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# European Economic Review

journal homepage: [www.elsevier.com/locate/eev](http://www.elsevier.com/locate/eev)

## Analyzing the effects of US monetary policy shocks in dollarized countries



Tim Willems\*

Nuffield College and Department of Economics, University of Oxford, Manor Road Building, Manor Road, Oxford OX1 3UQ, UK

### ARTICLE INFO

#### Article history:

Received 3 May 2012

Accepted 15 March 2013

Available online 27 March 2013

#### JEL classification:

E52

E31

C32

#### Keywords:

Monetary policy effects

Price puzzle

Structural VARs

Identification

Block exogeneity

### ABSTRACT

Identifying monetary policy shocks is difficult. Therefore, instead of trying to do this perfectly, this paper exploits a natural setting that reduces the consequences of shock misidentification. It does so by basing conclusions upon the responses of variables in three dollarized countries (Ecuador, El Salvador, and Panama). They import US monetary policy just as genuine US states do, but have the advantage that non-monetary US shocks are not imported perfectly. Consequently, this setting reduces the effects of any mistakenly included non-monetary US shocks, while leaving the effects of true monetary shocks unaffected. Results suggest that prices fall after monetary contractions; output does not show a clear response.

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## 1. Introduction

Since monetary policy is typically not executed in an erratic fashion, identifying random disturbances to monetary policy (the so-called “monetary policy shocks”) is difficult. For this reason, the present paper has a different focus than the standard VAR exercise. Instead of trying to find the perfect shock identification scheme, this paper asks: if shock identification is so difficult, cannot we find a natural setting that *reduces the consequences* of the almost inevitable misidentification of monetary shocks? The natural setting I exploit is the existence of dollarized countries. They import US monetary policy, but, as I will argue below, they are not perfectly integrated with the US economy. Consequently, non-monetary US shocks do not survive the transmission process to these client economies undamaged, which makes this paper’s findings less prone to monetary policy shock misidentification.

The fact that shock identification is difficult, might explain the presence of some ongoing debates in the structural VAR literature. Next to the fact that there is no consensus on the effects of monetary shocks on output, many studies find that prices *increase* after a monetary contraction, which goes against the predictions of most standard macroeconomic theories (such as the New Keynesian one). Even though this price response can be rationalized through the working capital channel,<sup>1</sup> it is generally referred to as “the price puzzle”.

\*Tel.: +44 7507672984.

E-mail address: [tim.willems@economics.ox.ac.uk](mailto:tim.willems@economics.ox.ac.uk)<sup>1</sup> Cf. Van Wijnbergen (1983), who obtained the price puzzle – *avant la lettre* – in a working capital model. There, firms need to borrow funds in order to be able to pay for their production factors, which makes the interest rate a determinant of real marginal costs.

The present paper tries to shed light on the question whether economic theory should take this price puzzle seriously (which may call for incorporation of the cost channel into standard macroeconomic models<sup>2</sup>), or whether it is just an artifact of shock misidentification. It does so by using output and price data from dollarized countries, all located in Latin America. By unilaterally adopting the US dollar, these countries have established a so-called “informal monetary union” with the US. From a monetary perspective, these client countries are therefore not that different from genuine US states: they use the US dollar as legal tender (just like, say, Idaho does) and have no possibility to deviate from US monetary policy, as there is no local currency to de- or revalue. Consequently, these countries rapidly import US monetary shocks (primarily via the financial channel; see Canova, 2005), while there are no exchange rate considerations at play. The fact that the monetary union is only “informal” (thereby contrasting with formal monetary unions, such as the euro zone), does not matter in this respect.

Taking this geographical detour brings at least two advantages. Firstly, the resulting econometric restrictions enable one to analyze the effects of US monetary shocks in the client economies, without imposing inertial or sign restrictions on the variables of interest.

Secondly, basing conclusions upon the responses of variables in dollarized countries makes this paper's findings less prone to the major concern any structural VAR exercise has to face: misidentification of the US monetary shock. This is the case because the dollarized countries that are going to be considered (Ecuador, El Salvador, and Panama) are only imperfectly integrated with the US economy. In particular, the economies of Ecuador and El Salvador are only moderately open in terms of trade-to-GDP ratios<sup>3</sup> and to the extent that the dollarized economies do trade internationally, most of it takes place with other countries than the US<sup>4</sup>. Consequently, non-monetary US shocks can be expected to produce only rather limited output – and price fluctuations in these countries – especially at short horizons.<sup>5</sup>

Lindenberg and Westermann (2010) investigated this issue empirically and they indeed find that Latin America does not share its business cycle with the US.<sup>6</sup> This suggests that these cycles are not driven by the same shocks, or that the shocks are only transmitted with a delay. In line with this, Canova (2005) even finds that non-monetary US shocks do not tend to produce significant output or price fluctuations in Latin America at all.

All this suggests that even if the identified “monetary policy shock” includes some non-monetary US components, the consequences of this mistake are contained in the dollarized countries, as the transmission of these non-monetary US disturbances to Latin America is not instantaneous and perfect. This makes the approach work a bit like an ideal filter, as it reduces (or at the very minimum: delays) the effects of any mistakenly included non-monetary US shocks on client country variables.

When one analyzes the effects of contractionary US monetary shocks through dollarized economies, prices in all client countries fall on impact—so the price puzzle disappears. Quantitatively, prices in dollarized economies seem to have been pretty flexible over the sample period. Output does not show a clear response, so monetary neutrality cannot be rejected.

## 2. Identifying monetary policy shocks

Since monetary authorities typically *respond to* economic developments, the main challenge for empirical studies analyzing the effects of monetary policy shocks, is to identify true exogenous movements in the monetary instrument. This section starts by describing how traditional studies tend to deal with this issue (and the possible problems associated with those approaches), after which Section 2.2 explains how dollarized countries can be used to mitigate these problems.

### 2.1. Traditional approach

As set out in Christiano, Eichenbaum and Evans (1999, henceforth CEE), a popular method to try and identify monetary policy shocks is by making assumptions that allow for the estimation of the monetary authority's feedback rule (which relates its actions to the state of the economy). Once this rule has been estimated, it becomes possible to identify the unpredicted shocks to the monetary instrument.

One way to advance along these lines (employed by CEE, 1999) is by assuming that the monetary authority is able to react to changes in output and prices within the period, while the output and price effects of monetary shocks can only show up

<sup>2</sup> This development has actually started already: Barth and Ramey (2001, p. 199–200) state that “cost-side theories of monetary policy transmission deserve more serious consideration”. Christiano et al. (2005) did this by adding a working capital channel to their model. Ravenna and Walsh (2006) discuss how the cost channel affects the optimal monetary policy.

<sup>3</sup> As reported by the CIA World Factbook, the ratio of exports (imports) to GDP equaled 0.250 (0.249) for Ecuador in 2009. For El Salvador, these numbers are 0.183 and 0.318 and for Panama they equal 0.441 and 0.523. To compare: for a textbook open economy, such as Singapore, these ratios are 1.550 and 1.358, while the corresponding US numbers equal 0.073 and 0.110.

<sup>4</sup> According to the Factbook, 66% of Ecuadorian exports (73% of their imports) went to (came from) other countries than the US in 2009. For El Salvador, these numbers are 56% for exports and 70% for imports. Finally, Panama exported 82% (imported 88%) of their total to (from) non-US trading partners.

<sup>5</sup> Non-monetary shocks are typically transmitted through the time-consuming trade channel, as a result of which they need a while to arrive at a different region. This idea goes back to at least Dornbusch (1976) and is confirmed in the empirical exercise by Canova (2005).

<sup>6</sup> They report that the correlation in growth rates between the US and El Salvador (Panama) equals only 0.23 (0.12). Ecuador is not included in their study, but in own calculations this correlation equals 0.30. To compare: for Canada and Mexico the correlations with US growth rates equal 0.77 and 0.73, respectively. A similar result is reported by Alesina et al. (2002).

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