



Inflation dynamics in open economies: Empirical evidence for G7 countries on the role of import prices and the cost channel



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ABSTRACT

The supply side effects of both the nominal interest rate (*i.e.*, the cost channel) and import prices on inflation are very important for the design of monetary policy. However, the empirical identification of the cost channel (traditionally associated with the advance payment of wages) has ignored import prices. We start by deducting a New Keynesian Phillips Curve (NKPC) which shows that ignoring import prices in the estimation of the cost channel may lead to incorrect results. Taking this into account, we study the empirical relevance of the cost channel and import prices using the NKPC for the G7 countries. We test whether the estimation of the cost channel is affected when the price of imported inputs is considered; if it is relevant to extend the cost channel given that imports of final consumption goods are also paid in advance; if imports should be treated as inputs and/or consumption goods, and if there is an immediate or slow exchange rate pass-through. Empirical results indicate that the cost channel is present in imported consumption goods in particular, and import prices play an important role in explaining inflation dynamics.

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1. Introduction

The main goal of this paper is to assess the empirical impact of import prices and the cost channel on inflation using a New Keynesian Phillips curve (NKPC). The cost (or working capital) channel, *i.e.*, the fact that firms borrow money to pay wages in advance, has emerged as one of the main explanations for the price puzzle associated with an increase in the interest rate. However, papers on that channel, such as those by [Ravenna and Walsh \(2006\)](#) and [Chowdury et al. \(2006\)](#), use a Cobb–Douglas production function and do not emphasize the role of open economy variables in their estimations.

In contrast, the present paper assuming a CES production function deduces a NKPC with import prices and the cost channel. In this framework, not only do the marginal cost and supply side inflation depend on the nominal interest rate and the terms of trade, but these variables are related with each other. Thus, it is only in some circumstances that the cost channel is correctly identified when the terms of trade (or the price of imported inputs) are ignored. This clearly demonstrates the relevance of also considering the impact of the terms of trade when assessing the supply side effect of interest rate on inflation.

In this paper we empirically test four related topics. Firstly, we proceed to the empirical test of the above theoretical implication that the cost channel is incorrectly identified when the price of imported inputs is omitted from the NKPC for GDP deflator inflation (domestic inflation).

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Secondly, we suggest and test empirically an extension of the cost channel assuming that imports of consumption goods are paid in advance. This extension implies that the change in the nominal interest rate affects CPI inflation.

Thirdly, in order to measure the impact of imports in CPI inflation it is necessary to evaluate whether imports of consumption goods should be treated as intermediate or final consumption goods. There is no consensus in the literature on this issue. On one hand, some works on the open economy NKPC (e.g. [Gali and Monacelli, 2005](#)) assume imports as final consumption goods and ignore imported intermediate goods. On the other hand, [McCallum and Nelson \(2001\)](#) treat imports only as intermediate goods. For the UK, [Kara and Nelson \(2003\)](#) concluded that a model in which imports are only considered intermediate goods provides a reasonable match with the data. The present paper analyses whether that conclusion can be generalised to other countries. The way in which imports of consumption goods are treated has implications for the relationship between the exchange rate and inflation and for the definition of monetary policy ([McCallum and Nelson, 2001](#); [Kara and Nelson, 2003](#)).

Fourthly and finally, we test whether immediate or slow exchange rate pass-through is the correct way of characterizing the effect of import prices (both of inputs and consumption goods) on inflation. This is particularly relevant for the design of monetary policy, as it is vital to decide if the central bank should target domestic inflation or CPI inflation, and what weight it should give to exchange rate movements ([Clarida et al., 2001](#); [Monacelli, 2005](#); [Corsetti, 2006](#)).

To my knowledge this is the first paper studying the empirical relevance of the cost channel that explicitly considers the price of imports. The research into whether or not imports of consumption goods are paid in advance is also new in the context of studies on the working capital channel. This paper also contributes to the literature by testing for the G7 countries and in the context of the NKPC the empirical relevance of slow exchange rate pass-through. Lastly, the test of whether imports should be considered as inputs and/or consumption goods for the G7 countries also adds to the NKPC literature, because until now this test has only been attempted for the UK.

We use the General Method of Moments (GMM) in the estimations of the NKPC since rational expectations generate orthogonality conditions to estimate that equation. Our empirical results indicate that import prices play an important role in explaining both domestic and CPI inflation dynamics. It is shown that slow exchange rate pass-through is present and that imports should be considered as inputs in production and consumption goods. With regard to the cost channel, there is weak evidence that the level of the nominal interest rate affects inflation (domestic or CPI inflation), but there is strong evidence that the change in the nominal interest rate affects CPI inflation.

The remainder of the paper is organised as follows. [Section 2](#) starts by revising the literature. [Section 3](#) calculates the NKPC to study the role of import prices in the identification of the cost channel. [Section 4](#) describes data and estimates NKPC for domestic and CPI inflations. [Section 5](#) concludes the study.

2. Literature review

With sticky wages and prices, a reduction in money supply raises the real interest rate, producing a reduction in investment, consumption and inflation. However, [Sims \(1992\)](#) finds that inflation increases significantly after a rise in the interest rate; this has been called the 'price puzzle'. Other papers found only a sluggish response of inflation after a monetary contraction ([Christiano et al., 1994](#); [Bernanke and Gertler, 1995](#); [Bernanke and Mihov, 1998](#)).

One possible explanation for that puzzle is a misspecification in the VAR model resulting from omitting the central bank's information on future inflation ([Christiano et al., 1994](#); [Rabanal, 2007](#)) or ignoring anticipated shocks to inflation ([Kapinos, 2011](#)). Nevertheless, the 'price puzzle' inspired some authors to propose a cost channel of monetary policy transmission. The main idea is that if firms have to pay for their production factors before receiving proceeds from sales, they have to borrow to finance working capital ([Blinder, 1997](#); [Christiano et al., 1997](#)). Therefore, a hike in the nominal interest rate causes an increase in firms' marginal cost and thus exerts *pressure* for a rise in inflation.

The study reported by [Barth and Ramey \(2001\)](#) was one of the first showing the empirical relevance of the cost channel. Including a commodity price index and controlling for the reaction function of the central bank, [Barth and Ramey \(2001\)](#) estimated VAR models to obtain the relevance of the supply side effect of monetary policy for 13 of the 21 industries studied and for the aggregate manufacturing industry.

A natural extension of [Barth and Ramey \(2001\)](#) consists of testing the cost channel with micro data. [Gaiotti and Secchi \(2006\)](#) perform such a study with data for 2000 Italian firms covering a period of 14 years and concludes for the relevance of the cost channel.

Given that in my opinion an approach based on VAR models cannot clearly distinguish the supply effects of monetary policy from the demand effects, a structural approach has been preferred in the literature. An influential work is the one of [Ravenna and Walsh \(2006\)](#) who introduce the cost channel in a New Keynesian model. In their forward-looking Phillips curve the real marginal cost is the sum of real unit labour cost and nominal interest rate. Using the GMM and quarterly data from 1960 to 2001, their estimates of the Phillips curve for the US have shown the statistical relevance of the cost channel.

[Chowdwury et al. \(2006\)](#) obtain a NKPC similar to [Ravenna and Walsh \(2006\)](#), with the main difference being the presence of lagged inflation. Their formulation highlights that the size of the cost channel depends positively on the fraction of changes in the policy rate that are passed-through to changes in the lending rate. They estimate the interest rate augmented Phillips curve for the G7 countries and conclude the cost channel is statistically relevant in all countries with the exception of Germany and Japan.

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