

## What's Driving Global Inflation?

Our examination of the underlying drivers of global inflation reaches the following key conclusions, which we discuss in this paper:

- *First, inflation has become much more difficult to explain—the explanatory power of our regression framework is lower in the years after the financial crisis than in the years before.*
- *Second, as a related matter, this decline in our ability to explain inflation is particularly pronounced for “domestic” variables in the advanced economies. In the years after the financial crisis, variables like wages, the output gap, and the unemployment rate add little explanatory power for these economies.*
- *Third, “global” variables had the most powerful effects during the years of the financial crisis. This seems reasonable given that the crisis was a common global shock and that inflation rates across many countries moved broadly in tandem. Both China and the United States appear to play some role in shaping these global determinants of inflation.*
- *Fourth, we find that “external” variables (the exchange rate and import prices) are particularly powerful in explaining the behavior of inflation in the emerging markets. This result underscores the continuing importance for these economies to effectively manage exchange rate and import price shocks.*
- *Finally, and perhaps most important, our results suggest that the relatively stable inflation performance in recent years has masked remarkable changes in the deeper drivers of inflation. As such, the underlying global inflation process strikes us as very much still in flux. It remains to be seen whether the features of the post crisis period will persist, or if the underlying process will shift yet again. For example, as economies approach potential output, will traditional measures of slack and wages become more correlated with inflation?*



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[In a recent paper](#), we documented the stability of global inflation during the past 15 years. Across the major advanced and emerging market economies, inflation has remained remarkably low and stable in the face of diverse economic conditions and shocks.<sup>1</sup>

An important related issue, which has been the focus of ceaseless debate, is whether inflation has increasingly been determined by global factors, including China’s rising prominence in the world economy. Taking this as our jumping off point, we seek to look more deeply at the global inflation process and assess some of the underlying factors that have influenced its recent performance.

In this effort, we consider three broad sets of variables that we believe are affecting inflation performance in countries around the world. The first set we label “domestic.” This includes variables that are broadly unique to a given country—e.g., the domestic output gap, the unemployment rate, wages and unit labor costs, and money supply growth. The second set of factors we call “external.” These are factors that are determined jointly by domestic and global conditions—the exchange rate, import prices, and export prices. The final group of factors is “global,” which we see as determined largely outside of any one country or, at least, with any one country having only a diluted impact. These factors include global inflation, the global output gap, and global commodity prices. That said, we also consider the possibility that developments in China—or the United States—may have an outsized effect on the evolution of inflation in other countries.

For each set of variables, we assess their relative importance in driving inflation outcomes in economies around the world. Given the breadth of this undertaking, we will not provide a comprehensive treatment of the underlying empirical issues, but rather highlight a few key results that strike us as being of particular value to investors. For example, we will not typically comment on the magnitude of the estimated coefficients, but just briefly report their statistical significance and signs. As in our previous paper, we work with a panel of six advanced and twelve emerging-market economies that together account for roughly 85% of global GDP.<sup>2</sup> The key data are expressed as quarterly changes and run from Q1 2002 through Q2 2017.

## BASIC FRAMEWORK

We hypothesize that inflation in a given country is driven by “global” factors, “external” factors, and “domestic” factors. The complete list of variables that we consider is shown in Figure 1.

FIGURE 1: EXPLANATORY INFLATION VARIABLES

Global		External	Domestic
Global Core Inflation	Global Non-Core Inflation	Nominal Effective Exchange Rate (% change)	Output Gap
Global Output Gap		Import Price Inflation	Speed Effects (actual growth - potential growth)
WTI Price Inflation	Non-Fuel Commodity Prices (% change)	Export Price Inflation	Unemployment Rate
U.S. Headline Inflation	U.S. Core Inflation		Unit Labor Costs
U.S. Output Gap	U.S. Michigan Inflation Expectations (5-10 yrs. fwd.)		Money Supply Growth (M2)
China Inflation	China Producer Price Index		Inflation Expectations (short-term)
China Growth	Imports from China (share of GDP)		

Source: PGIM Fixed Income as of February 2018. For illustrative purposes only.

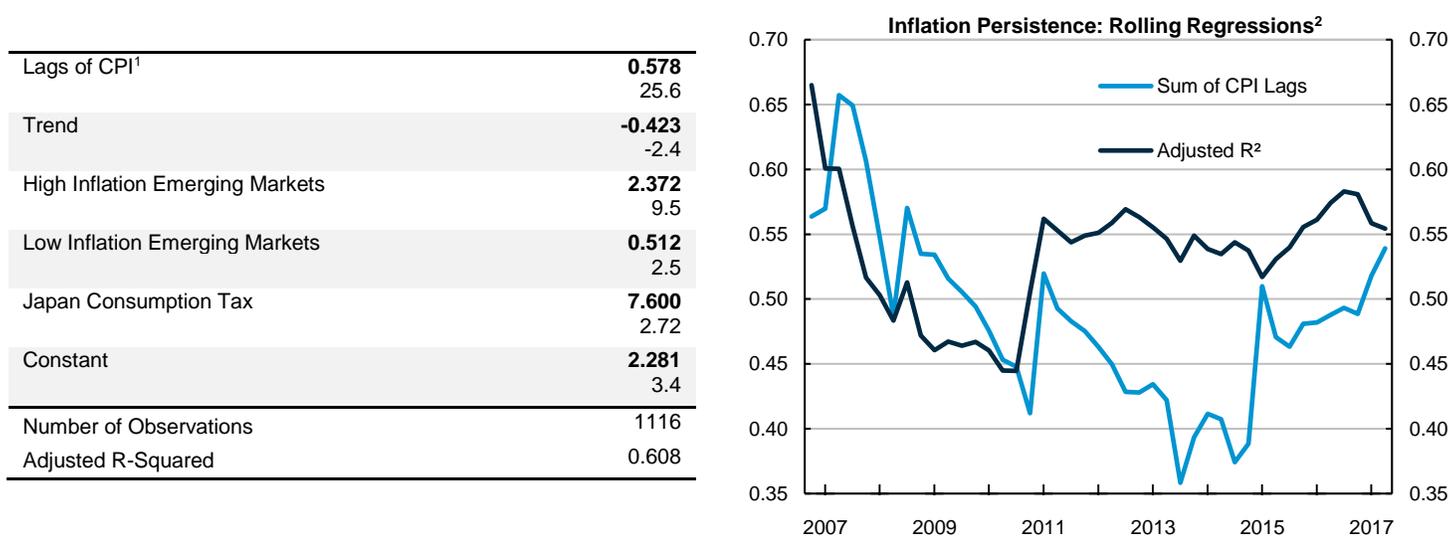
<sup>1</sup> See [“What’s Up with Global Inflation?”](#), *Global Macro Matters*, PGIM Fixed Income, October 2017.

<sup>2</sup> The advanced economies are the United States, euro area, Japan, United Kingdom, Australia, and Canada. The emerging markets are Brazil, Chile, Mexico, China, India, Indonesia, Korea, Poland, Russia, Saudi Arabia, South Africa, and Turkey.

To extract the information embedded in these data, we pursue two approaches. First, within each of the three groups of factors, we run a “horse race” in an effort to find the variables that are most robustly correlated with inflation.<sup>3</sup> Second, as an alternative approach, we use statistical techniques to extract “principal components” from each set of factors. This avoids the need to decide which of the variables are “best,” but has a downside in that finding an economic or structural interpretation for the resulting principal components can be difficult. In addition, the principal components indicate the central tendency of the data, but may not necessarily have the highest correlation with inflation.

In our regression models, we will always include a small set of control variables—three lags of the dependent variable (additional lags were not statistically significant), dummy variables that divide the emerging-market economies into two groups based on their inflation performance, a dummy variable for the Japanese consumption tax hike in 2014:Q2, and a time trend.<sup>4</sup> As shown in Figure 2, a regression including only these control variables scores an adjusted R<sup>2</sup> of 0.608, with the coefficients on the lags of the CPI summing to a little under 0.6, suggesting a fairly high degree of persistence; in other words, inflationary (or deflationary) shocks die out only slowly over time. The high-inflation emerging markets (EMs) have price increases running about 2 percentage points a year faster than the low-inflation EMs, and low inflation EMs have about ½ percentage point higher inflation than the advanced economy control group.

FIGURE 2: CONTROL VARIABLES



1 – All models include three lags of CPI. Bold value indicates t-statistic (reported underneath coefficient) significance at the 5% level. 2 – All rolling regression models use 5-year windows. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

The right panel of Figure 2 shows results from estimating this model using a rolling regression with five year-windows. The adjusted R<sup>2</sup> falls steadily for windows ending through 2010. It then steps up, and cycles around 0.55 in subsequent periods. Similarly, the sum of the coefficients on lagged inflation moves down, bottoming out in windows ending in 2013 and early 2014, but then bounces back up once the years of the financial crisis roll out of the window. In our work below, we will assess the extent to which other variables enhance the explanatory power of these basic control variables.

One further point is helpful. The International Monetary Fund (IMF) in its October 2016 World Economic Outlook undertook an exercise with some similarities to ours. That paper looked at inflation performance across a broad panel of countries, with an eye toward assessing why inflation has remained so subdued. The conclusion was that the soft performance of inflation reflected a combination of weak commodity prices and persistent slack in resource utilization, with evidence suggesting that slack in

<sup>3</sup> More specifically, we run regressions using various subsets of the data, keeping those variables with t-statistics consistently above one. This is equivalent to maximizing the adjusted R<sup>2</sup> (which rises when the t-statistic on a coefficient is greater than one).

<sup>4</sup> The lower inflation group is Chile, China, Korea, Mexico, Poland, and Saudi Arabia. The higher inflation group is Brazil, India, Indonesia, Russia, South Africa, and Turkey.

China's industrial sector was particularly important. This work also found that inflation persistence had diminished going into the financial crisis, but then again increased in the aftermath, broadly echoing our results in Figure 2.

## GLOBAL FACTORS

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In this section, we consider four conceptually distinct classes of global factors that may influence the behavior of inflation in individual countries. The specific variables we consider are listed in Figure 1.

**Global aggregates:** Inflation in a given country may reflect global conditions, such as global inflationary pressures and the extent of resource slack around the world. We proxy these factors with global core inflation, global non-core inflation (i.e., the portion of global headline inflation that is uncorrelated with global core inflation),<sup>5</sup> and the global output gap. More precisely, for each economy we derive unique global inflation indexes, weighting the corresponding inflation rates of the other 17 economies by market GDP. In this way, we define a "rest of world" inflation index from the perspective of that country.<sup>6</sup>

**Global commodity prices:** We look at the impact of changes in the price of WTI oil and an index of non-fuel global commodity prices. Some of these effects are no doubt captured by our measure of global non-core inflation. But we check to see whether there are any direct channels through which commodity price movements influence inflation.

**U.S. spillovers:** Developments in the United States, the world's largest economy, may shape inflation in other countries. The variables that we test include U.S. headline inflation, core inflation, the output gap, and long-term inflation expectations from the Michigan survey.<sup>7</sup>

**China spillovers:** As noted above, over the past fifteen years, a recurring narrative has been that developments in China influence global inflation performance. With this in mind, we examine the role of China's headline inflation, real GDP growth, PPI inflation (as a proxy for slack in the country's industrial sector), and the share of a country's imports from China (relative to that country's GDP).<sup>8</sup>

In our horserace of these factors, the results of which follow in Figure 3, we find that the global inflation variables, the global commodity price measures, and Chinese headline inflation add meaningfully to the regression's explanatory power. U.S. core CPI also performs well, but is slightly nosed out by global core inflation.

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<sup>5</sup> An advantage of this approach is that, by construction, there is no multi-collinearity between the two measures of global inflation.

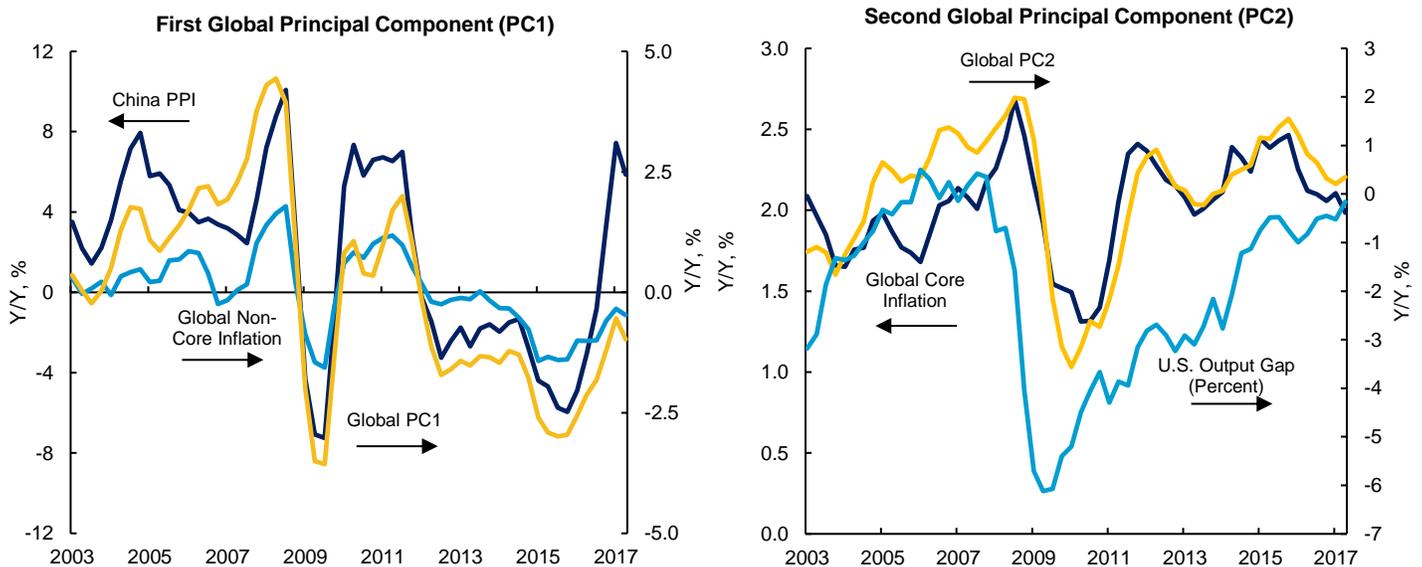
<sup>6</sup> We exclude a given country's inflation from the aggregate used in the regression to avoid spurious correlation, i.e., the possibility that the global aggregate is correlated with domestic inflation because it includes domestic inflation by construction.

<sup>7</sup> We also tested several other variables, including the U.S. PPI and U.S. non-core inflation (defined analogously to its global counterpart), but these variables showed little explanatory power.

<sup>8</sup> The IMF uses the Chinese PPI to derive an estimate of industrial slack in China. (See [Box 3.1 of the previously cited 2016 paper](#).) Also, given our definitions, the import share from China should arguably be included as an external variable instead, but we chose to keep the China-related variables together to streamline the exposition.

FIGURE 3: GLOBAL FACTORS

Lags of CPI <sup>1</sup>	<b>0.584</b> 26.4
Global Core Inflation	<b>0.490</b> 2.3
Global Non-Core Inflation	<b>0.292</b> 2.6
WTI Price Inflation <sup>2</sup>	0.004 1.7
Non-Fuel Commodity Prices (% change)	0.007 1.4
China Headline Inflation <sup>3</sup>	0.068 1.7
Number of Observations	1116
Adjusted R-Squared	0.633



1—Other control variables not reported. 2 – Contemporaneous and first lag, 3 – First lag. Bold value indicates t-statistic (reported underneath coefficient) significance at the 5% level. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

More specifically, the results plausibly suggest that a 1 percentage point shock in core inflation in the rest of the world, holding all else equal, raises domestic inflation by almost 0.5 percentage point. Over the longer term, this would increase the domestic price level by a little over 1 percentage point once all the lags have played through. The coefficient for global non-core inflation is a notch smaller, around 0.3, but also of plausible size and economic significance. The other three variables—the change in oil prices, the change in non-fuel commodity prices, and China’s headline inflation—enter the regressions as well, although their levels of statistical significance are somewhat lower and the coefficients are smaller in magnitude. Taken together, this framework registers an adjusted R<sup>2</sup> of 0.633, somewhat—but not dramatically—above the model with just the control variables.

As an alternative approach, we extract the first two principal components from the entire set of global variables. The objective is to find the central tendencies of these variables and to test their explanatory power. The resulting series are shown in the lower panels of Figure 3. The first principal component seems to broadly track the global commodity complex. It is closely related to global non-core inflation and the Chinese PPI. It also shows some meaningful relationship with the WTI price (not shown).<sup>9</sup> In

<sup>9</sup> In this paragraph, we are referring to the largest “factor loadings” for each of these principal components.

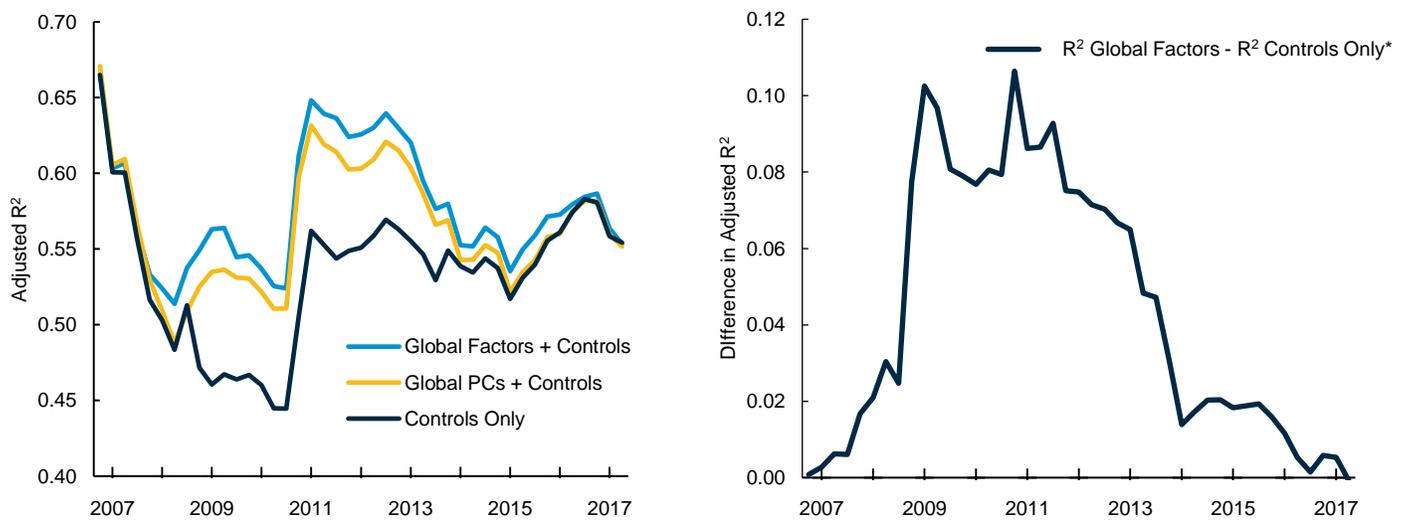
contrast, the second principal component is most correlated with the U.S. output gap, global core inflation, and U.S. core inflation (not shown). Notably, these results support our intuition that China and the United States tend to play an important role in shaping global conditions. For China, this is manifest through its relationship with commodity prices, while the U.S. influences seem to come through more general demand and price channels.

The left panel of Figure 4 reports rolling regressions from two global models. The first model uses the global variables identified in the horserace. The second includes the two principal components of the global data. Both regressions also include the control variables. The adjusted R<sup>2</sup> for the global model lies above that for the principal components model, but only slightly.<sup>10</sup>

Taken together, these results indicate that global factors do have some significant effects on the inflation process in individual countries. Aggregate global inflation (both core and non-core) seems to leave an imprint, as do commodity prices and developments in China. That said, the relatively strong performance of the principal components model highlights that deep common factors in these data—rather than one or two particular series—are likely playing the central role.

In the right panel of Figure 4, we look at the difference between the adjusted R<sup>2</sup> in the preferred global model versus that for the regressions with just the control variables; this captures the marginal explanatory power of the global variables.<sup>11</sup> The results are stark. The model's R<sup>2</sup> rises sharply as the global financial crisis enters the five-year window and remains elevated until the financial crisis rolls out of the window. The global model has only limited additional explanatory power in the years before and after the crisis. This highlights that the financial crisis was a shared global shock and that its inflationary effects were transmitted through shared global channels. These aggregate global variables appear to be much less powerful during normal times.

FIGURE 4: GLOBAL FACTORS—ROLLING ADJUSTED R<sup>2</sup>



\*The adjusted R<sup>2</sup> of the global model (including the control variables) less the adjusted R<sup>2</sup> of the model with the control variables only. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

## EXTERNAL FACTORS

We now replicate this exercise for the external factors. We examine each country's broad effective exchange rate, import prices, and export prices. As shown in Figure 5, our horserace process finds that the exchange rate and import prices are highly

<sup>10</sup> This qualitative result is not overturned by including additional principal components in that model.

<sup>11</sup> This framing tends to understate the total explanatory power of the global variables, since it credits the control variables with any variation explained jointly by the two sets of variables.

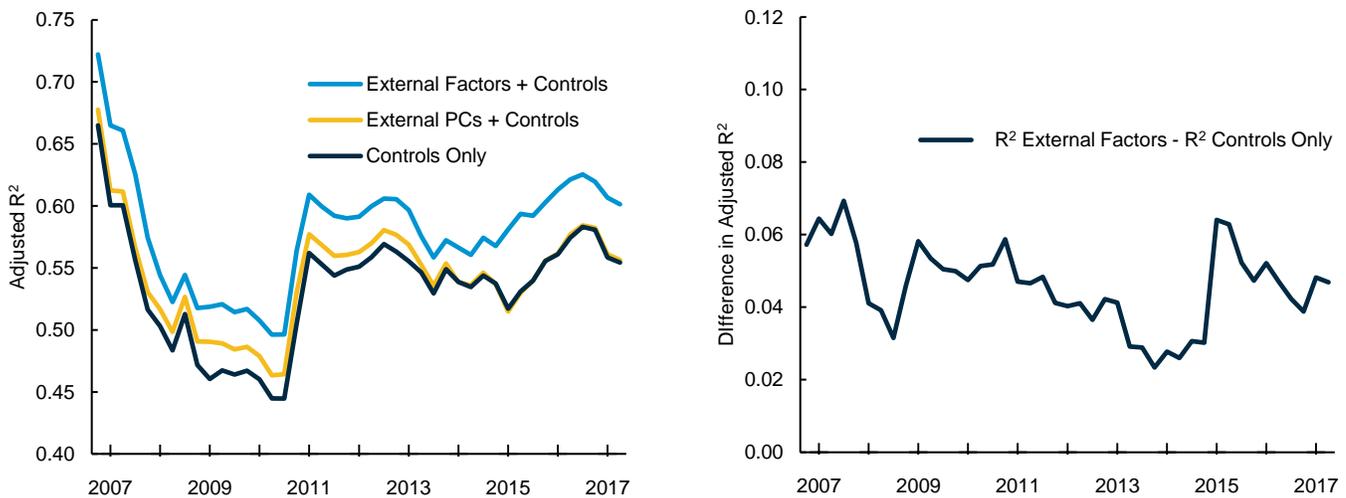
statistically significant and that they have the anticipated signs. Moreover, the adjusted R<sup>2</sup> for this model is higher than for the global model.

Of course, the exchange rate and import prices are themselves closely related. With this in mind, we extract a principal component from the external variables to test its power to explain inflation. The results are shown in the lower panels of Figure 5. Our selected external model outperforms the principal components model, suggesting that the exchange rate and import prices affect inflation through somewhat differing channels. This is an issue to which we will return to below.

The right panel shows the additional adjusted R<sup>2</sup> obtained from the external model relative to one with just the control variables. In contrast to the global variables, the explanatory power of this regression dips a bit during the financial crisis, but is relatively strong in the years before and after the crisis.

FIGURE 5: EXTERNAL FACTORS—ROLLING ADJUSTED R<sup>2</sup>

Lags of CPI	<b>0.569</b> 25.9
Nominal Effective Exchange Rate <sup>1</sup>	<b>-0.057</b> -6.9
Import Price Inflation	<b>0.042</b> 6.0
Number of Observations	1116
Adjusted R-Squared	0.649



<sup>1</sup> – Contemporaneous plus two lags. Bold value indicates t-statistic (reported underneath coefficient) significance at the 5% level. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

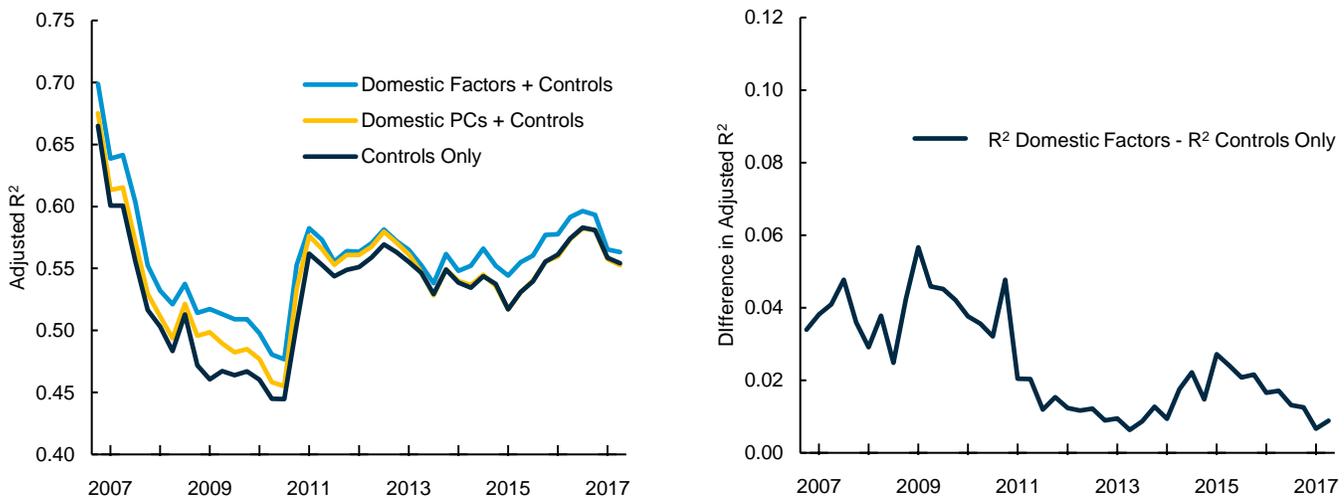
## DOMESTIC FACTORS

Figure 6 focuses on the role of domestic factors, which have traditionally been seen as the key drivers of inflation. We consider a host of such variables (listed in Figure 1) and find that many of these have a statistically significant relationship with inflation, including the output gap, “speed effects,” (i.e., the difference between actual growth and estimated potential growth), wage inflation, the growth in the money supply (M2), and short-term inflation expectations.<sup>12</sup>

<sup>12</sup> Long-term inflation expectations were not available for a large enough number of countries for a sufficient time series to include in the regression.

FIGURE 6: DOMESTIC FACTORS — ROLLING ADJUSTED R<sup>2</sup>

Lags of CPI	<b>0.476</b> 16.7
Output Gap	<b>0.098</b> 2.2
Speed Effects <sup>1</sup>	<b>0.070</b> 2.4
Wage Inflation <sup>1</sup>	<b>0.047</b> 2.7
Money Supply Growth (M2) <sup>1</sup>	<b>0.034</b> 3.0
Inflation Expectations (short-term)	<b>0.234</b> 5.4
Number of Observations	1116
Adjusted R-Squared	0.629



<sup>1</sup> – First and second lag. Bold value indicates t-statistic (reported underneath coefficient) significance at the 5% level. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

Unlike the global and external factors, the inclusion of domestic factors in the regression markedly reduces the sum of the coefficients on lagged inflation and trims their statistical significance. This suggests that at least some of the measured persistence in the inflation process is correlated with domestic macroeconomic developments. The bottom line, however, is that despite the significance of these domestic variables, the overall adjusted R<sup>2</sup> is lower than for the global and external regressions. This striking result underscores the important role of developments outside a country’s borders in driving the inflation process, particularly over the past decade. These domestic variables are individually significant, but they embed information about the inflation process that can also be inferred by studying the dynamics of inflation directly.

As displayed in the lower panels of Figure 6, the domestic model outperforms its principal components counterpart. However, as shown on the right, the extra significance derived from the inclusion of the domestic variables is relatively limited, particularly in the years after the financial crisis.

## COMPARING THE MODELS

In this section, we further probe the explanatory power of these three competing models. We begin by estimating an “All of the Above” model that includes the union of the variables in the global, external, and domestic models, as well as the control

variables. As shown in Figure 7, this framework achieves an adjusted R<sup>2</sup> of 0.685, markedly higher than for the other models. The results suggest that the most powerful variables are global non-core inflation, the two commodity price variables, the nominal effective exchange rate, and three domestic variables—wage inflation, money supply growth, and short-term inflation expectations.

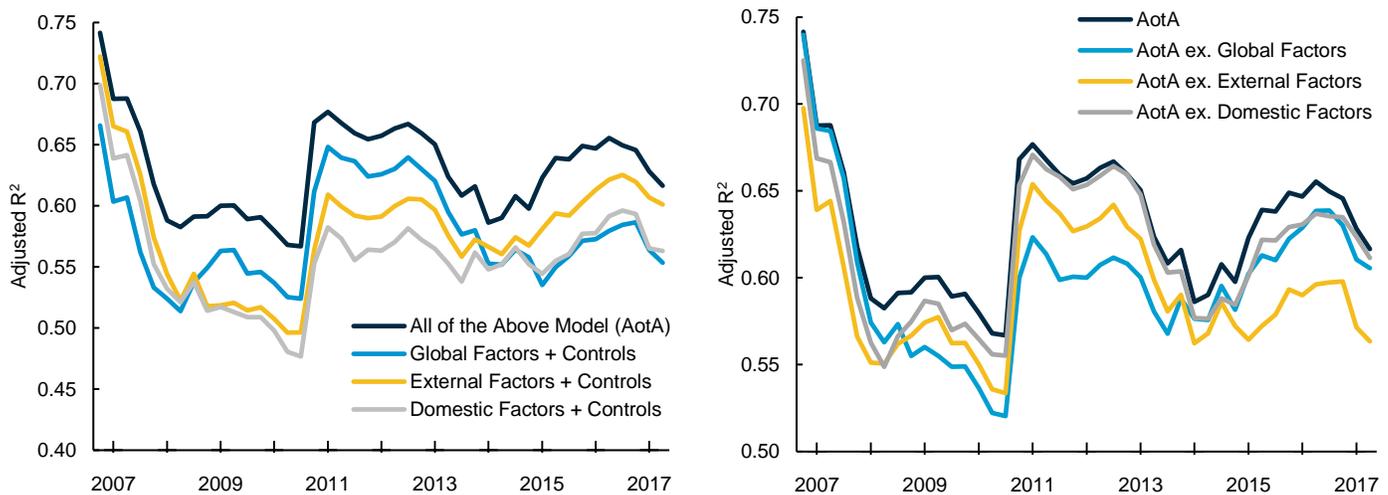
FIGURE 7: “ALL OF THE ABOVE” MODEL

Lagged CPI	<b>0.495</b> 18.4
Global Core Inflation	0.229 1.2
Global Non-Core Inflation	<b>0.302</b> 2.7
WTI Price Inflation <sup>1</sup>	<b>0.008</b> 3.5
Non-Fuel Commodity Prices (% change)	<b>0.010</b> 2.1
China Headline Inflation <sup>2</sup>	0.013 0.3
Nominal Effective Exchange Rate <sup>3</sup>	<b>-0.078</b> -9.3
Import Price Inflation	0.003 0.4
Output Gap	0.068 1.6
Speed Effects <sup>4</sup>	0.032 1.1
Wage Inflation <sup>4</sup>	<b>0.052</b> 3.3
Money Supply Growth (M2) <sup>4</sup>	<b>0.022</b> 2.1
Inflation Expectations (short-term)	<b>0.187</b> 4.6
Number of Observations	1116
Adjusted R-Squared	0.685

1 - Contemporaneous and first lag, 2 - First lag only, 3 - Contemporaneous plus two lags, 4 - Two lags only. Bold value indicates t-statistic (reported underneath coefficient) significance at the 5% level. Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

The fact that the “All of the Above” model outperforms the three other models indicates that those models contain information that is complementary in understanding the inflation process. This conclusion is reinforced by the results for the rolling regressions shown in the upper-left panel of Figure 8, where the broad model comfortably outperforms.

FIGURE 8: COMPARING THE MODELS — ROLLING ADJUSTED R<sup>2</sup>



	Adjusted R <sup>2</sup> For Three Sub-periods				
	Global Model	External Model	Domestic Model	All of the Above Model	Control Model
2002Q1 – 2007Q2	0.663	0.718	0.694	0.736	0.663
2007Q3 – 2011Q4	0.628	0.594	0.566	0.657	0.553
2012Q1 – 2017Q2	0.556	0.606	0.568	0.623	0.557

Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

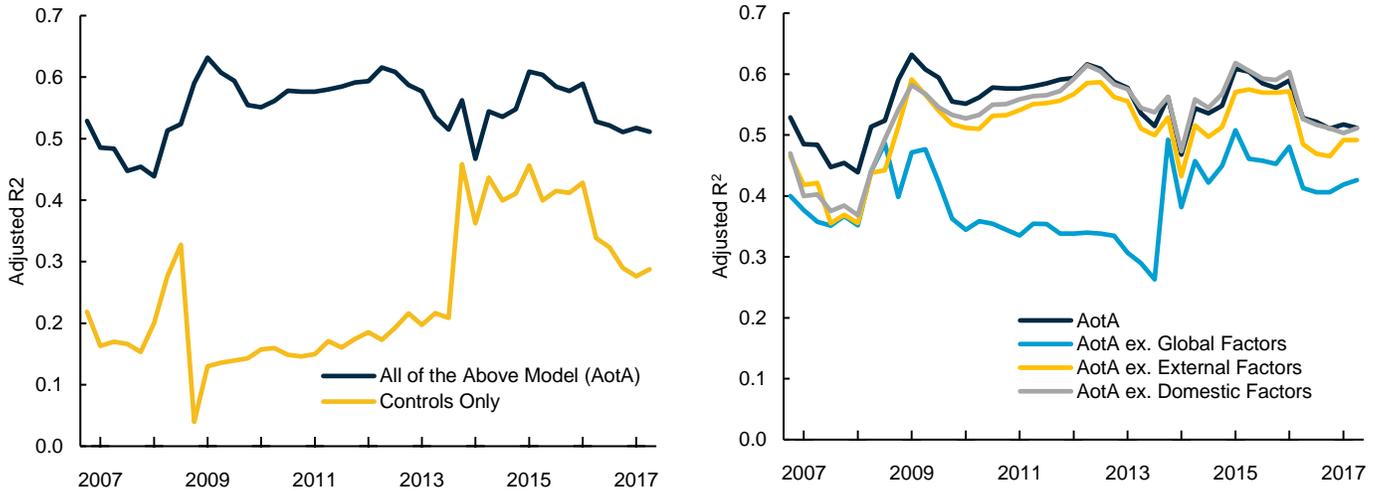
The upper-right panel reports the results obtained when we sequentially omit the global factors, then the external factors, and finally the domestic factors from the regression. Notably, for windows ending before the financial crisis, and again in windows after the crisis years have rolled out of the sample, the explanatory power of the regression is lowest when the external variables are omitted. During the crisis period, in contrast, the global variables are the biggest contributors. These results again highlight the important role of shared global factors in transmitting the inflationary and deflationary effects of the financial crisis. Similarly, the results also highlight the role of exchange rates and import prices in transmitting price shocks during more normal times. The domestic variables provide comparatively little additional explanatory power, once we have controlled for lags in inflation.

The lower panel divides the regression window into the pre-crisis, crisis, and post-crisis periods. Consistent with our other results, the external model comfortably outperforms the other two models before and after the financial crisis, while the global model is the best performer during the crisis period. Also of note, the overall explanatory power of our “All of the Above” model falls steadily across these three periods, indicating that inflation has become more difficult to explain.

## ADVANCED ECONOMIES VERSUS EMERGING MARKETS

Figure 9 repeats this exercise with only the advanced economies in our sample. As shown on the upper left, the combined model significantly outperforms the model with just the control variables, and its adjusted R<sup>2</sup> is just a notch below that for the overall sample. In contrast, the adjusted R<sup>2</sup> for the model with only the control variables is lower than the overall sample. This suggests that for these economies, more of the combined model’s explanatory power is coming from the economic variables, rather than from the control variables.

FIGURE 9: ADVANCED ECONOMY COMPARISONS—“ALL OF THE ABOVE” MODEL—ROLLING ADJUSTED R<sup>2</sup>



Adjusted R <sup>2</sup> For Three Sub-periods					
	Global Model	External Model	Domestic Model	All of the Above Model	Control Model
2002Q1 – 2007Q2	0.383	0.261	0.278	0.503	0.188
2007Q3 – 2011Q4	0.605	0.335	0.194	0.628	0.183
2012Q1 – 2017Q2	0.448	0.390	0.247	0.469	0.267

Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

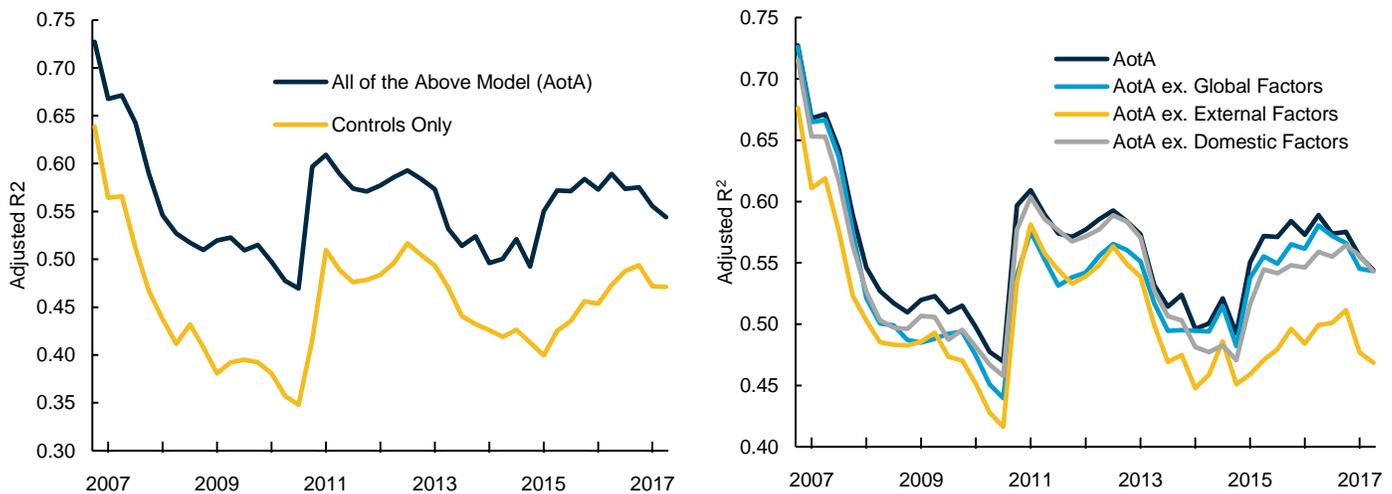
Given this observation, the right panel explores which of the economic variables are making the largest contributions. Two results are striking. First, excluding the domestic variables has little impact on the regression’s overall performance. Indeed, in the years after the financial crisis, the adjusted R<sup>2</sup> is generally higher when the domestic variables are deleted, indicating that these variables mainly have t-statistics of less than one. The poor performance of domestic variables highlights the frustrations and failures of using standard Phillips Curve models to forecast inflation for these economies in recent years. Second, the global variables are by far the most important, with a markedly lower adjusted R<sup>2</sup> when these variables are deleted. This is particularly the case for the years of the financial crisis, as the global economy sustained a large common shock, but is only slightly less true thereafter.

The bottom panel further highlights the relative importance of the global variables in explaining advanced economy inflation in all three regression sub-periods. During the financial crisis, the global variables account for a particularly large share of the combined model’s explanatory power. In addition, the external model seems to gain traction across the three samples, with its adjusted R<sup>2</sup> rising steadily from 0.261 in the years before the financial crisis to 0.390 afterwards. The domestic variables, in contrast, manifest little explanatory power. During the financial crisis, these variables add only slightly to the already modest power of the control model. In the years after the financial crisis, the domestic model’s adjusted R<sup>2</sup> rises a little, but is actually below that for the control variables only. The performance of the “All of the Above” model is strongest during the financial crisis, on the back of the global variables, and is roughly similar before and after the financial crisis. In recent years, the global and external variables have been the leading drivers of inflation, while domestic factors have been largely absent.

Figure 10 replicates this exercise for the emerging markets. The upper-left panel shows that the explanatory power of both the “All of the Above” model and the model with the control variables only is much higher than for the advanced economies. These results look similar to the results for the overall panel, likely reflecting that emerging markets economies comprise 12 of the 18 countries in the panel. The key insight from the right panel, as well as from the lower table, is that the external variables are consistently most helpful in explaining emerging-market inflation. This underscores the continued importance that policymakers in these countries must place on effectively managing the exchange rate and dealing with import price shocks. As with the

entire panel, the performance of the “All of the Above” model is lower after the crisis, especially compared with its pre-crisis performance. Notably, in the post-crisis period, the adjusted R<sup>2</sup> of the control model is above that for the global model and slightly below that for the domestic model. Over and above the control variables, which also decline in significance, the only explanatory power comes from the external variables.

FIGURE 10: EMERGING MARKET COMPARISONS—“ALL OF THE ABOVE” MODEL—ROLLING ADJUSTED R<sup>2</sup>



Adjusted R <sup>2</sup> For Three Sub-periods					
	Global Model	External Model	Domestic Model	All of the Above Model	Control Model
2002Q1 – 2007Q2	0.639	0.711	0.674	0.723	0.638
2007Q3 – 2011Q4	0.533	0.532	0.500	0.567	0.486
2012Q1 – 2017Q2	0.466	0.548	0.482	0.553	0.474

Source: PGIM Fixed Income and Haver Analytics as of February 2018. For illustrative purposes only.

## CONCLUDING THOUGHTS

After examining some of the key features of the inflation process for a panel of major global economies, the results highlight the importance of common global factors in explaining inflation performance through the financial crisis and the continued role of exchange rates and import prices in influencing inflation in the emerging markets. They also highlight the relatively limited usefulness of domestic factors in explaining inflation performance in recent years. More generally, our results indicate that in the years after the financial crisis, the inflation process continued to evolve and did not simply snap back to its pre-crisis features.

The open issue is whether the recent performance of inflation points to a new stable relationship—a new equilibrium—or whether these underlying patterns will shift yet again, as economies shake off the last vestiges of the financial crisis. Although we expect that the inflation process will eventually stabilize, we entertain the possibility that these relationships may remain in flux for some time to come. For example, China is seeking to rebalance its economy toward services and private consumption, and its influence on global price setting may shift in tandem. Similarly, the advent of shale oil technologies may also be creating new dynamics for global inflation.

The challenge for investors is two-fold. First, they must form some hypotheses regarding the behavior of inflation going forward. We will tackle this issue in a forthcoming paper in some detail, but our working hypothesis is that the strong global economy will support a gradual rise in inflationary pressures. Second, as a separate but related matter, investors must also deduce how central banks will respond to the ongoing shifts and uncertainties in the inflation process. In a paper entitled, “Monetary Policy Without a Working Theory of Inflation,” former Federal Reserve Governor Dan Tarullo argued that under such circumstances

monetary policymakers are well advised to place “more emphasis on actual, observed inflation rates, as opposed to expectations of where those rates are headed based on Phillips Curve-type assumptions.” He also underscored the need for central banks to remain “data sensitive” and flexible.<sup>13</sup>

With economic slack in many major economies now diminished, the next year will be crucial in terms of revealing additional information about the trajectory of inflation. As countries approach—or exceed—estimated levels of potential output, will resource constraints start to bind, making traditional measures of slack and wages more correlated with inflation? This strikes us as an open issue. The story of global inflation is very likely to offer some additional surprises and plot twists before these issues are ultimately resolved.

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<sup>13</sup> *Hutchins Center Working Paper #33, Brookings, October 2017.*

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as of February 2018.

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