



Liquidity trap and optimal monetary policy in open economies

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We consider an open-economy model with the Calvo-type sticky prices. We mainly analyze the situation in which the monetary authority in each country cooperates so as to maximize the world welfare. In the case where the zero lower bound (ZLB) on nominal interest rates never binds, the optimal inflation targeting rule in our open-economy model has exactly the same form as in the closed-economy model. This is not the case, however, when the ZLB may bind. The optimal paths are characterized in such a situation. In contrast with what has been suggested in the existing literature, the optimal paths of the nominal exchange rate in our model typically exhibit appreciation of the currency of the country where the ZLB binds. *J. Japanese Int. Economies* **22** (1) (2008) 1–33. Institute of Economic Research, Kyoto University, Kyoto 606-8501, Japan.

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1. Introduction

How should monetary policy be conducted when the zero lower bound (ZLB) for nominal interest rates may bind? The recent experience of Japan is a well-known example of such a “liquidity trap.” There, the call rate¹ has been below 0.5 percent per annum since October 1995 and

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¹ The call rate is an overnight interest rate, which is analogous to the federal funds rate in the US.

below 0.1 percent since March 1999 (except for the period August 2000–March 2001). Krugman (1998) argues that, even when the nominal interest rate hits the zero bound, the central bank could still stimulate the current level of output by raising expectations of future inflation. This point is further elaborated in a more fully dynamic framework with staggered pricing by Eggertsson and Woodford (2003).² Based on an optimization-based, quadratic approximate welfare measure, they analyze the state-contingent paths of inflation, output gap, and nominal interest rates under optimal policy commitment. Furthermore, they derive a price-level targeting rule that could implement the optimal paths.

In this paper, we extend the analysis of Eggertsson and Woodford (2003) to a two-country open-economy model.³ A continuum of differentiated products are produced in each country, and each good price is adjusted at random intervals as in Calvo (1983). We assume perfect exchange-rate pass-through, so that the law of one price holds. We analyze the optimal state-contingent paths of various variables, and compare our results to the proposal of Svensson (2001, 2003, 2004) that the currency of a country in a liquidity trap should depreciate.

We start with a result on equilibrium shares of consumption across countries. In the literature on open-economy monetary models, it is often assumed that the equilibrium shares of consumption across countries are determined independently of the monetary policy rule adopted by each country. This assumption is a bit problematic. It is true that with complete asset markets (and isoelastic preferences), given initial financial asset holdings and policy rules, the equilibrium shares of consumption are constant at all dates and all contingencies. In general, however, even under these assumptions, given initial asset holdings, different policy rules would result in different equilibrium shares of consumption across countries. We provide sufficient conditions on preferences and initial asset holdings for the equilibrium shares of consumption across the two countries to be independent of the policy rule adopted by each country. They include unit elasticity between goods produced in different countries. For simplicity, we assume that those conditions hold in this paper.

As for the policy objective, we mostly focus on the case in which the two monetary authorities cooperate each other to maximize the world welfare, which is defined as the world average of expected lifetime utility of households. Based on a second-order approximation, the objective function of the monetary authorities is given by a quadratic loss function in output gaps and inflation rates. Here, the welfare-relevant inflation rates are not the CPI inflation rates, but the producer-price inflation rate in each country, as in Benigno and Benigno (2003) and Clarida et al. (2001). Thus, fluctuations in the nominal exchange rate per se does not affect the welfare.

We first examine the optimal policy rule when the ZLB is assumed never to bind. Surprisingly, in this case, the optimal inflation targeting rule in our open economy model takes exactly the same form with the same parameter value as the one obtained for the closed economy by Woodford (2003, Section 7.5). That is, the (producer-price) inflation rate in each country must be targeted at the level given by a constant times the rate of change of its output gap. This is true even though the aggregate supply relation shows international dependence, that is, the inflation–output-gap tradeoff in each country is affected by the output gap in the other country. Thus, as long as

² A related problem is studied by Jung et al. (2005), Coenen and Wieland (2003), Adam and Billi (2006), among others.

³ There is growing literature on open-economy models with nominal rigidities. Examples include, among others, Corsetti and Pesenti (2001), Obstfeld and Rogoff (2002), Clarida et al. (2001), Gali and Monacelli (2002), Benigno and Benigno (2003), Svensson (2004).

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