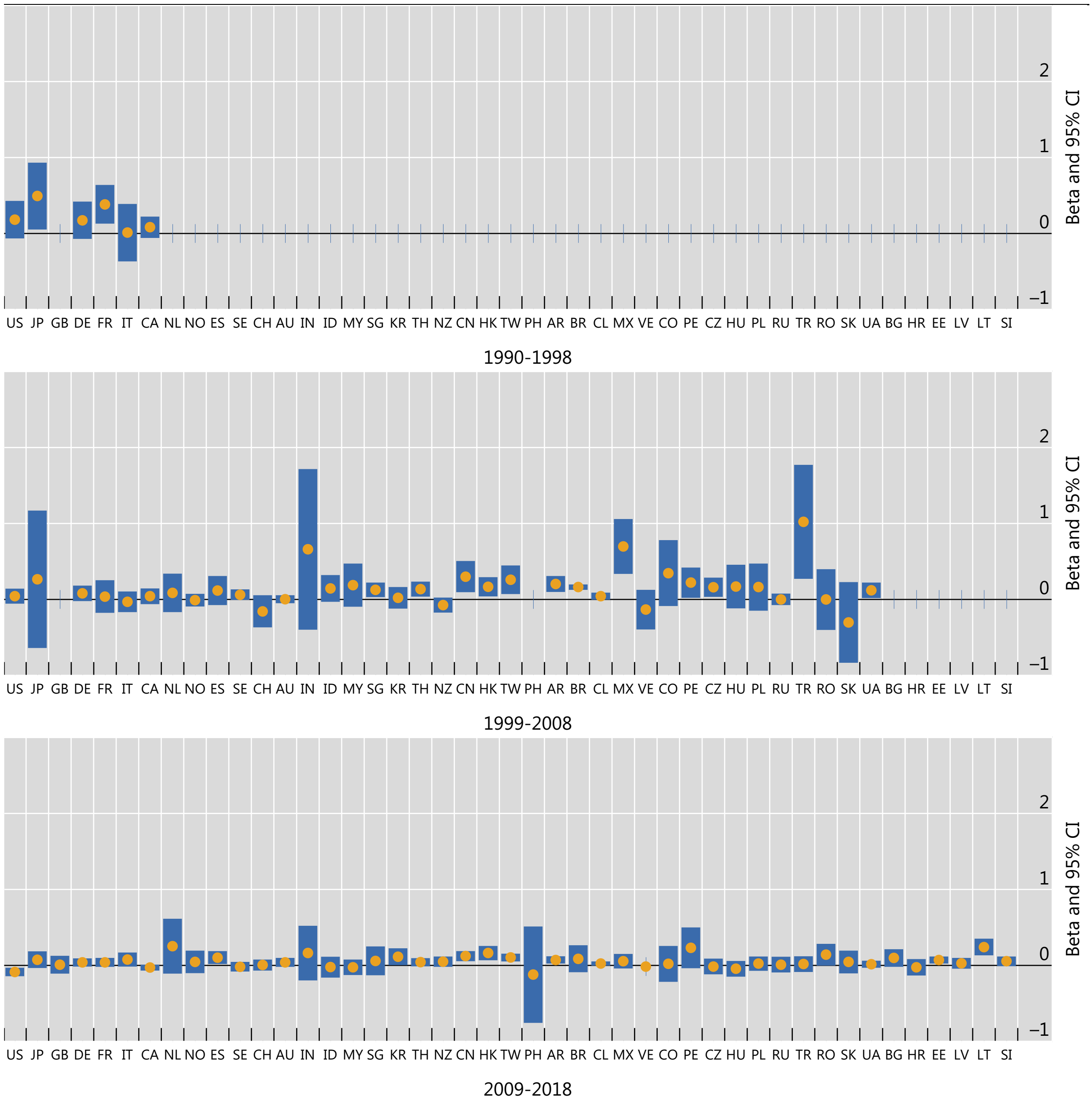


Clearly, well anchored expectations would be expected to result in a low estimate of β_i. But, in addition, we would expect the standard error of the estimate to be small: one can interpret a high standard error as reflecting the fact that there is an uneven relationship between short- and long-term expectations, such that sometimes the pass-through is higher than others. Graph 3 displays a scatter plot of the coefficients and their standard errors for each economy. There is a clear positive relationship between the two.

We also see how the pass-through has changed over time. The results are presented in Graph 4, based on 9–10 year subsamples. We display results for all economies with at least 10 forecast observations (out of a possible 17, 24 or 23 for the respective time-periods). While there are more economies in the sample in later subsamples, these generally display smaller estimates of pass-through (yellow dots) and tighter 95% confidence bands (blue bars).

Expectations pass-through over subsamples

Graph 4



Note: Dots indicate estimated the expectations pass-through for each economy, and bars 95% confidence bands.

We can formalise the improvement in anchoring over time, in the spirit of Gefang et al (2012). We divide economies into one of three categories. Anchored (A) economies are those where the estimated pass-through is low and precisely estimated (which we define as having a 95% confidence interval that includes 0.0 and an upper bound below 0.2). Contained (C) are those that are not anchored but have a pass-through significantly below one (that is, the 95% confidence band excludes 1.0. Finally, unmoored (U) economies are those where the pass-through is not significantly different from one.

Table 2 summarises the results. These clearly indicate an increase in the level of anchoring over time. In the earliest subsample, none of the six economies had anchored expectations. In the middle subsample, 35% of the economies were anchored. If we focus on the six economies that were also in the first subsample and define an improvement in the amount of anchoring as a decline in the pass-through coefficient and a reduction in the standard error, then four of the six show improvement. The other two are mixed (with the pass-through increasing while the standard error decreases, or vice versa). In this middle panel, we have four economies with unmoored expectations: Japan, India, Mexico and Turkey.

Number of economies by degree of anchoring, by subsample

Table 2

	1990–1999	2000–2008	2009–2018
Anchored	0	13	26
Contained	6	20	18
Unmoored	0	4	0
Total	6	37	44

3.2 Understanding inflation expectations pass-through

We next look to see what factors might explain inflation expectations pass-through over time. To do this, we supplement equation (1) above in the following way:

$$/\,\Delta\pi_{it}^{e,l} = \alpha + (\beta_0 + \sum_j \beta_j X_{ijt})\Delta\pi_{it}^{e,s} + \varepsilon_{it} \qquad (2)$$

For X_{ijt}, we consider a number of different potential exponential explanatory variables (j) that could help to explain the degree of the pass-through for short-term expectations to longer-term expectations. These are the average rate of inflation over the past 10 years (MeanInflation) and dummy variables for annual inflation below 1% (LowInflation), a policy rate below 0.3% (LowInterest), an inflation targeting regime (ITDummy, based on the IMF's AREAER), and a stable exchange rate (ERStable, defined as an annual standard deviation against one of the USD or euro (or Deutsche Mark in the pre-euro period) of less than 1% at daily frequency, similar to Carvalho Filho (2010)). In addition, we allow for various combinations of fixed effects.

We display the results in Table 3. The average level of inflation and a stable exchange rate appear to have little effect on the expectations pass-through. Meanwhile, the pass-through falls with low policy rates or low inflation. Inflation targeting also contributes significantly to insulating long-term expectations from changes in short-term expectations in most model specifications. We also note that the intercepts in the specifications without fixed effects are significantly negative, reflecting a trend decline in long-term expectations over time that is not correlated with short-term expectations.

Regression results. All explanatory variables together.				Table 3
	All			
MeanInflation	0.000070	–0.00012	–0.000077	–0.00012
	0.26	*0.49*	*0.56*	*0.54*
LowInflation	–0.09	–0.090	–0.10	–0.075
	0.00	*0.09*	*0.00*	*0.10*
LowInterest	–0.11	–0.0060	–0.029	0.12
	0.00	*0.91*	*0.48*	*0.12*
ITDummy	–0.089	–0.10	–0.23	–0.17
	0.01	*0.01*	*0.02*	*0.05*
ERStable	–0.013	–0.014	0.13	0.089
	0.75	*0.74*	*0.01*	*0.30*
Constant	–0.082	–0.067	–0.066	–0.054
	0.00	*0.00*	*0.00*	*0.00*
Year FE	N	Y	N	Y
Economy FE	N	N	Y	Y
N	*1731*	*1731*	*1731*	*1731*
Adj. R2	0.19	0.31	0.30	0.39

NB: p-values in italics; colour coding indicates statistical significance based on robust standard errors, for positive and negative coefficients respectively, as:

0.10,	*0.05,*	*0.01,*	*0.10,*	*0.05,*	*0.01.*

These results indicate that, judging from the pass-through of changes in short-term inflation expectations to long-term inflation expectations, low inflation and low policy rates have not resulted in expectations becoming unanchored. A possible explanation is that forecasters anticipate that these states were/are only transitory, and will be resolved is less time than the forecast horizon of the longer-term forecasts.

We have also examined the anchoring of inflation targeters in isolation, and tested to see if persistent deviations from the target are reflected in a decline in anchoring. Surprisingly, a persistent deviation is associated with a decline in the pass-through that is sometimes statistically significant, consistent with the argument that recent low inflation has not materially impaired anchoring as yet. Meanwhile, having had an inflation target for longer correlates with a decline in the pass-through that is generally statistically significant.

We also compare the results splitting the sample between advanced economies and emerging market economies (EMEs). The one key difference is the inflation targeting dummy: for advanced economies, there is no robust empirical relationship between inflation targeting and the expectations pass-through, while for EMEs inflation targeting regimes experience statistically significantly lower expectations pass-through across all empirical specifications.

4. Discussion and conclusions

In this chapter, we summarise ongoing work investigating the pass-through from short-horizon to long-horizon inflation forecasts as a way to assess the anchoring of inflation expectations. We find an overall decline in the pass-through from short-horizon forecasts to long-horizon forecasts over time in our sample. When we divide our sample into economies with anchored, contained or unmoored expectations, the share of economies with anchored expectations has steadily improved over the last three decades.

We then look to see what might explain this improvement, adding interactive terms to our regression. We find that inflation targeting appears to have played a modest role, especially in EMEs. However, variables associated with the recent period of low inflation out-turns – low policy rates, persistent deviations of inflation from target and low inflation itself – are surprisingly correlated with a decline in the expectations pass-through. This suggests that longer-term expectations remain well anchored: perhaps forecasters perceive low inflation outcomes as transitory, and unlikely to persist for as long as the horizon on the long-term forecasts. However, it remains to be seen if this will continue if low inflation outcomes persist.

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