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Sudden stops, sectoral reallocations, and the real exchange rate ☆

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ABSTRACT

A sudden stop of capital flows into a developing country tends to be followed by a rapid switch from trade deficits to surpluses, a depreciation of the real exchange rate, and decreases in output and total factor productivity. Substantial reallocation takes place from the nontraded sector to the traded sector. We construct a multisector growth model, calibrate it to the Mexican economy, and use it to analyze Mexico's 1994–95 crisis. When subjected to a sudden stop, the model accounts for the trade balance reversal and the real exchange rate depreciation, but it cannot account for the decreases in GDP and TFP. Extending the model to include labor frictions and variable capital utilization, we still find that it cannot quantitatively account for the dynamics of output and productivity without losing the ability to account for the movements of other variables.

1. Introduction

A sudden stop of capital flows into a developing country tends to be followed by a switch from trade deficits to surpluses, a depreciation of the real exchange rate, and decreases in output and total factor productivity. Substantial reallocation takes place from the nontraded sector to the traded sector. We construct a simple dynamic general equilibrium model and calibrate it to Mexico in 1988. We find that the model can capture the large capital inflows into Mexico following its financial opening in 1989–90, both because Mexico was initially capital poor and because its working age population was growing rapidly. When we subject the model to a sudden stop – the debt crisis in 1994–95 – it can reproduce the movements of the trade balance, the real exchange rate, and the relative price of nontraded goods. When the sudden stop is the only exogenous shock, the model cannot reproduce the observed decreases in output and TFP. We then quantitatively assess two frequently mentioned mechanisms that, at least qualitatively, could account for the decline in output and TFP, frictions in reallocating labor and variable capital utilization. We find that these mechanisms cannot account for the observed behavior of output and TFP without causing the model to generate wild movements of the trade balance, the real exchange rate, and the relative price of nontraded goods. In general, we find that the model can account for prices and the trade balance, but when we modify the model to try and account for quantities we lose the ability to account for prices.

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There have been numerous theories of why sudden stops occur; see, for example, Calvo (1988, 1998),Kaminsky and Reinhart (1999), Cole and Kehoe (2000), and Mendoza (2006). The models constructed to analyze a government's decision to default on its debt or a foreign lender's willingness to lend typically take the effects of the default on output as exogenous. This is done to maintain tractability. In contrast, a second line of research has focused on the effects of sudden stops, taking the sudden stop as given, which is our approach. Chari et al. (2005), Cook and Devereux (2006), and Meza and Quintin (2007) exogenously impose sudden stops and study their effects on aggregate variables.

The empirical literature regarding sudden stops has mainly focused on aggregate variables. Calvo and Talvi (2005), Guidotti et al. (2004), Chari et al. (2005), and Meza and Quintin (2007) document the declines in GDP and TFP that accompany sudden stops. Our findings regarding aggregate output and productivity are similar to theirs.

This paper focuses on the effects of a sudden stop on the disaggregated economy. When credit is restricted, we find that traded output falls by less than nontraded output and that labor and investment move from the nontraded sector to the traded sector, as is also emphasized by Tornell and Westermann (2002). We also find that the movement in the relative price of nontraded to traded goods accounts for about 20% of the movement in real exchange rates. We document these characteristics for the sudden stop in Mexico in 1994–95. Our findings are in line with Burstein et al. (2005) and Mendoza (2005), who study the real exchange rate depreciations that accompany sudden stops and also find that nontraded goods prices play a large role in these depreciations.

Accounting for the declines in GDP and TFP that coincide with sudden stops is challenging. Chari et al. (2005) show that equilibrium models with standard preferences predict not an output decrease, but an increase because of a decrease in the consumption of leisure following a reversal of the current account balance. They note that generating an output decrease requires frictions that have negative effects on output large enough to overcome the natural response to a decrease in credit.

Our analysis follows the analysis of great depressions of Cole and Ohanian (1999) and Kehoe and Prescott (2002, 2007) in insisting that the model generates growth accounting that matches that in the data. The growth accounting in the data indicates that most of the drop in output during the sudden stop is due to a drop in TFP. We start by explaining that the negative terms of trade shock generated by the sudden stop cannot result in drops in TFP if output is measured as real GDP in base period prices as in the data. We then extend our baseline model to incorporate two mechanisms that could generate this drop in TFP. The first is costs to adjusting the amount of labor used in production in each sector. These costs are modeled as drops in output, so the reallocation of labor between the two sectors generates a decrease in TFP. In our calibrated model, however, these costs cannot account for the observed decrease in TFP; increasing these costs beyond a certain point just results in less reallocation. The second is variable capital utilization, as in Greenwood et al. (1988) and Meza and Quintin (2007). To the extent that the aggregate capital stock does not change but the amount of output falls, the drop in utilization during the sudden stop appears as a decrease in TFP. In our model, however, while capital in the nontraded sector is underutilized during the sudden stop, capital in the traded sector is overutilized. Consequently, we find that variable capital utilization alone cannot account for the observed decrease in TFP. Combining the labor adjustment costs and variable capital utilization and pushing these frictions towards their limits, we find that the model is able to generate the observed decrease in TFP. Doing so, however, produces wild movements of the trade balance, the real exchange rate, and the relative price of nontraded goods. The strong adjustment friction may produce decreases in TFP, but its detrimental effect on prices – the focus of this paper – do not make it an appealing mechanism.

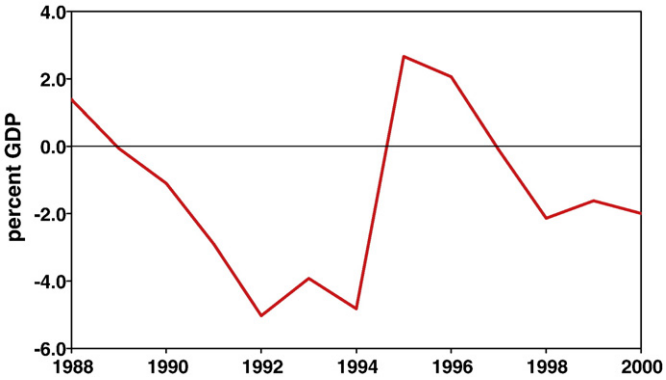

Fig. 1. Trade balance.

Other researchers have suggested that financial constraints are important for understanding sudden stops: see, for example, Calvo (1998), Mendoza and Smith (2004), Neumeyer and Perri (2005), and Schneider and Tornell (2004). We abstract from the financial sector in our model to quantitatively assess how far a standard model can go in explaining the effects of sudden stops. As discussed above, our simple model can go a long way in accounting for the effects of a sudden stop, although the effects of a sudden stop may work through the financial sector in generating declining TFP. It is worth noting that the papers in existing literature on financial constraints and sudden stops generate decreases in output largely through a decrease in labor, however, rather than through the observed decrease in TFP.

As a final extension, we consider a specification of our model in which the economy is subject to an aggregate negative TFP shock. We find that the extended model can also account for a large share of the decline in output without distorting our ability to account for prices and trade flows. Although we do not view modeling the decrease in TFP as an exogenous shock as an appealing explanation for the observed decrease in output, we consider it an important robustness check.

2. The 1994–95 Mexican debt crisis

In this section, we present the properties of Mexico's opening to foreign capital in 1989–90 and its sudden stop in 1994–95. The successes and failures of our model depend on its ability to account for these properties. The properties that we identify are typical of sudden stop episodes in a large sample of countries; see Tornell and Westermann (2002).

Fig. 1 plots Mexico's trade balance as a share of GDP. (All of the data used in this paper are available at www.econ.umn.edu/~tkehoe.) As Mexico opened its capital markets, the country went from being a net lender to a net borrower. In 1994, the trade deficit was 4.83% of GDP. In the final weeks of 1994, the sudden stop began as the government had trouble rolling over its debt. (See, for example, Kehoe, 1995b.) The trade deficit became trade surpluses of 2.66 and 2.06% of GDP in 1995 and 1996. When the sudden stop ended in 1997, the trade balance returned to a deficit, reaching 2.14% of GDP in 1998. The trade balance reversal is a robust feature of sudden stops; see Guidotti et al. (2004).

To address the natural question of whether there were foreseeable conditions in Mexico that led to the sudden stop, consider the interest rate on Mexican dollar denominated debt. (Our measure of this interest rate is the J.P. Morgan Emerging Market Bond Index spread on Mexican Brady Bonds, computed after stripping out the collateralized principal.) We decompose this interest rate into two parts: The first is the U.S. Treasury bill