Macroeconomic Dynamics, **20**, 2016, 1668–1682. Printed in the United States of America.
doi:10.1017/S1365100514001035

A NOTE ON REMITTANCES, MONETARY REGIMES, AND NONTRADABLE INFLATION DYNAMICS

EMMANUEL K.K. LARTEY
California State University Fullerton

This paper examines the dynamic and desirable properties of monetary regimes in a remittances recipient economy, with emphasis on the effect on sectoral output and nontradable inflation dynamics. The findings indicate that under a fixed exchange rate regime, an increase in remittances creates increased demand for nontradable goods, and hence a rise in nontradable inflation, as well as expansion in output of nontradables. Under a nontradable inflation targeting regime, however, a decrease in nontradable inflation and an expansion in tradable goods production are observed following an increase in remittances. A near-zero nontradable inflation rate and managed variability in the nominal exchange rate typify the optimal monetary policy, suggesting that an inflation targeting regime is preferable to a fixed exchange regime under such a scenario. A VAR analysis shows that the dynamics of inflation in El Salvador and the Philippines is in consonance with those observed in the model under the fixed exchange rate and nontradable inflation targeting regimes, respectively.

Keywords: Monetary Policy, Nontradable Inflation, Real Exchange Rate, Remittances

1. INTRODUCTION

Recorded remittances to developing countries are projected to reach $500 billion by 2015, according to a World Bank report on global migration and remittances issued in 2012. The estimates for the recent past are $327 billion in 2010 and $372 billion in 2011, reaching slightly over $406 billion in 2012.[1] Although the literature has documented some positive effects of remittances, including lower poverty indicators and high growth rates [Acosta et al. (2008)], some studies have indicated that rising levels of remittances could be harmful to the growth prospects of recipient economies through appreciation of the real exchange and resource allocation from the tradable to the nontradable sector, characteristic of the phenomenon known as the Dutch disease [Acosta et al. (2009)].

Address correspondence to: Emmanuel K.K. Lartey, Department of Economics, California State University, Fullerton, 800 N. State College Blvd, Fullerton, CA 92834, USA; e-mail: elartey@fullerton.edu.

 1365-1005/15

Remittances, therefore, could be associated with real exchange rate appreciation and loss of international competitiveness, which in turn could lead to a decline in the production of tradable goods. The experiences of some countries suggest that prices of financial assets and especially of real estate could rise following increases in remittances, culminating in resource reallocation toward these sectors. Arguably, such outcomes will alter the growth prospects of these countries, which invites the question of whether policy responses should be resorted to in an effort to address such unfavorable consequences of remittances.

Chami et al. (2006) and Mandelman (2012) consider the role of monetary policy in economies that receive remittances. Chami et al. (2006), using a flexible-price model with cash-in-advance constraints, show that the introduction of remittances into a closed-economy alters the standard optimal Friedman rule. Mandelman (2012) examines the stabilization role and welfare implications of monetary and exchange rate policies in a small open economy that is subject to remittances fluctuations. The study shows that a fixed exchange regime provides a better outcome for households facing a rising trend in remittances, whereas a flexible regime does better when unanticipated shocks over the business cycle are considered. Ball et al. (2013) analyze the short-run dynamics of an increase in remittances under different exchange rate regimes, with a focus on money supply and inflation. The theoretical results indicate that under a fixed exchange rate regime, a rise in remittances leads to an increase in gross domestic product (GDP), an increase in the rate of inflation, and an appreciation of the real exchange rate, whereas they generate an increase in GDP and an appreciation of the real exchange rate, but a decrease in inflation rate, under a flexible exchange rate regime. The main result is the observed inflationary consequences of remittances under a fixed exchange regime, which is supported by an empirical analysis.

In contrast, I analyze the dynamics of an increase in remittances in a small open economy under different monetary and exchange rate policies, focusing on the impact on resource reallocation across sectors and the implications for nontradable inflation and consequently real exchange rate dynamics. I also perform an analysis to ascertain what the optimal policy would be from a welfare perspective.

There is ongoing debate among policy makers about the desirability of managing real exchange rate appreciation following inflow of remittances in order to enhance the external competitiveness of recipient countries, as well as their potential for growth. This paper, therefore, contributes to the literature by examining the dynamic and optimal properties of monetary policy regimes in an economy that is a recipient of remittances, with emphasis on the differences in dynamics pertaining to nontradable-inflation-based real exchange rate appreciation and sectoral resource movement, i.e., the Dutch disease effects. I also conduct an empirical analysis using data for El Salvador and the Philippines, two countries that are recipients of massive amounts of remittances but operate under different monetary regimes, and examine the dynamics of inflation and the real exchange rate using a vector autoregressive (VAR) model.

2. THE MODEL

2.1. Households

There is a continuum of households of unit mass. The households have preferences over real consumption (C_t) and labor effort (L_t) supplied in a competitive market. The consumption index is an aggregate of a nontradable good (C_N) and a tradable good (C_{T}); $C_t = [\gamma^{1/\theta}(C_{\mathrm{T},t})^{(\theta-1)/\theta} + (1-\gamma)^{1/\theta}(C_{N,t})^{(\theta-1)/\theta}]^{\theta/(\theta-1)}$, $\gamma \in [0, 1]$, $\theta > 0$. Consumption of nontradable goods is differentiated, with a subindex, $C_N = [\int_0^1 C_N(i)^{(\vartheta-1)/\vartheta} di]^{\vartheta/(\vartheta-1)}$, $\vartheta > 1$. The tradable consumption good is a composite of home ($C_{\mathrm{H},t}$) and foreign ($C_{\mathrm{F},t}$) tradable goods, $C_{\mathrm{T},t} = [(\gamma_h)^{1/\rho_h}(C_{\mathrm{H},t})^{(\rho_h-1)/\rho_h} + (1-\gamma_h)^{1/\rho_h}(C_{\mathrm{F},t})^{(\rho_h-1)/\rho_h}]^{\rho_h/(\rho_h-1)}$, $\gamma_h \in [0, 1]$, $\rho_h > 0$. The corresponding price index is $P_{\mathrm{TC},t} = [\gamma_h(P_{\mathrm{T},t})^{1-\rho_h} + (1-\gamma_h)(P_{\mathrm{CF},t})^{1-\rho_h}]^{1/(1-\rho_h)}$, where $P_{\mathrm{CF},t}$ is the price of the foreign tradable consumption good and P_{T} is the price of the domestic tradable good. The consumer price index is $P_t = [\gamma(P_{\mathrm{TC},t})^{1-\theta} + (1-\gamma)(P_{N,t})^{1-\theta}]^{1/(1-\theta)}$; $P_N = (\int_0^1 P_N(i)^{1-\vartheta} di)^{1/(1-\vartheta)}$ is the price subindex for the nontradable good, and P_{TC} is the price of the tradable consumption good. Optimal allocation of expenditure between tradable and nontradable goods yields $\frac{C_{N,t}}{C_{\mathrm{T},t}} = \frac{\gamma}{1-\gamma}(\frac{P_{N,t}}{P_{\mathrm{TC},t}})^{-\theta}$, and that between home and foreign tradables is given by $\frac{C_{\mathrm{H},t}}{C_{\mathrm{F},t}} = \frac{\gamma_h}{1-\gamma_h}(\frac{P_{\mathrm{T},t}}{P_{\mathrm{CF},t}})^{-\rho_h}$.

The household's utility function is given by

$$E_t \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{1-\sigma} C_t^{1-\sigma} - \psi \frac{L_t^{1+\nu}}{1+\nu}\right], \tag{1}$$

with $\sigma, \nu, \psi > 0$.

The budget constraint is

$$B_{t+1} + \varepsilon_t B_{t+1}^* + \frac{\kappa}{2}(\varepsilon_t B_{t+1}^*)^2 + P_t C_t + v_t x_{t+1}$$
$$= (1+i_t)B_t + \varepsilon_t(1+i_t^*)B_t^* + (v_t + d_t)x_t + W_t L_t + \varepsilon_t R_t + \tau_t + \Pi_t. \tag{2}$$

The representative household enters each time period t with shares x_t of the production unit of the tradable sector purchased from the previous period, and earns a return $(v_t + d_t)$ on shares held from the previous period; v_t is the period-t price of a claim to the tradable sector firm's entire future profit, and d_t is period-t dividends issued by the firm. R_t is remittances, i_t and i_t^* are nominal interest rates on bonds denominated in home (B) and foreign (B^*) currencies respectively, W_t is the nominal wage, ε_t is the nominal exchange rate, and Π_t represents profits of the nontradable sector. $\frac{\kappa}{2}(B_{t+1}^*)^2$ is the cost of adjustment for foreign bond holdings (financial intermediation cost). τ_t is the rebate of financial intermediation fees to the household.

The optimality conditions for the household's choices are

$$C_t^{-\sigma} = \beta E_t \left[C_{t+1}^{-\sigma}(1+i_{t+1})\frac{P_t}{P_{t+1}}\right], \tag{3}$$

https://doi.org/10.1017/S1365100514001035 Published online by Cambridge University Press

$$C_t^{-\sigma}\left[\varepsilon_t+\kappa\left(\frac{\varepsilon_t B_{t+1}^*}{P_t}\right)\right]=\beta E_t\left[C_{t+1}^{-\sigma}\varepsilon_{t+1}(1+i_{t+1}^*)\frac{P_t}{P_{t+1}}\right], \tag{4}$$

$$C_t^{-\sigma}v_t=\beta E_t\left[C_{t+1}^{-\sigma}(v_{t+1}+d_{t+1})\frac{P_t}{P_{t+1}}\right], \tag{5}$$

$$C_t^{-\sigma}\frac{W_t}{P_t}=\psi L_t^{\nu}. \tag{6}$$

2.2. Firms

Production occurs in two sectors; tradable and nontradable. Capital is used in the tradable sector only, and hence the nontradable good is produced using only labor.[2] Capital acquisition is subject to adjustment costs given by $\frac{\phi}{2}(\frac{I_t}{K_t}-\delta)^2K_t$. The total domestic labor supply is $L=L_T+L_N$, where L_T is tradable sector labor and L_N is nontradable sector labor.

2.2.1. Tradable sector

2.2.1.1. Investment Unit. The investment unit combines home investment (I_{H}) and foreign investment (I_{F}) to produce investment (I) to maintain and accumulate capital, using the technology $I_t=[\mu^{1/\rho}(I_{\mathrm{H},t})^{(\rho-1)/\rho}+(1-\mu)^{1/\rho}(I_{\mathrm{F},t})^{(\rho-1)/\rho}]^{\rho/(\rho-1)}$, where $\rho>0$, and $0<\mu\leq 1$. The unit cost of investment is $P_{\mathrm{I},t}=[\mu(P_{\mathrm{T},t})^{1-\rho}+(1-\mu)(P_{\mathrm{T},t}^{\mathrm{F}})^{1-\rho}]^{1/(1-\rho)}$; $P_{\mathrm{T},t}$ is the price of the domestic tradable good and $P_{\mathrm{T},t}^{\mathrm{F}}$ is the price of foreign investment in domestic currency, where $P_{\mathrm{T},t}^{\mathrm{F}}=\varepsilon_t P_{\mathrm{T},t}^{\mathrm{F}*}$, and $P_{\mathrm{T},t}^{\mathrm{F}*}$ is the foreign currency price.

The unit's minimization problem is

$$\min_{\{I_{\mathrm{H}},I_{\mathrm{F}}\}} P_{\mathrm{T},t}I_{\mathrm{H},t}+P_{\mathrm{T},t}^{\mathrm{F}}I_{\mathrm{F},t}\quad \text{s.t.}\left[\mu^{\frac{1}{\rho}}(I_{\mathrm{H},t})^{\frac{\rho-1}{\rho}}+(1-\mu)^{\frac{1}{\rho}}(I_{\mathrm{F},t})^{\frac{\rho-1}{\rho}}\right]^{\frac{\rho}{\rho-1}}=I_t,$$

and the optimal choices are

$$I_{\mathrm{F},t}=(1-\mu)\left(\frac{P_{\mathrm{T},t}^{\mathrm{F}}}{P_{\mathrm{I},t}}\right)^{-\rho}I_t, \tag{7}$$

$$I_{\mathrm{H},t}=\mu\left(\frac{P_{\mathrm{T},t}}{P_{\mathrm{I},t}}\right)^{-\rho}I_t. \tag{8}$$

2.2.1.2. Production unit. The production unit produces a tradable good using technology $Y_{\mathrm{T},t}=\exp\{a_t\}K_t^{\alpha}L_{\mathrm{T},t}{}^{1-\alpha}$, $0<\alpha<1$, where a_t is a productivity shock. The unit maximizes the present discounted value of dividends, $E_t\sum_{s=t}^{\infty}\Lambda_s\{P_{\mathrm{T},s}Y_{\mathrm{T},s}-P_{\mathrm{I},s}[I_s+\frac{\phi}{2}(\frac{I_s}{K_s}-\delta)^2K_s]-W_sL_{\mathrm{T},s}\}$, subject to $K_{t+1}=I_t+(1-\delta)K_t$, where δ is the depreciation rate. The optimal choices for

https://doi.org/10.1017/S1365100514001035 Published online by Cambridge University Press

$K_{t+1,}$ I_t, and $L_{\mathrm{T},t}$ respectively are

$$E_t\Lambda_{t+1}\left\{\alpha P_{\mathrm{T},t+1}\frac{Y_{\mathrm{T},t+1}}{K_{t+1}}-P_{I,t+1}\left[\frac{\phi}{2}\left(\frac{I_{t+1}}{K_{t+1}}-\delta\right)^2-\phi\left(\frac{I_{t+1}}{K_{t+1}}-\delta\right)\frac{I_{t+1}}{K_{t+1}}\right]\right.$$
$$\left.+Q_{t+1}(1-\delta)\right\}=Q_t, \tag{9}$$

$$P_{\mathrm{I},t}\left[1+\phi(\frac{I_t}{K_t}-\delta)\right]=Q_t, \tag{10}$$

$$(1-\alpha)\frac{Y_{\mathrm{T},t}}{L_{\mathrm{T},t}}=\frac{W_t}{P_{\mathrm{T},t}}, \tag{11}$$

where Q_t is the shadow price of capital.

2.2.2. Nontradable sector

There is a continuum of monopolistically competitive firms of measure unity, each producing output with the production function $Y_{N,t}(i)=\exp\{z_t\}L_{N,t}(i)$, where z_t is a stochastic productivity parameter for the nontradable sector, which follows the AR(1) process $z_{t+1}=\eta_z z_t+\epsilon_{z,t+1}, 0<\eta_z<1; \epsilon_z\sim N(0,\sigma_z)$. Firms demand labor in a perfectly competitive fashion, taking the wage and level of output as given. The static efficiency condition for labor demand is

$$\mathrm{mc}_t\frac{Y_{N,t}(i)}{L_{N,t}(i)}=\frac{W_t}{P_{N,t}}, \tag{12}$$

where $\mathrm{mc}=\frac{\mathrm{MC}}{P_N}$ is the real marginal cost, the inverse of which is the markup, which is common across firms.

Firms in the nontradable sector set prices à la Calvo (1983), with $(1-\varphi)$ being the probability of changing the optimal price $\tilde{P}_{N,t}(i)$. The optimal pricing condition is

$$\tilde{P}_{N,t}(i)=\frac{\vartheta}{1-\vartheta}\frac{E_t\sum_{k=0}^{\infty}\varphi^k\Lambda_{t+k}\mathrm{MC}_{t+k}Y_{N,t+k}(i)}{E_t\sum_{k=0}^{\infty}\varphi^k\Lambda_{t+k}Y_{N,t+k}(i)}, \tag{13}$$

where $\tilde{P}_{N,t}(i)$ represents the newly set price for a firm that adjusts its price in period t. The pricing behavior yields the familiar forward-looking Philips curve, which in log-linear form is

$$\hat{\pi}_{N,t}=\beta E_t\hat{\pi}_{N,t+1}+\frac{(1-\varphi)(1-\beta\varphi)}{\varphi}\widehat{\mathrm{mc}}_t, \tag{14}$$

where $\widehat{\mathrm{mc}}_t$ represents the log deviation of real marginal cost from its steady-state level.[3]

https://doi.org/10.1017/S1365100514001035 Published online by Cambridge University Press

2.3. Real Exchange Rate and Exports

The small open economy can affect neither foreign prices nor foreign output, and thus takes these variables as given. The real exchange rate e_t is defined as the ratio of the price of foreign consumption basket to the domestic one, $e_t = \frac{\varepsilon_t P_t^*}{P_t}$, where P_t^* is the foreign consumer price index in units of foreign currency, and ε_t is the nominal exchange rate. Similar to Gertler et al. (2007), I postulate an empirically reasonable reduced form export demand curve, $X_t = e_t^{\xi} Y_t^{\mathrm{F}}$, $\xi > 0$, where Y_t^{F} is aggregate output in the foreign economy.

2.4. Remittances

I follow Acosta et al. (2009) and assume that migrants with close family ties in the home economy send remittances to domestic households independent of domestic economic conditions.[4] Thus, I specify remittances as following an exogenous stochastic process given by

$$R_{t+1} = (R_t)^{\eta^{\mathrm{R}}} \exp(\epsilon_{\mathrm{R},t+1});\ 0 < \eta^{\mathrm{R}} < 1;\ \epsilon_{\mathrm{R}} \sim N(0, \sigma_{\mathrm{R}}). \tag{15}$$

2.5. Resource Constraints

The following equations characterize the resource constraints of the economy: $Y_{\mathrm{T},t} = C_{\mathrm{H},t} + I_{\mathrm{H},t} + X_t$; $Y_{N,t} = C_{N,t}$; $Y_t = P_{\mathrm{T},t} Y_{\mathrm{T},t} + P_{N,t} Y_{N,t}$, where X_t is the component of tradable sector output that is exported and Y_t is aggregate output.

2.6. Monetary Policy

The monetary authority uses the nominal interest rate as the policy instrument and follows a set of policy rules derived from a generalized Taylor rule. The general form of the equation describing the policy rules is

$$(1 + i_t) = (1 + r^{\mathrm{ss}}) \left(1 + \pi_{N,t}\right)^{\omega_{\pi_N}} \left(\frac{Y_t}{Y^{\mathrm{ss}}}\right)^{\omega_y} \left(\frac{\varepsilon_t}{\overline{\varepsilon}}\right)^{\omega_\varepsilon} \left(\frac{e_t}{e_{t-1}}\right)^{\omega_e}, \tag{16}$$

where ω_{π_N}, ω_y, ω_ε, $\omega_e \geq 0$, are the reaction coefficients on nontradable price inflation, aggregate output, nominal exchange rate depreciation, and real exchange rate depreciation respectively, and r^{ss} and Y^{ss} are the steady-state real interest rate and GDP respectively. The baseline rule is a fixed exchange rate regime under which the coefficient ω_ε is assigned an arbitrarily high value, such that $\varepsilon_t = \overline{\varepsilon}$, for any t. The other rules are a standard Taylor rule given by equation (16) with $\omega_\varepsilon = \omega_e = 0$ and an open-economy version of the Taylor rule characterized by the case with $\omega_\varepsilon = 0$.

https://doi.org/10.1017/S1365100514001035 Published online by Cambridge University Press

3. MODEL DYNAMICS UNDER MONETARY REGIMES

3.1. Calibration

The model is solved numerically. The following parameter values are from Acosta et al. (2009): household discount factor $\beta = 0.99$, inverse of the intertemporal elasticity of substitution in consumption $\sigma = 2$, share of capital in tradable good production $\alpha = 0.33$, elasticity of substitution between home and foreign tradable consumption goods $\rho_h = 0.55$, share of home goods in composite tradable good $\gamma_h = 0.4$, degree of persistence for remittances shock $\eta^{R} = 0.95$, share of home investment $\mu = 0.5$, and share of tradables in the consumption basket $\gamma = 0.45$. The depreciation rate, $\delta = 0.05$, and inverse of elasticity of labor supply, $\nu = 0.83$, are from Kose and Riezman (1999). The adjustment cost of bond holdings parameter $\kappa = 0.01$, as in Lartey (2008). The elasticity of substitution between tradables and nontradables in the consumption basket $\theta = 1.4$, as in Ostry and Reinhart (1992). The disutility of labor supply parameter $\psi = 1$, and the share of the tradable good in the consumption basket $\gamma = 0.45$, follow Devereux et al. (2006). The probability of price nonadjustment $\varphi = 0.75$ and the benchmark Taylor rule reaction coefficients $\omega_{\pi_N} = 1.5$, $\omega_y = 0.5$, $\omega_e = 0.2$.

3.2. Fixed Exchange Rate Regime

The impulse responses under a fixed exchange regime are presented in Figure 1. An unanticipated one-percentage-point transitory increase in remittances leads to an increase in total consumption as demand for both tradables and nontradables go up. The larger increase in nontradables consumption drives up nontradable output and hence the demand for nontradable sector labor, drawing labor away from the tradable sector. Moreover, the household's increased consumption of tradables comes at the expense of investment, leading to no change in the capital stock. The combination of these effects causes a contraction of the tradable sector. The increased demand for nontradable goods triggers a rise in nontradable prices, and accordingly nontradable inflation, culminating in an appreciation of the real exchange rate.[5]

3.3. Inflation Targeting Regime

Figure 2 shows the dynamics under two inflation targeting regimes in comparison to the fixed exchange rate regime dynamics. Under both inflation targeting regimes, an exogenous increase in remittances, on impact, leads to a decrease in consumption of both tradables and nontradables. Tradables consumption decreases initially, as remittances stimulate capital accumulation via increased demand for shares, but increases significantly thereafter. The decrease in consumption of nontradables, on the other hand, is persistent. These dynamics are driven by the policy rules, such that with foresight that the policy maker would raise the interest rate if nontradable inflation went up, households finance purchases of shares and subsequently

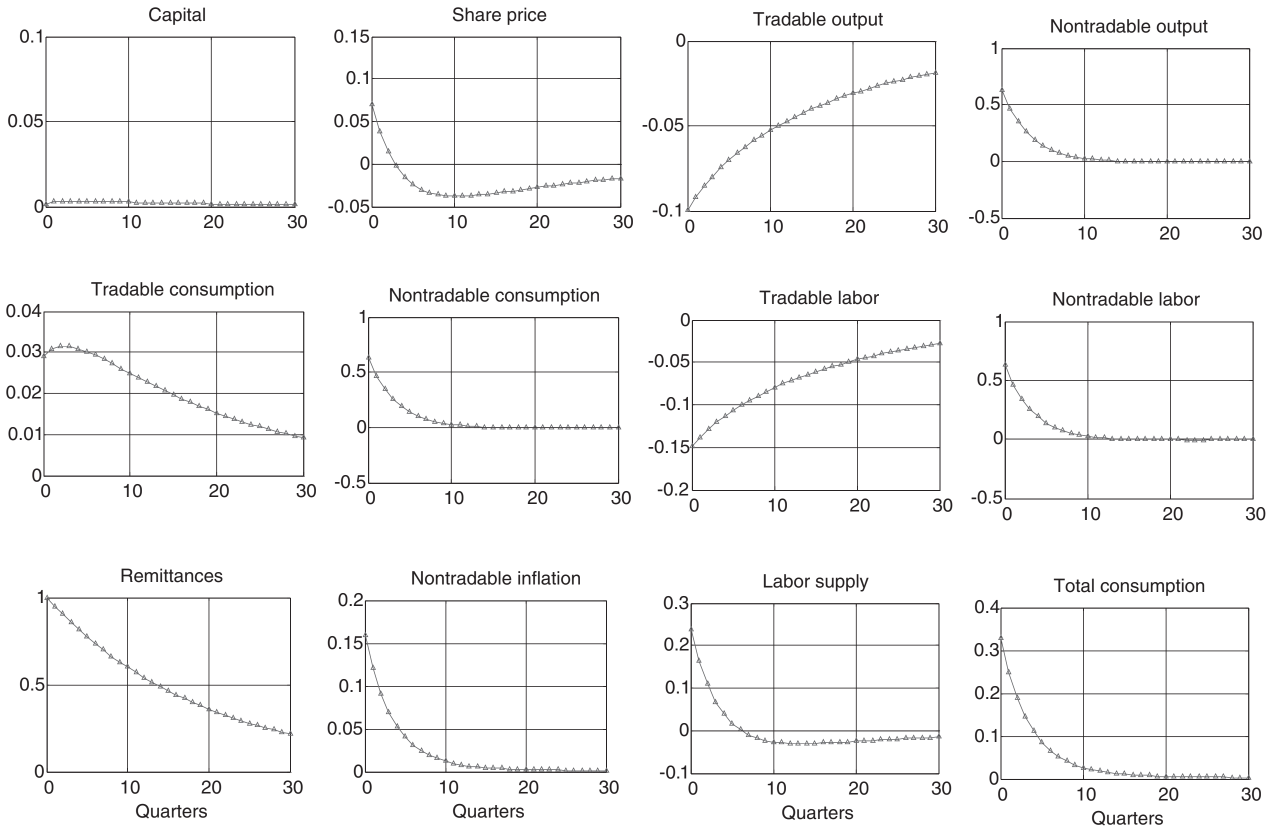


FIGURE 1. Impulse responses under fixed exchange rate regime.

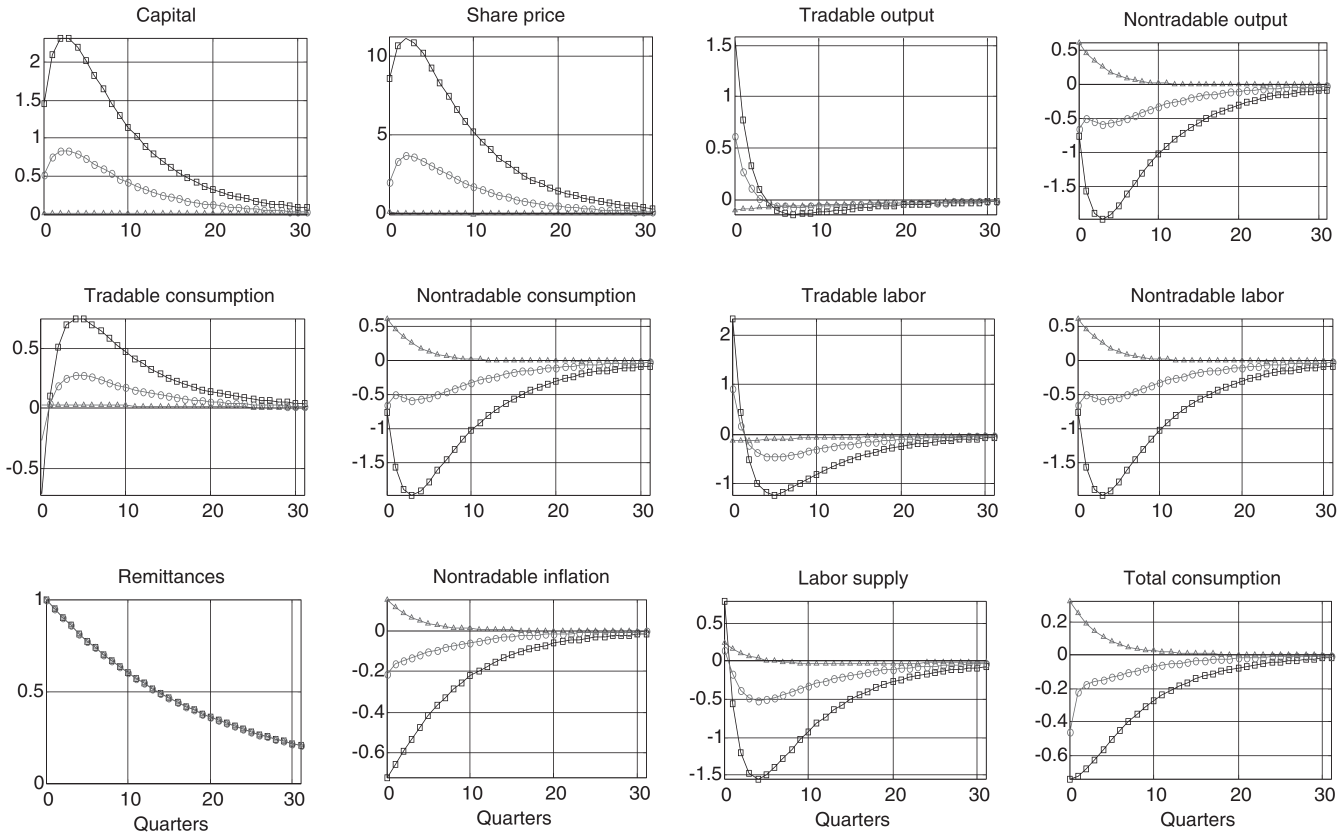


FIGURE 2. Impulse responses under fixed exchange rate regime (triangles), open-economy Taylor rule (circles), and Taylor rule (squares).

tradables with remittances, and reduce demand for nontradables, which in turn decreases nontradable inflation.[6] The increase in capital accumulation, coupled with increased demand, generates an expansion in tradable output. Nontradable output, however, declines because of the decrease in demand. In summary, the inflation targeting policy induces an expansion of the tradable sector, a decline in the nontradable sector, and a decrease in nontradable inflation, which implies a depreciation of the real exchange rate.[7]

Thus, a fixed exchange rate regime generates dynamics indicative of Dutch disease effects following inflow of remittances, whereas a monetary regime characterized by a Taylor-type rule averts such effects.

3.4. Optimal Monetary Policy

I conduct a welfare analysis to determine the policy rule that is optimal from the perspective of the household following a positive shock to remittances. The welfare criterion used is the expectation of the second-order Taylor expansion of the household's utility function around the steady state, given by

$$W_t = \frac{\overline{C}^{1-\sigma}}{1-\sigma} - \psi\frac{\overline{L}^{1+\nu}}{1+\nu} + \overline{C}^{1-\sigma}E(\hat{C}_t) - \psi\overline{L}^{1+\nu}E(\hat{L}_t) - \frac{\sigma}{2}\overline{C}^{1-\sigma}E(\hat{C}_t^2) - \frac{\psi\nu}{2}\overline{L}^{1+\nu}E(\hat{L}_t^2), \quad (17)$$

where $\overline{C}$ and $\overline{L}$ are steady state values of consumption and labor supply, respectively, and variables with a circumflex denote percentage deviations from the steady state. The monetary authority chooses the reaction coefficients of the policy rule to maximize the welfare function. The general interest rate rule is

$$(1+i_t) = \left(1+\pi_{N,t}\right)^{\omega_{\pi_N}} \left(\frac{Y_t}{Y^{ss}}\right)^{\omega_y} \left(\frac{\varepsilon_t}{\varepsilon_{t-1}}\right)^{\omega_\varepsilon} \left(\frac{e_t}{e_{t-1}}\right)^{\omega_e}. \quad (18)$$

The estimates of the optimal parameter values are $\omega_{\pi_N} = 4.9$, $\omega_y = 0.5$, $\omega_\varepsilon = 0.2$, and $\omega_e = 0.005$. The optimal monetary policy, therefore, is characterized by a very aggresive stance against nontradable inflation, a standard response to the output gap, and managed variabililty in the nominal exchange rate, consistent with a Taylor-type rule.[8] The dynamics of the model for the optimal policy is shown in comparison to the dynamics under the fixed exchange rate policy in Figure 3. Under the optimal policy, the consumption of both tradables and nontradables decreases following an increase in remittances, but only consumption of tradables rises thereafter, for the same reasons noted under the benchmark inflation targeting regimes. Households avoid interest rate hikes that follow an increase in nontradable inflation by decreasing nontradables consumption, thereby holding nontradable inflation down. The labor supply also rises initially to boost tradable output, but declines thereafter as households decrease disutility of work, thereby enhancing

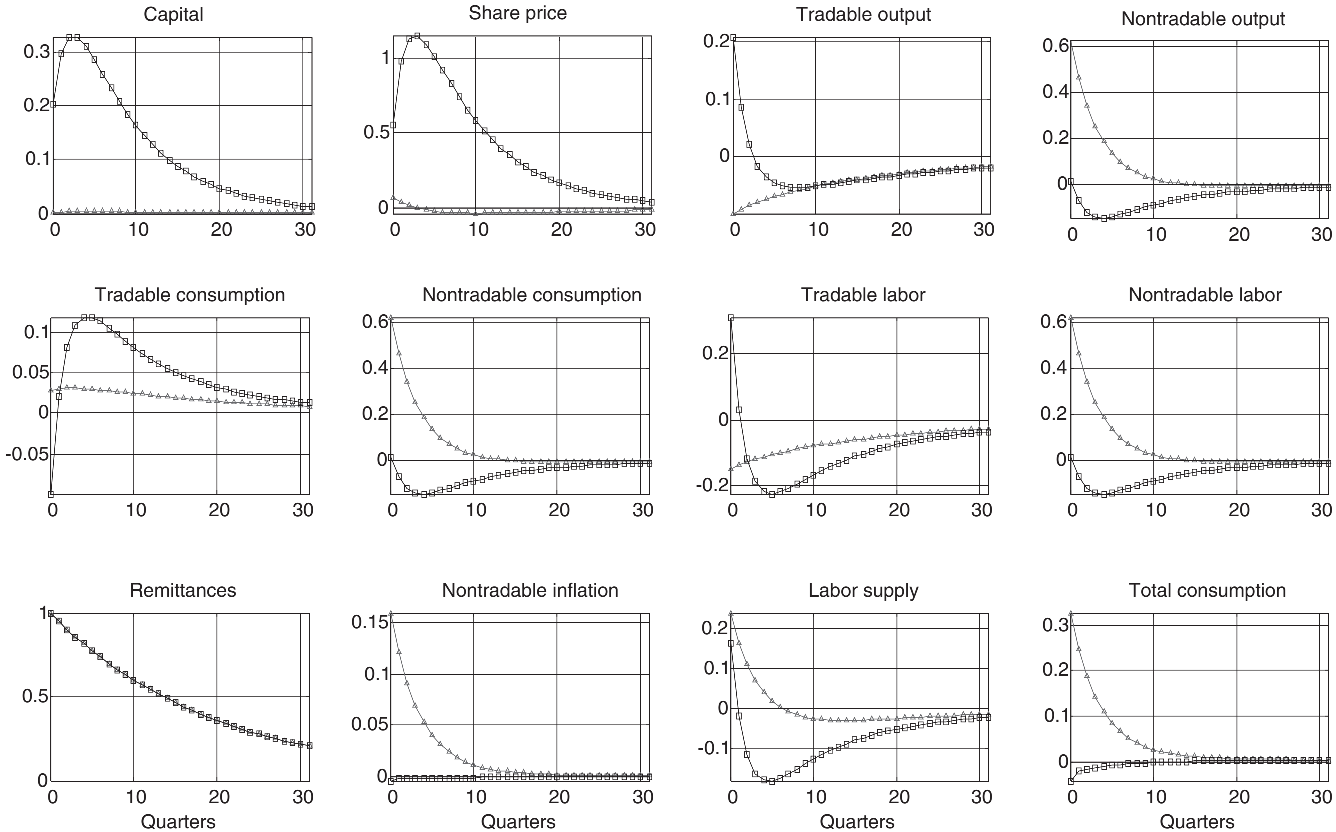
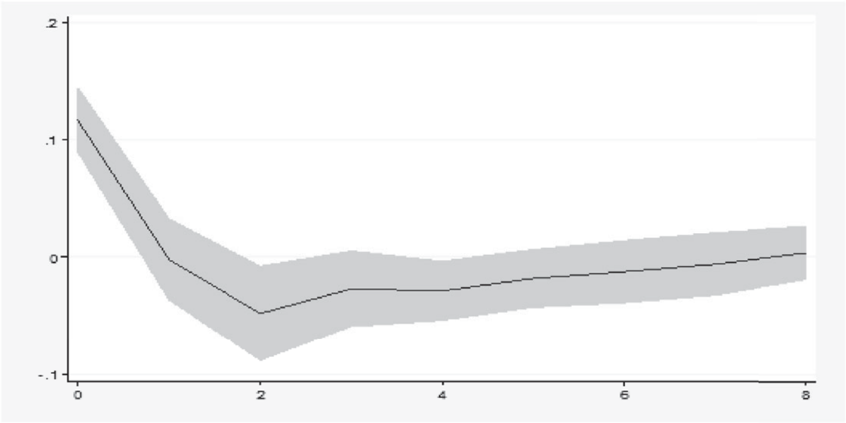
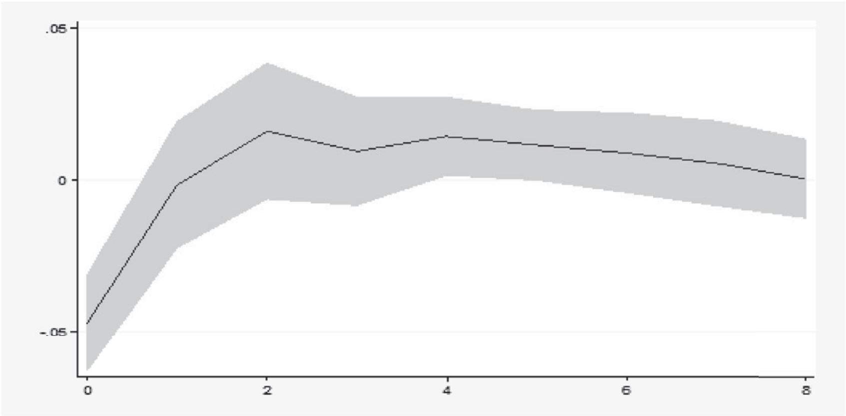


FIGURE 3. Impulse responses under optimal monetary policy (squares) and fixed exchange rate regime (triangles).



Consumer price index



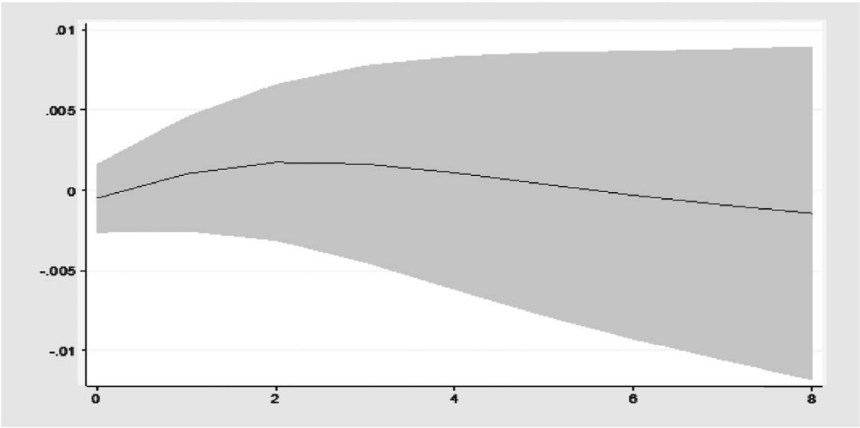
Real exchange rate

FIGURE 4. Impulse responses to remittances shock: El Salvador consumer price index real exchange rate.

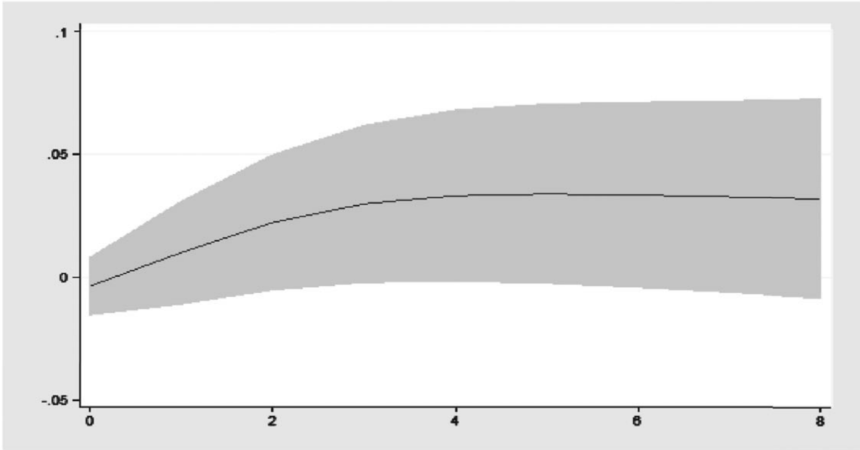
welfare. In addition, the optimal policy generates a smooth path for consumption, which is consistent with welfare improvement.

Still, the key result under the optimal policy is that nontradable inflation is close to zero, which in turn averts the appreciation of the real exchange rate that would otherwise have occured through higher nontradable prices. This occurs because the policy discourages consumption of nontradables while facilitating an expansion of the tradable sector.

https://doi.org/10.1017/S1365100514001035 Published online by Cambridge University Press



Consumer price index



Real exchange rate

FIGURE 5. Impulse responses to remittances shock: Philippines consumer price index real exchange rate.

4. VAR ANALYSIS

I perform an empirical analysis using data for El Salvador and the Philippines, two countries that are recipients of enormous amounts of remittances but operate under different monetary policy regimes. El Salvador is representative of an economy operating a fixed exchange rate regime, whereas the Philippines exemplifies an economy under an inflation targeting regime. I compare the dynamics following an exogenous increase in remittances, as indicated by the impulse response functions, for two main variables of interest; inflation and the real exchange rate.[9] I utilize a VAR model, applying the Cholesky decomposition with the following ordering of the variables: remittances, CPI, and the real exchange rate.[10] The data on all the variables are expressed in logs. Figures 4 and 5 present the impulse reponses with 95% confidence intervals for El Salvador and the Philippines, respectively. A shock to remittances causes an increase in the CPI and an appreciation of the real exchange rate in El Salvador on impact, whereas in the Philippines, it barely generates any movement in the CPI but causes a depreciation of the real exchange rate. These are in consonance with the dynamics of the theoretical model, such that under a fixed exchange regime, an increase in remittances will likely culminate in an appreciation of the real exchange rate through higher nontradable prices, whereas little to no variation in nontradable inflation will be observed under an inflation targeting regime.

5. CONCLUSION

This paper uses a small open economy model to show that under a fixed exchange rate regime, an increase in remittances leads to an increase in consumption of nontradable goods and higher nontradable inflation, which implies an appreciation of the real exchange rate. For an inflation targeting regime, however, an increase in remittances drives up capital accumulation, generating an expansion of the tradable sector. This policy operates to decrease nontradable output as consumption of nontradables declines, thereby reducing nontradable inflation. Further analysis reveal that the optimal policy is characterized by managed variability in the nominal exchange rate and a nontradable inflation rate that is close to zero. The optimal policy, therefore, prevents a real exchange appreciation that would otherwise occur through higher nontradable prices, while encouraging an expansion of the tradable sector, and thus is not associated with the Dutch disease phenomenon.

This study makes an important contribution to the literature and the growing debate among policy makers on the desirability of managing real exchange rate appreciation induced by nontradable inflation following an increase in remittances, in order to enhance the external competitiveness of recipient countries and their potential for growth. The results suggest that, from a policy perspective, a nontradable inflation targeting regime and more generally an inflation targeting regime should be preferable to a fixed exchange rate regime.

NOTES

1. A remittance is a transfer of money by a migrant to an individual in his or her home country.
2. This follows the modeling strategy used by Acosta et al. (2009).
3. The sticky prices in the nontradable sector yield a nontradable-sector-specific Philips curve, consistent with the objective of allowing the monetary authority to operate a nontradable inflation targeting regime.
4. Acosta et al. (2009) show that the motivation for sending remittances has no bearing on the dynamics of their model in terms of Dutch disease effects. In effect, the dynamics associated with this specification describing the behavior of remittances can be generalized to apply to other cases.

5. The decline in tradable output and the increase in demand for nontradables, which generates an increase in nontradable output and prices, summarize the resource movement effect and the spending effect, respectively, associated with the Dutch disease phenomenon.

6. The difference between the dynamics of the two Taylor rules lies only in the magnitude of the impulse responses. The qualitative implications are identical.

7. It should be noted that the dynamics here is due not to the assumption that capital is used only in the tradable sector, but rather to the role of monetary policy in targeting nontradable inflation. In effect, even in the case where capital is also utilized in the nontradable sector, nontradable output will still decline in response to the decrease in demand for such goods because of the policy rule.

8. The reaction coefficient on nontradable inflation, ω_{π_N}, is higher in simulations where the upper threshold of the constraint is greater than the one used for the reported estimates, the highest possible estimate being 53.2. The other parameter estimates are robust to a variety of constraints.

9. The data for El Salvador are the same as in Acosta et al. (2009), covering the period 1991:Q1–2006:Q4, and the data for the Philippines are the same as in Mandelman (2012), covering the period 1995:Q1–2009:Q4. See the two references for details on the data.

10. The CPI is a good proxy for nontradable prices, given that prices of tradables are exogenously determined for small open economies.

REFERENCES

Acosta, Pablo, Cesar Calderón, Pablo Fajnzylber, and Humberto López (2008) What is the impact of international migrant remittances on poverty and inequality in Latin America? *World Development* 36, 89–114.

Acosta, Pablo A., Federico S. Mandelman, and Emmanuel K.K. Lartey (2009) Remittances and the Dutch disease. *Journal of International Economics* 79, 102–116.

Ball, Christopher P., Claude Lopez, and Javier Reyes (2013) Remittances, inflation and exchange rate regimes in small open economies. *World Economy* 36, 487–507.

Calvo, G. (1983) Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics* 12, 383–398.

Chami, R., T. Cosimano, and M. Gapen (2006) Beware of Emigrants Bearing Gifts: Optimal Fiscal and Monetary Policy in the Presence of Remittances. IMF working paper 06/61.

Devereux, Michael B., Philip R. Lane, and Juanyi Xu (2006) Exchange rates and monetary policy in emerging market economies. *Economic Journal* 116, 478–506.

Gertler, M., S. Gilchrist, and F. Natalucci (2007) External constraints on monetary policy and the financial accelerator. *Journal of Money, Credit and Banking* 39, 295–330.

Kose, M. Ayhan and Raymond Riezman (1999) Trade Shocks and Macroeconomic Fluctuations in Africa. CSGR working paper 43/99.

Lartey, Emmanuel K.K. (2008) Capital inflows, Dutch disease effects and monetary policy in a small open economy. *Review of International Economics* 16, 971–989.

Mandelman, Federico S. (2012) Monetary and exchange rate policy under remittance fluctuations. *Journal of Development Economics* 102(c), 128–147.