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Gains from Anchoring Inflation Expectations: Evidence from the Taper Tantrum Shock

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Gains from Anchoring Inflation Expectations: Evidence from the Taper Tantrum Shock *

Rudolfs Bems† Francesca Caselli‡ Francesco Grigoli§ Bertrand Gruss¶

Abstract

Many argue that improvements in monetary policy frameworks in emerging market economies over the past few decades, have made them more resilient to external shocks. This paper exploits the May 2013 taper tantrum in the United States to study the reaction of 18 large emerging markets to an external shock, conditioning on their degree of inflation expectations' anchoring. We find that while the tapering announcement negatively affected growth prospects regardless of the level of anchoring, countries with weakly anchored inflation expectations experienced larger exchange rate pass-through to consumer prices, hence comparatively higher inflation. We conclude that efforts to improve the extent of anchoring of inflation expectations in emerging markets pay off, as they ease the trade-off that central banks face when external shocks weaken growth prospects and trigger currency depreciations.

Keywords: Inflation Expectations, Taper Tantrum, Exchange Rate Pass-Through.

JEL Codes: E31, E52.

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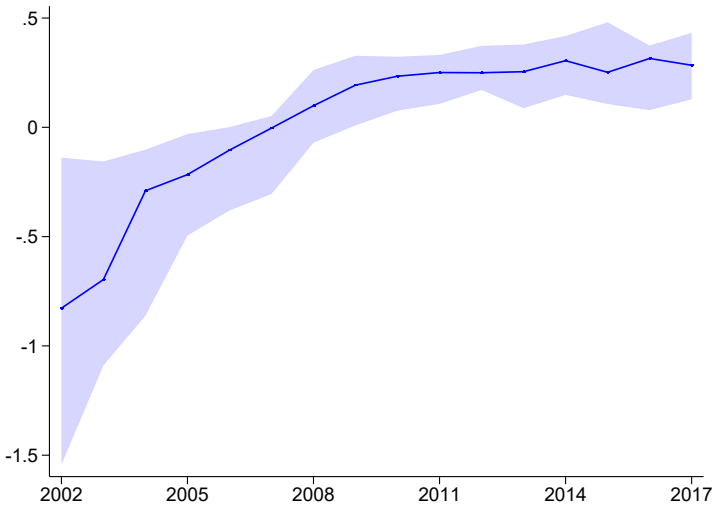
1 Introduction

As monetary policy gradually normalizes in advanced economies, the ability of emerging economies to cope with external shocks is being tested again. Many argue that improvements in macroeconomic policy frameworks over the past few decades rendered these economies more resilient to external shocks (Vegh and Vuletin 2014; IMF 2016). One clear manifestation of improved frameworks in emerging markets is the extent to which long-term inflation expectations became better anchored (Figure 1).[1]

Figure 1: Long-Term Inflation Expectations Anchoring Improvement Over Time



Notes: the figure shows the evolution over time of the anchoring index from Bems et al. (2018) for a sample of 18 emerging economies. This country-specific index summarizes the information from a set of four complementary metrics constructed from surveys of professional forecasters about long-term inflation. A higher number denotes more-anchored expectations. The solid line corresponds to the median, while the shaded area denotes the interquartile range. For details on the construction of the index see Section 1.2 and Bems et al. (2018).

But did improvements in policy frameworks make emerging markets more resilient to external shocks? To tackle this question, this paper exploits the exogenous shock that emerging markets faced during the so-called taper tantrum—a bout of financial panic triggered by an announcement by Federal Reserve Chairman Ben Bernanke in May 2013 about the possibility of tapering-off the Federal Reserve's program of quantitative easing—and a new index of long-term inflation expectations' anchoring developed in Bems et al. (2018). The empirical analysis estimates the conditional cumulative response of growth, the exchange rate, and the consumer price index (CPI) in the six months after the tapering announcement for a sample of 18 emerging markets, comparing coun-

[1] The literature suggests that the extent of anchoring is intimately related to the credibility of the monetary strategy (Cukierman and Meltzer 1986; King 1995). A monetary policy plan will be credible if the public believes the monetary authority does not have incentives to deviate from that plan or does not need to subordinate it to other considerations, such as restoring fiscal solvency.

tries with weakly and strongly anchored inflation expectations.[2]

We find that the tapering announcement resulted in a worsening of the growth prospects regardless of the level of anchoring. However, the countries with weakly anchored expectations experienced a persistent rise in inflation due to higher exchange rate pass-through. In fact, despite a lower exchange rate depreciation, the countries with poorly anchored expectations registered a significantly higher level of inflation, finding themselves facing a starker policy trade-off between fighting the recession and coping with higher inflation.

1.1 Taper Tantrum Episode: A Natural Experiment

In his testimony to the United States Congress on May 22, 2013, the Fed Chairman Bernanke raised the possibility of tapering-off the Federal Reserve's program of quantitative easing by reducing the pace of bond purchases. The sudden shift in expectations toward an earlier normalization of monetary policy in the United States induced a rebalancing of global portfolios away from emerging-market assets, triggering capital outflows and currency depreciations—a "taper tantrum in financial markets". This event represents an interesting natural experiment to study the consequences of a sudden stop in capital flows (Calvo, 1998). It is triggered by an expectation of a faster *de facto* monetary policy tightening in advanced economies and, importantly, it is exogenous to emerging economies. The identification strategy exploits the exogenous nature of the taper tantrum shock to emerging markets and the cross-sectional variation in the degree of anchoring.

1.2 Inflation Expectations' Anchoring

There are several measures of the extent to which inflation expectations are anchored. In economies with a strong anchor expectations for inflation over a sufficiently long horizon should be centered around the explicit or implicit target and hence not react to transitory fluctuations in actual inflation or in short-term inflation expectations (Bernanke, 2007; Demertzis et al., 2012; Kumar et al., 2015). Similarly, revisions of long-term forecasts in response to news should be minor (ibid.), so the average of long-term forecasts should be stable over time. In addition, if the monetary framework is credible and inflation expectations are well anchored, the dispersion (range of values) of individual long-term inflation forecasts should be low (Capistrán and Ramos-Francia, 2010; Dovern et al., 2012; Ehrmann, 2015; Kumar et al., 2015).

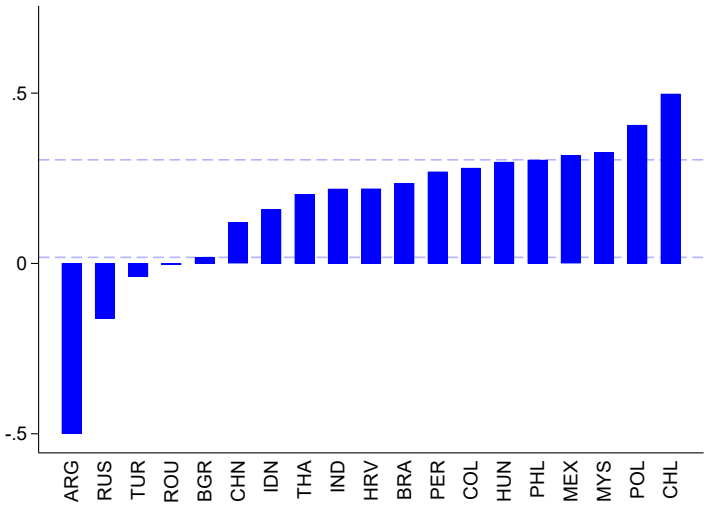
Building on these operational characteristics, Bems et al. (2018) use survey-based long-term inflation forecasts from professional forecasters to construct a country-specific index of the degree of anchoring of long-term inflation expectations.[3] The sample includes 18 emerging markets for which long-term (three-years ahead and above) inflation expectations are available. For the details on the construction of the index see Bems et al. (ibid.). Figure 2 shows the average value of

[2]The sample includes all emerging markets that report long-term inflation expectations (that is, three-year-ahead and longer) in Consensus Economics, with the exception of Ukraine, where inflation dynamics towards the end of the sample were influenced by the civil war. The included countries are: Argentina, Bulgaria, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Mexico, Malaysia, Peru, Philippines, Poland, Romania, Russia, Thailand, and Turkey. We estimate the reaction of output growth forecasts, as data on actual output growth are not available at the monthly frequency.

[3]To construct a country-specific index we first standardize each of the four metrics, centering them around zero, with a standard deviation of one. The anchoring index for horizon h is then constructed as the average of the four standardized metrics, so that a higher (lower) value of the index corresponds to a better (worse) anchoring of inflation expectations. In the analysis that follows, we focus on the index using three-year ahead inflation forecasts.

the anchoring index for each country in the sample calculated during the period 2002–17, and the 25th and 75th percentiles (with a higher number indicating an improved anchoring). The evidence shows significant cross-country heterogeneity, with Hungary, Malaysia, Poland, and Chile performing above the 75th percentile and Turkey, Romania, Bulgaria, Russia, and Argentina below the 25th percentile.

Figure 2: Cross-Country Heterogeneity of Inflation Expectations' Anchoring, 2002–2017



Notes: the figure shows the average anchoring index by country computed during the period 2002–17. The value for Argentina is -1.5, but we set the minimum of the vertical axis to -0.5 to ease visualization.

2 Empirical Framework

To assess the responses of output growth, prices, and the exchange rate to the taper tantrum shock, we estimate the following empirical model in a local projection framework (Jordà, 2005):

$$y_{i,t+h} = \alpha_{ih} + \phi_h \sum_{k=1}^{3} y_{i,t-k} + \beta_h taper_t + \theta_h anchoring_{it} + \gamma_h anchoring_i \times taper_t + \varepsilon_{i,t+h} \qquad (1)$$

where $y_{i,t+h}$ corresponds, alternatively, to monthly changes in output growth forecasts, consumer prices, and the exchange rate; for country i, at time t, over horizon h. $taper_t$ is a dummy variable equal to one in May 2013 and zero otherwise, and $anchoring_{it}$ is the anchoring index, as defined in Bems et al. (2018). The coefficient γ_h on the interaction term $anchoring_i \times taper_t$ traces the effect of the shock for different levels of the anchoring index. We define the country-year observations with an anchoring index above the 75th percentile as being *strongly anchored*, while the observations below the 25th percentile as being *poorly anchored*. The significance of the γ_h coefficient on the interaction term provides a direct measure of whether the effect is significantly dif-

ferent between the two groups. The identification strategy exploits the exogenous nature of the taper tantrum announcement and the cross-sectional variation in the degree of anchoring.[4] The estimations is implemented at the monthly frequency over the period 2002–17.

We study the conditional cumulative response between t and $t+h$ of output growth forecasts, the exchange rate, and consumer prices to the taper tantrum shock. The dependent variable is defined as $y_{i,t+h} = \frac{y_{i,t+h} - y_{i,t}}{y_{i,t}}$ in the case where the exchange rate and consumer prices are the dependent variable, and as $y_{i,t+h} = y_{i,t+h} - y_{i,t}$ in the case of the growth forecasts. Taking the ratio of the responses of consumer prices and the exchange rate allows us to compute the implied degree of exchange rate pass-through at each horizon after the shock.[5] The estimation includes three lags of the annualized change in the dependent variable. It also includes country fixed effects that capture any time-invariant country-specific characteristics (such as the quality of the institutions). Standard errors are corrected for serial correlation, heteroskedasticity, and cross-sectional dependence using the Driscoll and Kraay (1998) procedure.

3 Results

We now present our findings about the differential impact of the taper tantrum announcement in countries with strongly-anchored inflation expectations and countries with weakly-anchored inflation expectations.[6] Figure 3 shows the response of growth forecasts in both country groups. It confirms that the taper tantrum announcement led to a deterioration of the growth prospects in emerging markets. As soon as the shock hits, output forecasts declined sharply and to comparable degrees, regardless of the strength of the anchoring level.

Figure 4, panel (a), shows the cumulative response of the exchange rate. The currency depreciated on impact in both groups of countries. The initial depreciation was smaller in the less-anchored group (3.2 percent after three months) than in the strongly-anchored group (4.7 percent).[7] The lower initial depreciation in the less-anchored countries is consistent with the "fear of floating" argument of Calvo and Reinhart (2002), due to currency mismatches and high exchange rate pass-through. However, after the third month, the extent of the depreciation is the same across the two groups (panel [b]).

The response of the CPI in Figure 5, panel (a), suggests a very persistent and statistically significant increase in the price level for the weakly anchored economies, and a significantly smaller impact in the more-anchored group. The difference between the two groups is statistically significant at all horizons (Figure 5, panel [b]).

Given these sets of results, we can compute the degree of exchange rate pass-through as the ratio of the impulse response of prices to that of the exchange rate. Figure 6 suggests that the exchange rate pass-through during the taper tantrum episode was substantially larger in countries with less-anchored inflation expectations. The magnitude of the pass-through is almost 20 percent for the non-anchored group and less than 10 percent for the anchored group.[8] This finding is consistent

[4] For a similar exercise see Jordà et al. (2013).

[5] Growth forecasts are from Consensus Economics; the consumer price index is from Haver Analytics; and the nominal bilateral exchange rate against the US dollar is from the IMF, International Financial Statistics.

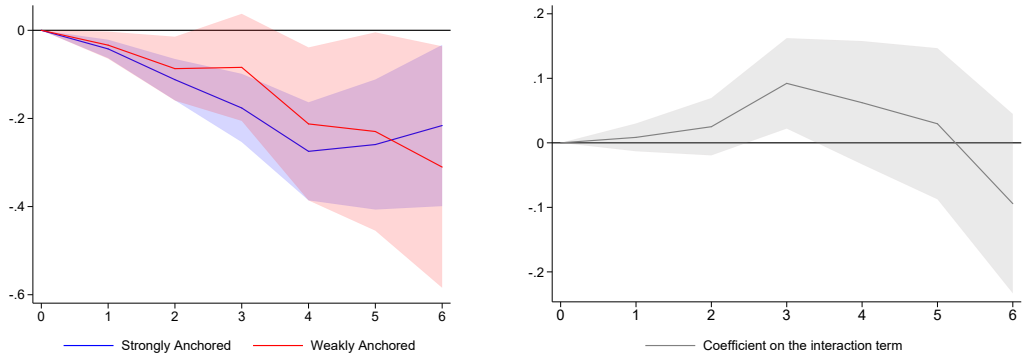
[6] The regression results are reported in the tables in Appendix A.

[7] These results are robust to the inclusion of the policy rate as a control variable to control for potentially heterogeneous monetary policy reactions.

[8] We compute country-level clustered standard errors simultaneously estimating the (co)variance of the coefficients of the exchange rate and CPI models. We then compute the ratio of the two and build 95 percent confidence

with the hypothesis of Taylor (2000), who argues that improvements in monetary performance, as reflected in price stability and better-anchored inflation expectations, result in a reduction of exchange rate pass-through. Several empirical studies have found evidence in line with this hypothesis, including Edwards et al. (2007), Choudhri and Hakura (2006), Mishkin and Schmidt-Hebbel (2007), Carriere-Swallow et al. (2016), and Caselli and Roitman (2016).

Figure 3: Output Growth Response

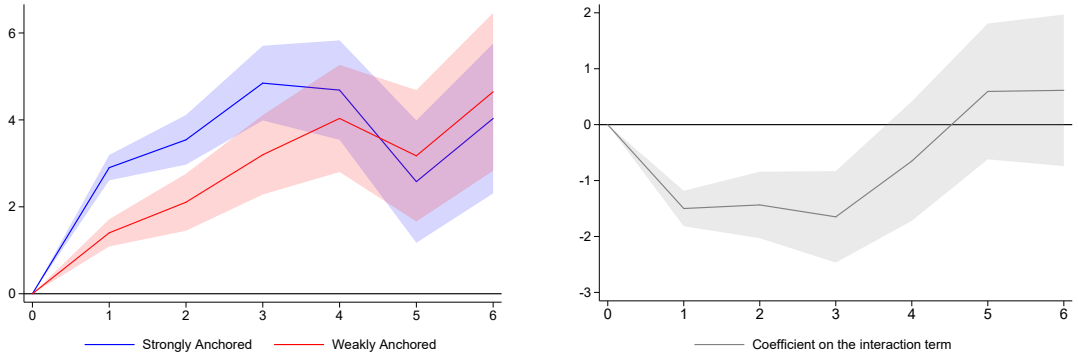


(a) Response by anchoring level

(b) Test on the difference of the coefficients

Notes: the figure shows the cumulative response of output growth forecasts to the taper tantrum shock. The solid blue line represents the response when expectations are strongly anchored (anchoring = 75th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p75}$. The red solid line represents to the response when expectations are weakly anchored (anchoring = 25th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p25}$. Shaded areas denote the 95 percent confidence intervals computed with Driscoll-Kraay standard errors.

Figure 4: Exchange Rate Response



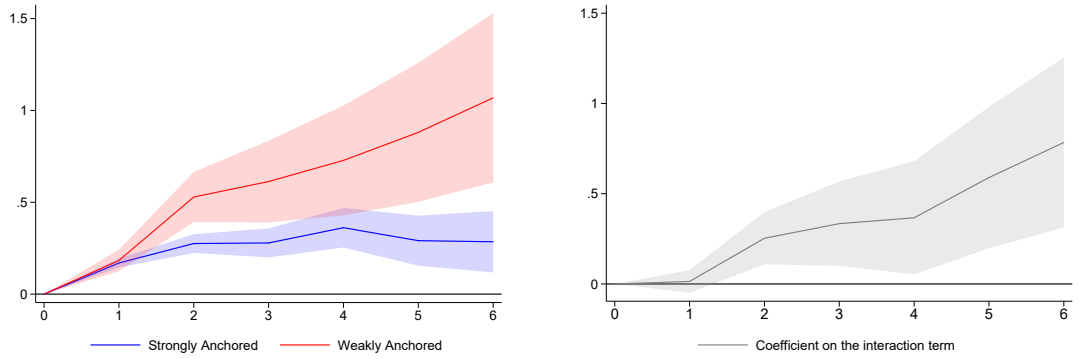
(a) Response by anchoring level

(b) Test on the difference of the coefficients

Notes: the figure shows the cumulative response of the exchange rate to the taper tantrum shock. The solid blue line represents the response when expectations are strongly anchored (anchoring = 75th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p75}$. The red solid line represents to the response when expectations are weakly anchored (anchoring = 25th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p25}$. Shaded areas denote the 95 percent confidence intervals computed with Driscoll-Kraay standard errors.

intervals.

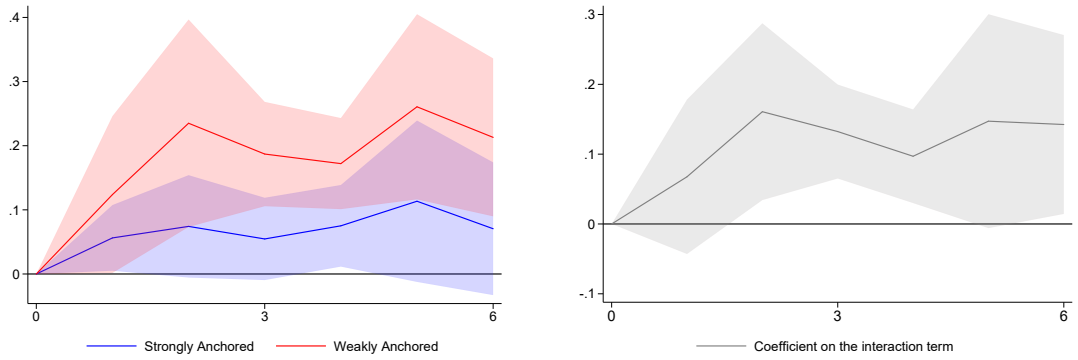
Figure 5: Consumer Price Inflation Response



(a) Response by anchoring level (b) Test on the difference of the coefficients

Notes: the figure shows the cumulative response of the consumer price index to the taper tantrum shock. The solid blue line represents the response when expectations are strongly anchored (anchoring = 75th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p75}$. The red solid line represents to the response when expectations are weakly anchored (anchoring = 25th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p25}$. Shaded areas denote the 95 percent confidence intervals computed with Driscoll-Kraay standard errors.

Figure 6: Implied Exchange Rate Pass-Through



(a) Response by anchoring level (b) Test on the difference of the coefficients

Notes: the figure shows the cumulative response of the consumer price index to the taper tantrum shock. The solid blue line represents the response when expectations are strongly anchored (anchoring = 75th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p75}$. The red solid line represents to the response when expectations are weakly anchored (anchoring = 25th percentile of its sample distribution) and corresponds to $\hat{\beta}_h + \hat{\gamma}_h \times anchoring_{p25}$. Shaded areas denote the 95 percent confidence intervals computed with Driscoll-Kraay standard errors.

4 Conclusions

This paper explores if economies where inflation expectations are better anchored are more resilient to external shocks. To do that, it exploits the exogenous nature of the taper tantrum shock that followed Chairman Bernanke's testimony to Congress on May 22, 2013, and relies on the cross-sectional variation in the degree of anchoring of inflation expectations in emerging markets documented in Bems et al. (2018).

Comparing the conditional response of growth forecasts, exchange rates, and consumer prices between countries with varying degrees of anchoring suggests that the strength of inflation expectations anchoring significantly affected how emerging economies responded to the taper tantrum shock. We find that the taper tantrum represented an adverse external shock for emerging markets that led to a deterioration of growth prospects over the subsequent months. The shock also induced a depreciation of their currencies regardless of the degree of anchoring of long-term inflation expectations. However, the extent to which the nominal depreciation led to higher consumer price inflation varied depending on the level of anchoring: in countries in which expectations were better anchored, inflation increased by less, implying a smaller exchange rate pass-through to consumer prices and lower inflation persistence. On the contrary, in countries with less-anchored inflation expectations, the taper tantrum shock not only had a negative effect on economic activity but also triggered a larger increase in inflation, posing a starker monetary policy dilemma for the central bank.

In sum, the analysis suggests that emerging economies are more resilient to external shocks that can trigger sudden stops in capital flows, such as the taper tantrum episode, and face better monetary policy trade-offs, when long-term inflation expectations are better anchored.

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Appendix A. Estimation Results

Table A.1: Response of Output Growth

	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$	(6) $h=6$
Taper dummy	-3.636**	-9.602***	-12.854**	-23.550***	-22.755**	-23.115*
	(1.408)	(3.319)	(5.566)	(8.030)	(10.633)	(13.114)
Taper dummy × anchoring index	-2.941	-6.562	-18.053***	-15.119*	-11.105	6.077
	(1.900)	(4.002)	(6.459)	(8.910)	(11.082)	(13.284)
Anchoring index	-0.693	-2.467	-4.689	-6.683	-8.938	-11.565
	(1.986)	(3.643)	(5.408)	(7.420)	(9.717)	(11.992)
Countries	18	18	18	18	18	18
Observations	2,688	2,670	2,652	2,634	2,616	2,598
R-squared	0.287	0.312	0.316	0.317	0.320	0.328

Notes: all regressions include three lags of the change in consumer prices and country fixed effects. Driscoll-Kraay standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.2: Response of Consumer Price Inflation

	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$	(6) $h=6$
Taper dummy	0.170***	0.372***	0.405***	0.490***	0.503***	0.567***
	(0.015)	(0.031)	(0.049)	(0.069)	(0.092)	(0.120)
Taper dummy × anchoring index	-0.037	-0.409***	-0.532***	-0.549**	-0.838***	-1.062***
	(0.038)	(0.090)	(0.157)	(0.231)	(0.309)	(0.388)
Anchoring index	-0.106***	-0.209***	-0.324***	-0.458**	-0.601**	-0.754**
	(0.035)	(0.075)	(0.123)	(0.182)	(0.251)	(0.328)
Countries	18	18	18	18	18	18
Observations	2,910	2,892	2,874	2,856	2,838	2,820
R-squared	0.457	0.548	0.600	0.633	0.658	0.678

Notes: all regressions include three lags of the change in consumer prices and country fixed effects. Driscoll-Kraay standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.3: Response of Exchange Rate Depreciation

	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$	(6) $h=6$
Taper dummy	2.270***	2.959***	4.090***	4.311***	2.704***	4.136***
	(0.166)	(0.346)	(0.518)	(0.688)	(0.852)	(1.054)
Taper dummy × anchoring index	2.028***	1.821***	2.135***	0.595	-1.212	-1.163
	(0.177)	(0.366)	(0.562)	(0.772)	(0.983)	(1.198)
Anchoring index	0.385	0.807	1.256	1.846	2.604*	3.335*
	(0.307)	(0.636)	(0.971)	(1.259)	(1.488)	(1.693)
Countries	18	18	18	18	18	18
Observations	2,910	2,892	2,874	2,856	2,838	2,820
R-squared	0.021	0.025	0.032	0.041	0.051	0.062

Notes: all regressions include three lags of the change in consumer prices and country fixed effects. Driscoll-Kraay standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.