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Optimal monetary policy in a currency union with interest rate spreads

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ABSTRACT

We introduce "financial imperfections" – asymmetric net wealth positions, incomplete risk-sharing, and interest rate spreads across member countries – in a prototypical two-country currency union model and study implications for monetary policy transmission mechanism and optimal policy. In addition to, and independent from, the standard transmission mechanism associated with nominal rigidities, financial imperfections introduce a wealth redistribution role for monetary policy. Moreover, the two mechanisms reinforce each other and amplify the effects of monetary policy. On the normative side, financial imperfections, via interactions with nominal rigidities, generate two novel policy trade-offs. First, the central bank needs to pay attention to distributional efficiency in addition to macroeconomic (and price level) stability, which implies that a strict inflation targeting policy of setting union-wide inflation to zero is never optimal. Second, the interactions lead to a trade-off in stabilizing relative consumption versus the relative price gap (the deviation of relative prices from their efficient level) across countries, which implies that the central bank allows for less flexibility in relative prices. Finally, we consider how the central bank should respond to a financial shock that causes an increase in the interest rate spread. Under optimal policy, the central bank strongly decreases the deposit rate, which reduces aggregate and distributional inefficiencies by mitigating the drop in output and inflation and the rise in relative consumption and prices. Such a policy response can be well approximated by a spread-adjusted Taylor rule as it helps the real interest rate track the efficient rate of interest.

1. Introduction

We study optimal monetary policy in a two-country model of the currency union with features we refer to collectively as "financial imperfections:" asymmetric net wealth positions across member countries in the currency union, incomplete risk-sharing within the union, and a spread between borrowing and deposit interest rates. Large imbalances in net asset positions – as is evident from Table 1 which presents the net international investment position as a ratio of GDP for selected Euro Area countries – by itself may not be a first-order concern for monetary policy. It can however pose a new and significant challenge to the central bank when it is coupled with non-trivial interest rate spreads and imperfect risk-sharing. Fluctuations in the spread redistribute wealth across borrower and saver countries within a currency union. When risk sharing is not perfect among member countries, distributional inefficiencies arise as a result. The central bank thus may need to pay attention to such inefficiencies in addition to the conventional aggregate inefficiencies captured by standard macroeconomic target variables, such as inflation and output gap. Moreover, in such an environment, central bank's adjustment of its policy interest rate also affects the cross-country wealth distribution. Thus, monetary policy cannot (and should not) focus solely on macroeconomic stability with no consideration for distributional effects.

We seek to shed light on normative implications of such developments for the common central bank in a currency union. How do financial imperfections change the monetary policy transmission mechanism? What is the central bank's optimal response to an increase in the interest rate spread, such as one arising from a financial shock? Does the central bank face a new policy trade-off under financial imperfections? Can a traditional and simple Taylor rule closely approximate optimal monetary policy in this environment?

We address these questions by extending the standard two-country sticky price currency union model, such as the one in Benigno (2004), where the production function is subject to both an aggregate and a

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Table 1
Net international investment position as a ratio of GDP (%) in the Euro Area.

Country	2007	2008	2009	2010
France	−1.6	−12.2	−9.5	−10.6
Germany	28.5	23.6	35.8	37.8
Greece	−103.4	−72.7	−89.5	−97.6
Ireland	−21.0	−68.0	−101.3	−96.6
Italy	−26.3	−22.8	−26.7	−24.7
Portugal	−95.4	−90.9	−114.9	−109.1
Spain	−83.9	−75.0	−95.4	−88.6

Source: IMF balance of payments data.

country-specific productivity shock. We augment this prototypical set-up with financial imperfections.[1] First, we allow asymmetric initial and steady-state wealth position across the countries, with one country a borrower and the other a saver. Second, the only financial instrument that is traded across countries in the currency union is a non-state contingent nominal bond that is in zero net supply. This lack of a complete set of state-contingent securities means that cross-country risk-sharing is incomplete within the union. Third, there are frictions in financial intermediation that lead to a spread between the deposit and borrowing rates. To keep our set-up tractable, we adopt the modeling framework of Curdia and Woodford (2009, 2010) in introducing these frictions. Perfectly competitive financial intermediaries that operate union-wide accept deposits and lend to households. Origination of loans is costly and consumes real resources as a function of the real quantity of loans. This implies that the interest rate spread varies endogenously as aggregate debt evolves in the economy. In addition, we also allow for an exogenous loss rate of loans that varies over time, which constitutes a "financial shock" that affects the interest rate spread. Importantly, variations in interest rates and the spread affect both aggregate variables, by affecting aggregate demand, as well as relative (cross-country) variables, by redistributing wealth over the business cycle between the borrower and saver country.[2]

Our approach enables us to derive an analytical and intuitive expression of the central bank's loss function. In particular, we follow Woodford (2003) and take a second-order approximation of a weighted sum of the household's utilities in the two countries around an efficient non-stochastic steady state. The terms that appear in the welfare-theoretic quadratic loss function illustrate the various distortions present in the model. As is standard in models with staggered price setting, the loss function contains inflation of the two countries and the union-wide output gap. Moreover, as Benigno (2004) has also shown, since countries in a currency union effectively have a fixed exchange rate and prices are sticky, the relative price gap, which is the deviation of relative prices from their efficient level, is present in the loss function. The next two terms are new to our set-up and arise because of financial imperfections. First, because of imperfect risk-sharing between the countries, relative consumption appears in the loss function. Second, because financial intermediation consumes real resources and the endogenous interest rate spread is a function of aggregate debt, aggregate debt is also included in the loss function.[3]

Given the various aforementioned distortions that are potentially competing, characterization of optimal monetary policy is quite involved. Before proceeding to the general version of our model with both nominal and financial frictions, it is therefore instructive to consider two special cases where only one of the two frictions is present at a time. In our model, nominal and financial frictions lead to two different, and in principle independent, channels of monetary policy transmission. On the one hand, monetary policy has real effects through the usual and well-understood aggregate demand channel because of nominal frictions: monetary policy can affect the (ex-ante) real interest rate under sticky prices, which enables it to manage the aggregate, union-wide output gap. On the other hand, due to asymmetric net asset positions and incomplete markets, monetary policy has real effects even under flexible prices as it affects the wealth distribution of the economy. Because the countries trade a nominal bond in our model, the central bank's changing of the deposit rate, and thereby inflation, redistributes wealth between the borrower and saver country, which in turn affects relative consumption and prices. Considering these two special cases separately is helpful because we can shut down one of the two channels at a time and analytically characterize optimal policy.

So consider first the well-understood case without asymmetric net asset positions or endogenous interest rate spreads, but with sticky prices. In this case, where only the aggregate demand channel is in operation, the central bank can affect aggregate output and inflation but not any cross-country variables. Thus, the central bank's loss function only contains inflation and the output gap. Since our model does not feature inefficient supply shocks such as markup shocks or cross-country heterogeneity in price stickiness, there is no trade-off in stabilizing inflation versus the output gap. Optimal monetary policy then constitutes full stabilization of inflation, and thereby, of the output gap. Such optimal policy however, does not attain the efficient outcome since in the presence of country-specific productivity shocks, the relative price gap is not zero and is in fact outside the control of the central bank.

Next, consider the case without any sticky prices but with financial imperfections, where the transmission mechanism operates through the wealth redistribution channel. In this case, the central bank cannot affect aggregate output but can affect cross-country variables. Thus, the central bank's loss function only contains relative consumption and debt.[4] In the presence of the financial shock, the central bank faces a trade-off since it is not possible to simultaneously achieve zero relative consumption and zero debt. This precludes optimal policy from attaining the efficient outcome. When a financial shock hits and drives the interest rate spread upward, the central bank optimally reduces the distributional inefficiency – relative consumption increase – arising due to the wealth redistribution from the borrower to the saver country by decreasing the deposit rate and driving down the borrowing country's debt. Finally, in stark contrast to the case of sticky prices, the central bank lets inflation fluctuate freely, as it creates no distortion.

In our general model with both nominal and financial frictions, the central bank will have to optimally balance the variability of all the target variables, not just inflation and output gap. Moreover, there will generally be a trade-off in mitigating aggregate vs. cross-country distortions. One important implication is that a strict inflation targeting policy of setting union-wide inflation to zero is not optimal. Our result is thus in contrast with the previous finding in Benigno (2004) that complete stabilization of union-wide inflation is optimal when the economy has no inefficient supply shocks – such as markup shocks – and no cross-country heterogeneity in price stickiness. Note that this new result emerges because terms in the loss function, such as relative price gap, relative consumption, and debt are not generally independent of monetary policy due to financial imperfections that lead to the wealth redistributive role of monetary policy. On the flip side, the central bank will not allow inflation to fluctuate as much to mitigate variations in relative

[1] For simplicity and to make clear our contributions to the literature on monetary policy in a currency union (in particular, to highlight the role of financial imperfections in isolation), the model abstracts from some potentially important sources of ex-ante heterogeneity between member countries, for example, in preferences, shock processes, and the extent of price stickiness. There is also no home bias in consumption.

[2] We use "relative" and "cross-country" interchangeably in the paper. In our model, countries are either a borrower or a saver over the business cycle.

[3] It is possible to rewrite the loss function in terms of two aggregate variables, union-wide inflation and union-wide output gap, and four cross-country variables, the relative price gap, the first difference of relative prices, relative consumption, and debt.

[4] Under flexible prices, the central bank does not care about inflation, and while the central bank does care about relative price gap variation, it is proportional to relative consumption and thus can be dropped from the loss function.