



Global slack and open economy Phillips curves – A province-level view from China[☆]



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ABSTRACT

The “global slack hypothesis” implies that greater integration of the world economy, *i.e.* globalisation, should have made inflation more responsive to global than domestic economic slack. Many previous studies have accordingly estimated national inflation equations with measures of global output gaps. We use three and a half decades of subnational data from China’s provinces to test the global slack hypothesis. Using tests for non-nested regressions, for many provinces we can reject a Phillips curve with a province-level measure of economic slack against a model with China’s national output gap, which is consistent with the hypothesis. We also show that the real exchange rate matters for inflation dynamics in many Chinese provinces, in particular those most open to international trade. In addition to supporting the global slack hypothesis, our results emphasise the importance of cross-border factors for China’s inflation developments.

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1. Introduction

The “global slack hypothesis” implies that greater integration of the world economy, *i.e.* globalisation, should have made inflation more responsive to global than domestic resource utilisation (slack). Many studies have accordingly estimated national inflation equations with measures of global output gaps, in order to test the importance of global economic slack for domestic inflation developments. One of the most-cited papers is Borio and Filardo (2007) – the authors find that measures of the global output gap significantly add to the explanatory power of conventional reduced-form inflation rate equations for different economies.¹ Earlier papers on the topic include Tootell (1998) and Gamber and Hung (2001), who analyse the importance of foreign capacity utilisation for inflation in the United States.

[☆] All views are those of the authors and do not necessarily represent those of the Bank for International Settlements. All errors are the authors’ responsibility. This project was started when the third author was affiliated with the Bank of Finland.

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¹ The evidence has later been confirmed in a structural model for the United States by Milani (2009). For a more cautious view regarding the importance of global slack for domestic inflation in G-7 countries, see *e.g.* Milani (2010). Ihrig et al. (2010) find little evidence that foreign output gaps would matter for domestic inflation in a sample of industrial countries. Using data for China, Zhang (2016) documents that globalisation has increased the response of (national) inflation to the global output gap and weakened the relationship between the domestic output gap and inflation.

However, it is not clear that national data, amended with a measure of the global output gap, provide the only test of the global slack hypothesis. Indeed, [Martinez-Garcia and Wynne \(2013\)](#) argue that *intranational* data could be used, as the economic relationships between cities and states within a single economy should approximate those within a fully globalised world. We follow this route and study the global slack hypothesis using subnational data from the largest emerging economy, China. Indeed, China is one of the economies that have arguably benefited most from globalisation, using its comparative advantage in labour-intensive manufacturing to significantly increase its export shares over time. Moreover, as documented by [Chen et al. \(2011\)](#), China has experienced a gradual integration process *within* its borders, including in its product markets. [Young \(2000\)](#) discusses the trade barriers that used to restrict interregional trade within China in the 1980s and 1990s, with implications such as subnational differences in prices of traded goods. Similarly, [Poncet \(2005\)](#) provides evidence of domestic market fragmentation along China's provincial borders in the 1990s, and [OECD \(2009\)](#) notes that protectionism in local markets has been an important barrier to trade in some product classes, such as beverages and automobiles.²

Our test of the global slack hypothesis consists in estimating conventional Phillips curve equations for Chinese provinces, and comparing the importance of the provincial *versus* a national measure of the output gap. If the global slack hypothesis holds, national measures of the output gap should be more important for provincial inflation and wage developments than the province-level ones.³ We estimate both wage-inflation and price-inflation Phillips curves. The estimation of wage-inflation Phillips curves can be motivated, *inter alia*, by the close co-movement of provincial price inflation rates and the fact that the national output gap may mechanically matter more for the growth in price indices that include a large share of tradable goods, than for wage inflation. We also augment the estimated price Phillips curves with the real exchange rate, effectively considering an open-economy Phillips curve for the Chinese provinces. Despite the fact that the Chinese economy is relatively open to international trade, the openness factor has largely been omitted from the evaluation of the inflation process in this economy. But it is likely to matter – [Shu et al. \(2008\)](#) document a relatively large and rapid pass-through from exchange rate changes to import prices in China, and, as China gradually moves up the value chain and away from processing trade, changes in the exchange rate could have an increasingly important impact on the domestic economy ([Cui and Syed, 2007](#)).

To preview our findings, we find that over three and a half decades a national measure of the output gap is more important than a province-level measure of slack for around half of the 29 provinces in our sample. This result arises from tests of non-nested regressions, where we can reject a wage Phillips curve with a province-level measure of economic slack against a model with a national output gap. In price Phillips curves, the evidence in favour of the national output gap is stronger, as for most provinces we can reject a model with the province-level output gap. Thus, we find evidence in favour of the global slack hypothesis, using subnational data. This result is in line with the increased integration of China's internal product markets over time (e.g. [OECD, 2009](#)). Moreover, we find that changes in the real exchange rate matter for inflation developments in most of China's provinces, in particular those most open to international trade.

In addition to contributing to the literature on global slack, our paper contributes to the increasing number of macroeconomic studies that use China's province-level data (see [Brandt et al., 2013](#); [Cudré and Hoffmann, 2014](#)). The inflation process at the provincial level has also been investigated ([Mehrotra et al., 2010](#)). Provincial differences in the inflation process could be important, as China is a large economy comprised of fairly heterogeneous regions.⁴ However, our focus differs from the latter study, given our emphasis on the importance of external slack, and the inclusion of open-economy terms.⁵

This paper is structured as follows. The next section provides the framework for our empirical investigation and describes the data. [Section 3](#) presents the empirical results, and [Section 4](#) concludes.

2. Methodology and data

We estimate both wage and price Phillips curves. Our starting point is a simple province-level wage Phillips curve of the following form:

$$\pi_{it}^{wage} = \alpha_i + \beta_{i0}\pi_{it-1} + \beta_{i1}y_{it} + \varepsilon_{it}, \quad (1)$$

where π_{it}^{wage} denotes wage inflation, i.e. growth in nominal wages at the provincial level (for the province i), π_{it-1} is lagged price inflation, y_{it} is the province-level output gap (difference between actual and potential output, based on data in logarithms) and ε_{it} denotes an error term. The equation is estimated with annual data, for each province, using ordinary least squares.⁶ The use of wage Phillips curves as a starting point is motivated by the fact that the national output gap may mechanically matter more

² There has also been segmentation in China's factor markets, perhaps most prominently in the labour market, due to the urban household registration system. At the same time, we note that in the theoretical model of [Martinez-Garcia and Wynne \(2010\)](#), building on [Clarida et al. \(2002\)](#), labour is immobile across countries and cross-border movement in goods only is required to derive a Phillips curve with a foreign output gap.

³ A measure of external economic slack has recently been included in province-level Phillips curves by [Holz and Mehrotra \(2016\)](#). However, these authors adopt a panel framework. Our approach, estimating Phillips curves separately for each province, allows us to investigate the differences in the importance of external slack between the provinces. Another difference is that we evaluate the importance of real exchange rates for provincial inflation developments.

⁴ [Beck et al. \(2009\)](#) is a recent study investigating inflation differentials in two large currency areas, the euro area and the United States.

⁵ [Mehrotra et al. \(2010\)](#) show evidence that the inflation process differs significantly between the more developed coastal regions and rest of the country. They acknowledge the possible importance of open-economy terms for China's provincial Phillips curves, but do not explicitly consider such variables.

⁶ We acknowledge that endogeneity cannot be ruled out in this empirical framework. However, some other estimation strategies, such as generalized method of moments, may not be preferable here due to the very short sample.

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