Globalisation and the Slope of the Phillips Curve

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Abstract

We study the effects of globalisation on the slope of the New Keynesian Phillips curve for CPI inflation, based on a broad panel of 35 countries and controlling for possibly non-linear exchange rate effects. We find that the output gap generally has a significant positive effect on inflation, but that this effect decreases as integration in the global economy increases. We conclude that the advance of globalisation has been a key force behind the flattening of price Phillips curves across the world.

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1. Introduction

This paper analyses the effects of globalisation on the slope of the New Keynesian Phillips curve for a broad panel of 35 countries. We use a dynamic panel framework for estimating the Phillips curve adapted from Jasova *et al* (2019, 2020), where we control for global factors and possibly non-linear effects of exchange rate pass-through. We exploit cross-country variation to avoid the identification difficulties of country specific estimates that were discussed by Reichlin (2018) and Forbes (2019). We find that the slope of the Phillips curve (ie the effect of the output gap on CPI inflation) is generally positive and economically and statistically significant – but that greater integration in the global economy decreases it. This is partly due to effects of greater competition on pricing behavior.

Relation to the literature

Forbes (2019) finds that globalisation matters for inflation dynamics. However, she considers global factors only as additive terms in the Phillips curve, rather than interacting them with the slope of the Phillips curve.[3] In contrast, we find that while the degree of globalisation generally does not affect the level of inflation, it does have clear effects on the responsiveness of inflation to changes in underlying economic conditions. This is broadly consistent with decreased pricing power under greater openness.

The effect of the global output gap, as opposed to domestic ones, on inflation was also considered in Borio and Filardo (2007) and Jasova *et al* (2020). Earlier, Ball (2006) had concluded that globalisation did not affect US inflation dynamics. Finally, the effects of globalisation and global supply chains in particular on pricing had been extensively studied eg in Auer and Fischer (2010) and Auer *et al* (2013).

2. Methodology

To study the effects of globalisation on the slope of the Phillips curve over time and across countries, we follow Jordà (2005)'s local projection method in that we estimate the following equation using panel data for 35 OECD economies:[4]

$$
\begin{aligned}
lCPI_{it+h} - lCPI_{it-1} \\
= \alpha_i + \beta_t + \phi\, outputgap_{it} + \gamma\, globalisation_{it} \\
+ \kappa\, outputgap_{it} \cdot globalisation_{it} + \delta\, d(lCPI_{it-1}) + \rho\, \pi_{it}^e \\
+ \mu_1 \Delta NEER_{it} + \mu_2 (\Delta NEER_{it})^2 + \varepsilon_{it.}
\end{aligned}
\tag{1}
$$

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[3] Forbes (2019) provides a comprehensive overview of the recent literature on globalisation and inflation. See also Ha *et al* (2021) for an overview of recent determinants of inflation globally.

[4] This Phillips curve specification is based on Jasova *et al* (2019).

where $lCPI_{it} = 100 * \ln(CPI_{it})$, CPI_{it} is the consumer price index in country i at time t, $outputgap_{it}$ denotes the output gap, $globalisation_{it}$ is an index that measures the extent of globalisation in country i at time t; π_{it}^e denotes next-year inflation expectations, $\Delta NEER_{it}$ is 100 times the log change in the nominal effective exchange rate, with an increase indicating an appreciation of the currency; β_t are time fixed effects to control for all observed and unobserved variation in common global factors. Last, α_i are country fixed effects to control for observed and unobserved country heterogeneity. We use quarterly data from 1985 to 2018, depending on data availability for each country.[5] The cumulative impulse responses are estimated for h=0 to 3, with h=0 corresponding to quarter-on-quarter inflation, and h=3 to year-on-year inflation.

Data on output gaps is sourced from the OECD. Data on CPI inflation is taken from Datastream and national sources. As a measure of globalisation, we consider the KOF globalisation index, which measures the economic, social and political dimensions of globalisation for individual countries (Dreher (2006), Gygli *et al* (2019)). Nominal effective exchange rate indices are from the BIS. Inflation expectations data was obtained from Consensus Economics.

3. Empirical results

Our baseline Phillips curve estimates are shown in Table 1 for all horizons (ie h=0 to 3). We find that the coefficient on the output gap is significantly positive for all horizons, with a value of 0.67 for CPI inflation within a year. Moreover, the coefficient on the interaction term between globalisation and the output gap is negative and significant, with a *p-value* that is always below 0.01.[6,7] These estimates imply that at the median level of globalisation, a unit increase in the output gap has an impact of 0.19 percentage point on CPI inflation within a year.

The above results imply that overall the slope of the Phillips curve is clearly flatter at higher levels of globalisation. For instance, the central estimate is that the effect of a unit increase in the output gap on CPI inflation for a country with a globalisation

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[5]   The countries are Austria, Australia, Belgium, Bulgaria, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Mexico, the Netherlands, Norway, New Zealand, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland and the United States.

[6]   Note that globalisation on its own has no effect on the New Keynesian Phillips curve.

[7]   Note also that non-linear exchange rate effects are important for short-term developments of inflation, consistent with Jasova *et al* (2019). That said, the magnitude of the overall exchange rate pass-through coefficient of 0.085 within a year is rather modest.

index that is one standard deviation above the median is 0.09 percentage point, while that for a country that is one standard deviation below is 0.29 percentage point.

The resulting slopes of the Phillips curve for changes in globalisation over time are shown in Figure 1 for a hypothetical country with a median level of global integration.[8] What is clear is that, as globalisation increased over time, the slope of the Phillips curve has generally decreased.

The estimation results for the post-2005 sample period are shown in Table 2. Also for this more recent period, the coefficient on the output gap is significantly positive for all horizons, and the coefficient on the interaction term between globalisation and the output gap is clearly negative (*p-values* below 0.01).

The resulting slopes of the Phillips curve for different levels of globalisation in the most recent period are plotted in Figure 1, for the 25th, 50th and 75th percentiles of the KOF globalisation index (right panel). Even though the overall slope is considerably flatter in the post-2005 sample, countries with higher levels of globalisation still show substantially flatter Phillips curve slopes than countries with low levels of globalisation even in the restricted recent sample. More specifically, a country with a globalisation index at the 75th percentile has a Phillips curve slope that is 4.5 times steeper than that of a country at the 25th percentile at the horizon of one year.

The key implication of the above results is that the level of integration in the global economy is key for assessing how economic activity might or might not translate into more generalised price pressures. In this respect, it is noteworthy that the Covid-19 pandemic has induced important changes on the supply side of both labour and product markets. For instance, labour migration reduced following the closure of international borders to non-residents in several countries.[9] In addition, also disruptions of global value chains likely contributed to a decrease in globalisation during the pandemic. A key implication of the above results is that if such trends become persistent, inflation could become more sensitive to domestic outputs gap once again.

4. Conclusions

We studied the effects of globalisation on the slope of the New Keynesian Phillips curve for CPI inflation, using a broad panel of countries and controlling for non-linear exchange rate effects. We find systematic evidence that output gaps push up CPI

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[8]   A country close to the median level of globalisation over the whole period, as well as close to the median levels pre- and post-2005, is for example Israel.

[9]   See e.g. Lowe (2021).

inflation, but that this effect is considerably weaker in more open and globalised economies. Our results indicate that the flattening of the Phillips curves has intensified in recent decades, affecting particularly more open economies.

All in all, our results point to the key importance of global integration in assessing the extent to which economic activity translates into price pressures.

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CPI inflation vs output gap, with interaction term with globalisation				Table 1
D.V.: $lCPI_{t+h}$-$lCPI_{t-1}$				
	h=0	h=1	h=2	h=3
$lCPI_{t-1}$	0.196***	0.269***	0.298***	0.258***
	0.038	0.059	0.074	0.089
output gap	0.195***	0.390***	0.547***	0.670***
	0.051	0.089	0.118	0.171
globalisation	0.003	0.001	-0.003	-0.011
	0.006	0.010	0.016	0.024
globalisation * output gap	-0.002***	-0.004***	-0.006***	-0.007***
	0.001	0.001	0.001	0.002
inflation expectations	0.230***	0.458***	0.640***	0.786***
	0.017	0.034	0.048	0.057
ΔNEER	-0.028**	-0.058***	-0.075***	-0.085***
	0.008	0.012	0.013	0.013
$(ΔNEER)^2$	0.002***	0.002***	0.001	0.001
	0.0003	0.001	0.001	0.001
Constant	-0.347	-0.012	0.409	1.542
	0.464	0.740	1.164	1.774
observations	2828	2828	2828	2828
number of countries	35	35	35	35
R2 within	0.582	0.649	0.659	0.652
R2 between	0.882	0.883	0.876	0.862

Note: Fixed effects panel estimation; sample period: 1985Q1-2018Q4. Robust standard errors are shown below coefficients. ***/**/* denote statistical significance at 1/5/10% confidence level.

CPI inflation vs output gap since 2005, with interaction term with globalisation				Table 2
D.V.: $lCPI_{t+h}$-$lCPI_{t-1}$				
	h=0	h=1	h=2	h=3
$lCPI_{t-1}$	0.234***	0.301***	0.333***	0.313**
	0.040	0.073	0.097	0.119
output gap	0.202***	0.387***	0.560**	0.729***
	0.047	0.079	0.119	0.180
globalisation	0.005	0.019	0.039	0.057
	0.011	0.020	0.031	0.043
globalisation * output gap	-0.002***	-0.005***	-0.006***	-0.008***
	0.001	0.001	0.001	0.002
inflation expectations	0.263***	0.531***	0.700***	0.784***
	0.028	0.059	0.095	0.118
ΔNEER	-0.021**	-0.048***	-0.066***	-0.079***
	0.008	0.011	0.012	0.013
$(ΔNEER)^2$	0.001	0.002*	0.003*	0.004**
	0.001	0.001	0.001	0.002
Constant	-0.679	-1.967	-3.171	-4.182
	0.869	1.583	2.377	3.340
observations	1860	1860	1860	1860
number of countries	35	35	35	35
R2 within	0.605	0.669	0.676	0.659
R2 between	0.921	0.862	0.763	0.621

Note: Fixed effects panel estimation; sample period: 2005Q1-2018Q4. Robust standard errors are shown below coefficients. ***/**/* denote statistical significance at 1/5/10% confidence level.
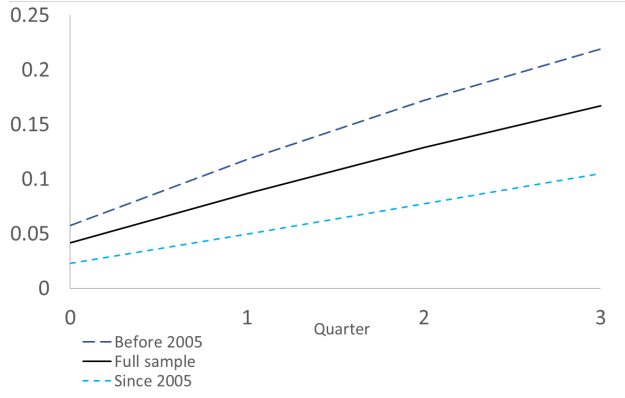
Phillips curves by level of globalisation[1]

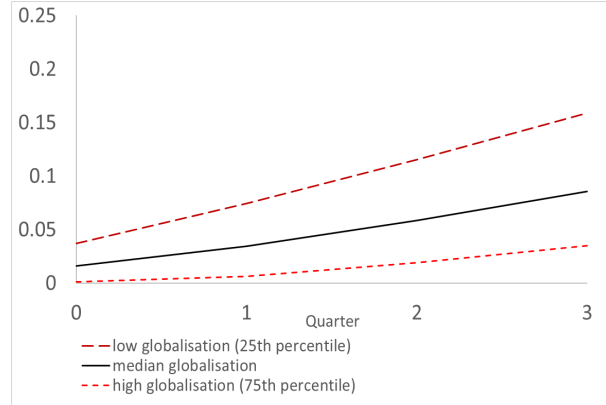Responses to 1 percentage point increase in the output gap, in per cent   Figure 1

CPI by level of globalisation over time[2]   CPI by level of globalisation across countries (since 2005)[3]

[1] Estimates based on equation (1). [2] Cumulative impulse responses for median of the KOF globalisation index over time (before 2005, since 2005, full sample period). [3] Cumulative impulse responses for countries at the 25th, 50th and 75th percentiles of the KOF globalisation index. Estimates based on data since 2005 only.