The Global Factor in Neutral Policy Rates

Some Implications for Exchange Rates, Monetary Policy, and Policy Coordination

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Motivation

Monetary Policy with an r* anchor

Wicksell, Friedman, Taylor, Woodford

with a time varying and low r * - Yellen, Haldane, Williams

with a globally correlated and time varying r* - Clarida, Gertler, Gali

Empirical Evidence on time varying r*

US - Laubach Williams; Hamilton et. al

Global – Holston Laubach Williams, King and Low, Lucasz Smith

National Monetary Policies, International Spillovers in world with r* shocks

Beggar thy neighbor depreciations?

Currency War races to the bottom on rates?

Attainable gains to Monetary Policy cooperation or coordination?

Challenges in communication and credibility with policy cooperation?

This Paper

Review some existing evidence of global factor in time varying country r*s

Study and assess international implications of r* shocks in a standard model

r* star shocks driven by shock to expected productivity growth

r* shocks are sum of global factor and country specific factor

Monetary policy is set optimally taking foreign policy as given

Results in model (Gali Monacelli; Clarida) with no policy externalities

Exchange rate adjustment required to country specific r* shocks

-This is not ‘beggar thy neighbor’ depreciation to fall in r*

No exchange rate adjustment required for global r* shocks

-This is not a ‘race to bottom on rates’ currency war

Exchange rate is present value of expected path of r* differentials

-plus PPP and business cycle factors

This paper - Policy Externalities

More general model (based on CGG) with international spillovers and intrinsic r* correlation

Nash equilibrium looks like first model

Exchange rate adjustment still required to country specific r* shocks

No exchange rate adjustment required for global r* shocks

Exchange rate is still present value of expected path of r* differentials

But r* in each country is now a function of home *and* foreign productivity and b cycle

This is true even if home and foreign fundamentals are independent

Creates potential for material gains to *policy coordination*

-nowcasting, reaction function parameters, 'my r* depends on your r*' gains

And *in theory* gains to binding *policy cooperation …BUT* I argue

-Policy *Cooperation* could be hard to communicate/defend *in practice*

Quick Review of Empirical r* Estimates

Figure 1: HLW Estimates of r*

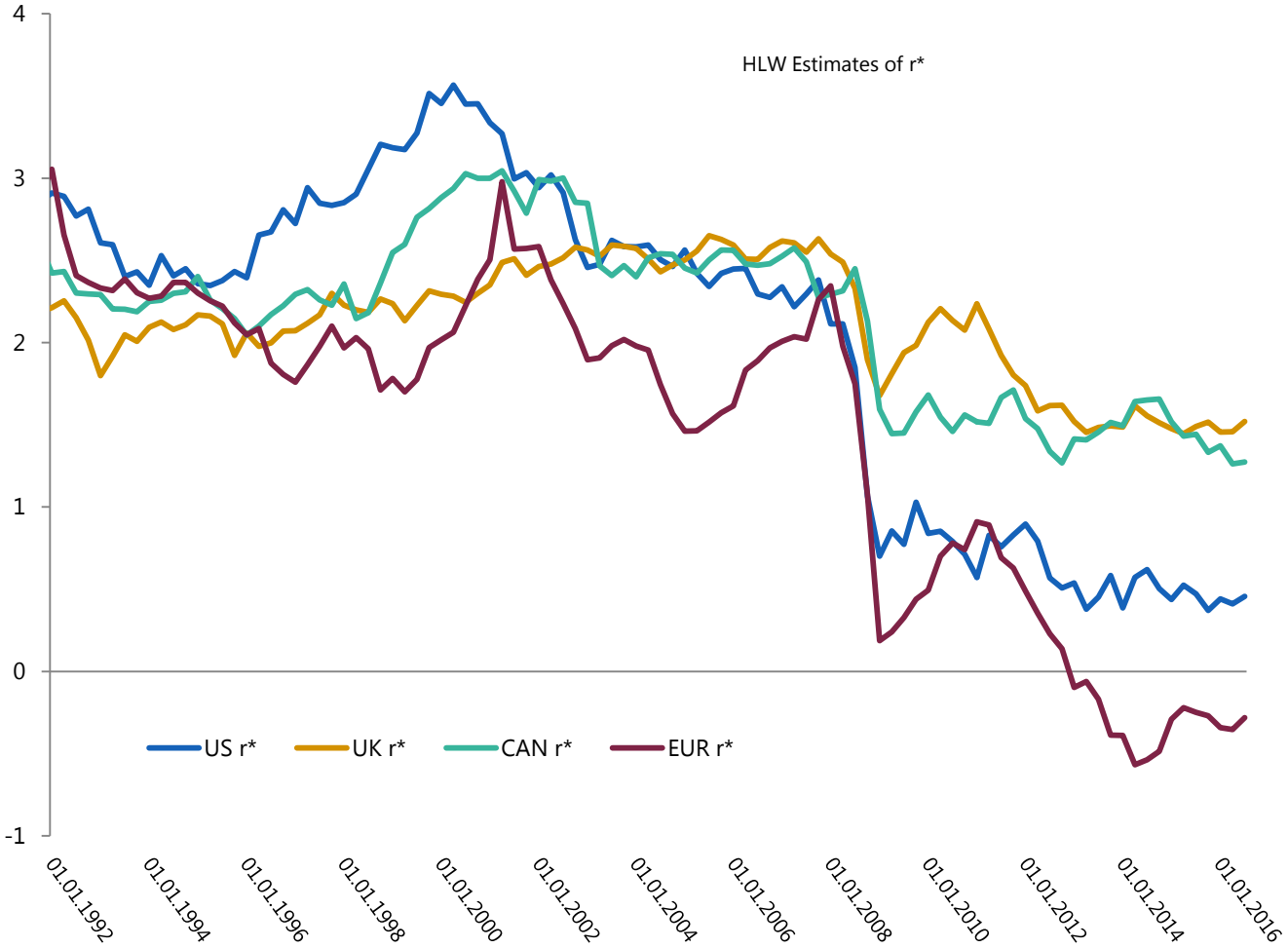


Figure 2: HLW r* and TIPS Implied Forwards

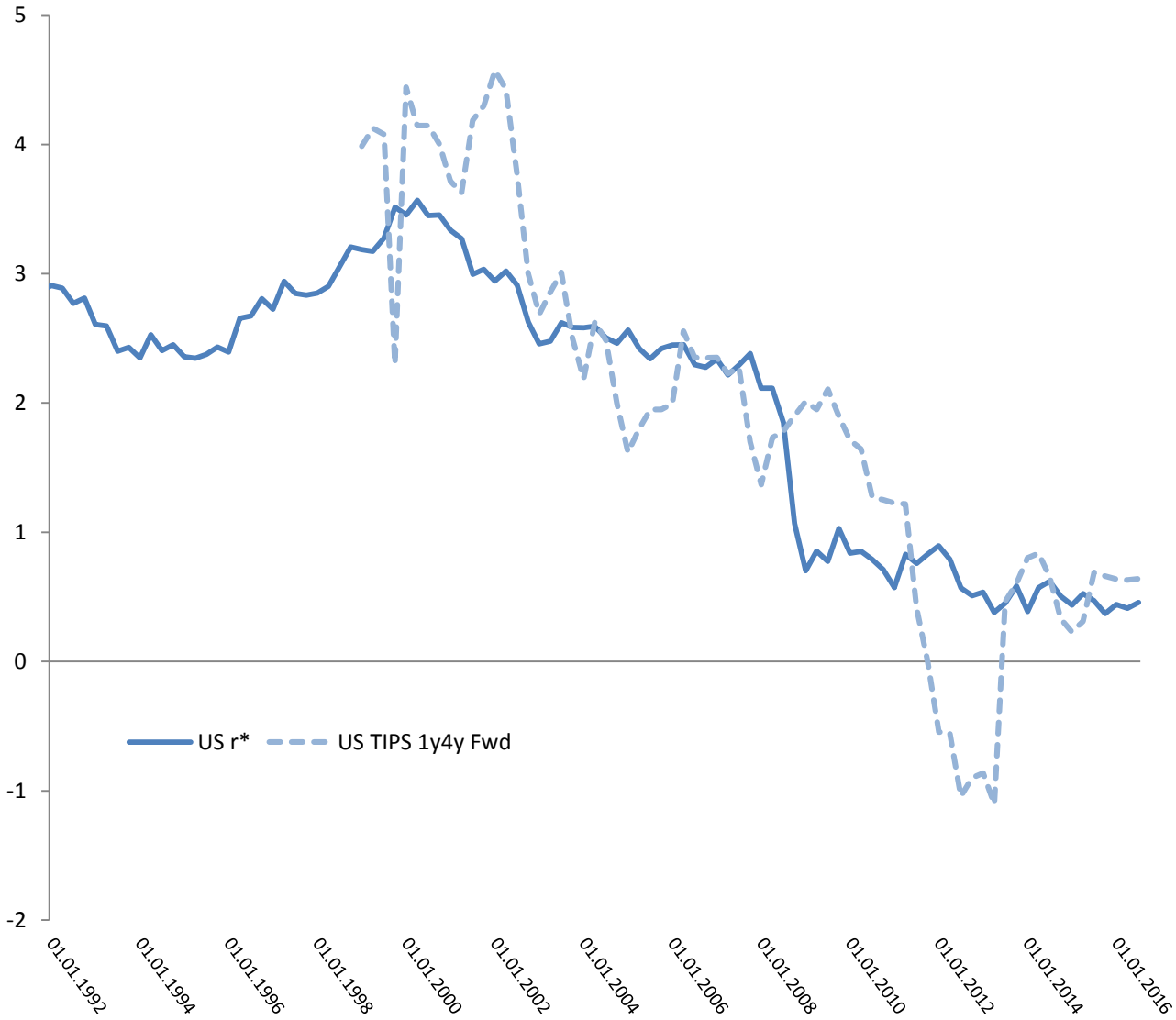


Figure 3: HLW r* and Implied Linker Forward

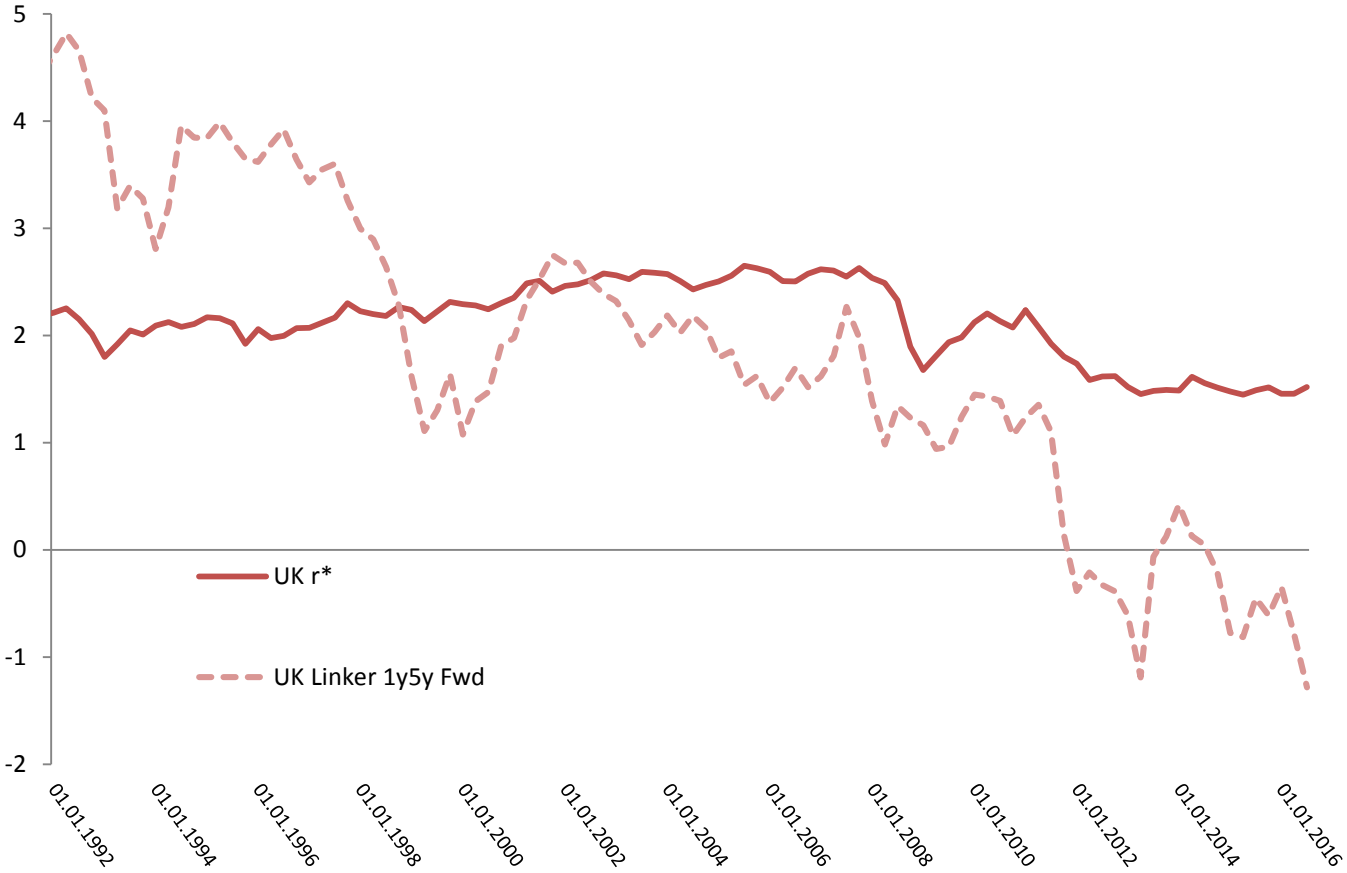
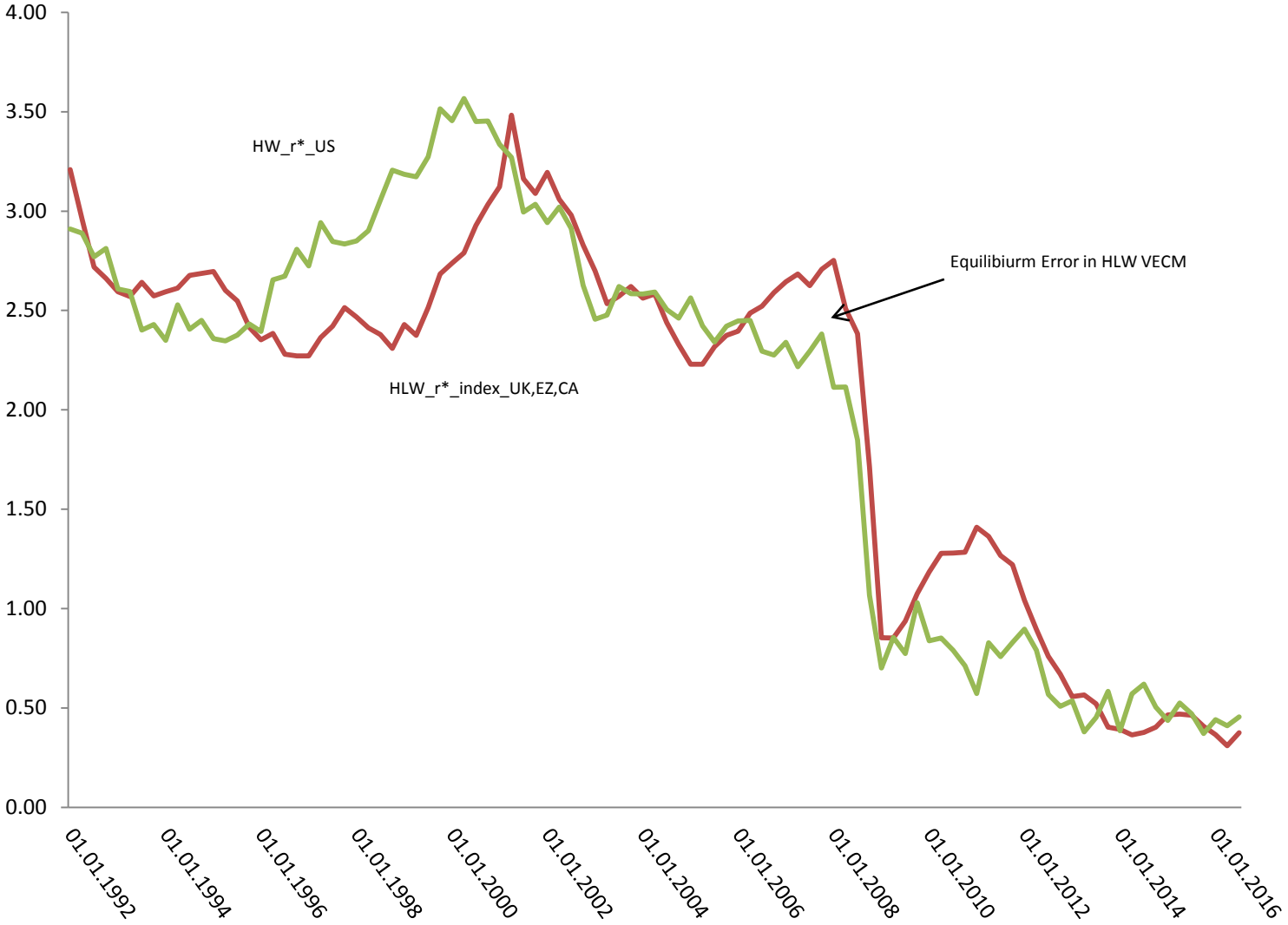


Figure 4:Equilbrium Error in the HLW VECM Representation



Optimal Monetary Policy and Exchange Rates with r* Shocks

Two country model based on Gali Monacelli (2005) as extended in Clarida (2014)

Global common factor in productivity as well as home-country specific factor

This sole source of r * shocks

Home country business cycle with nominal rigidity and mark up shocks

Parameters chosen so no gains to policy cooperation if national policies are set optimally

Key equations

$$r^*_t = E_t \Delta a^F_{t+1} + E_t \Delta a_{t+1}$$

$$x_t = E_t x_{t+1} - \{R_t - E_t (p_{t+1} - p_t) - r^*_t\}$$

$$p_t - p_{t-1} = \beta E_t (p_{t+1} - p_t) + \lambda x_t + u_t$$

$$s_t = a_t + x_t$$

$$e_t = s_t + p_t$$

Equilibrium Exchange Rate with r* Shocks

$$e_t = p_t + x_t - \mathbf{E}_t \sum_{i=0}^{\infty} (r^*_{t+i} - r^{F^*}_{t+i})$$

Log nominal exchange rate (home price of foreign currency) can be decomposed into the sum of a

PPP component,
Business cycle component,
Forward looking r component.*

The nominal exchange rate today will reflect the entire expected future time path of the country specific component in the neutral real interest rate *but ceteris paribus does not adjust to the global component in the neutral policy rate.*

In particular, if today the neutral real rate at home is expected in the future to lie below the neutral real rate abroad, the nominal exchange rate today must weaken (home currency price of foreign currency goes up) relative to domestic prices given the state of the business cycle xt.

Empirical Relationship HLW VECM Error and Trade Weighted $

Figure 5: US TWD vs. HLW Vecm Error

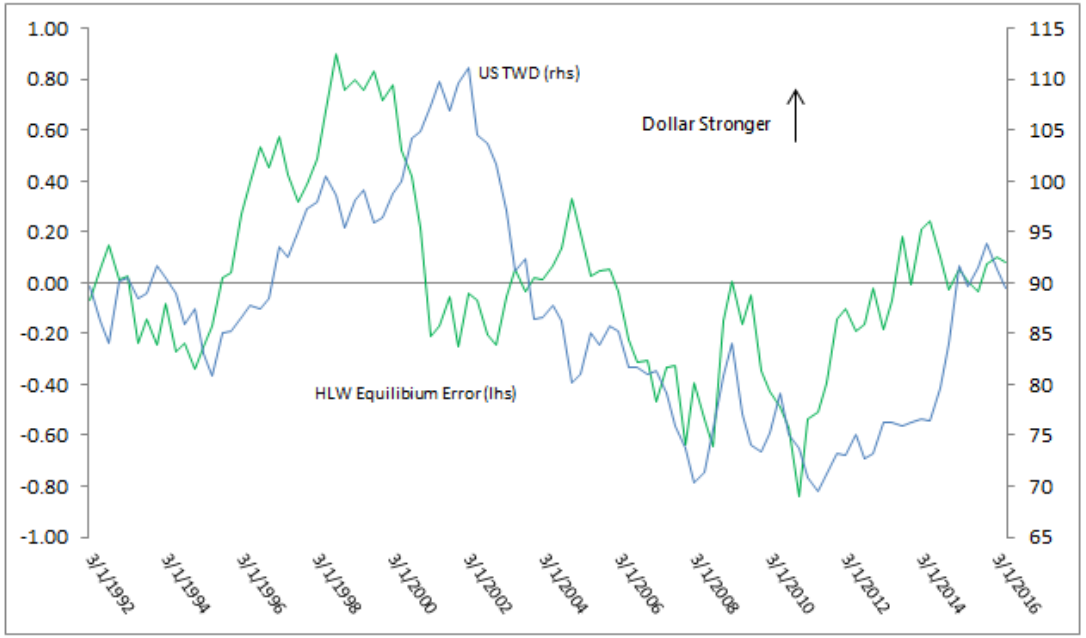
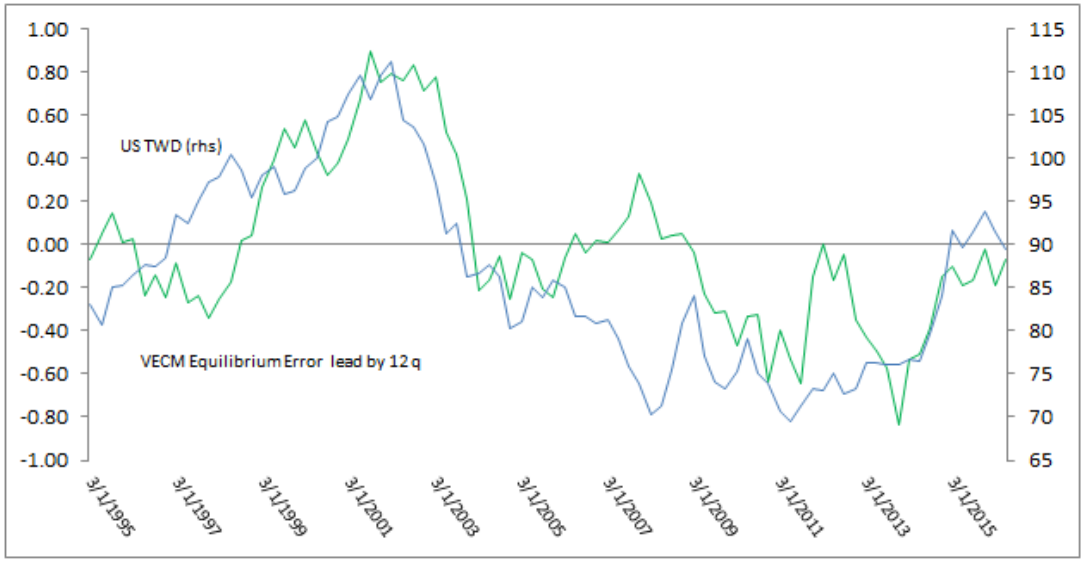


Figure 6: US TWD vs. HLW Vecm Error lead by 12 quarters



Closing the Model with Optimal Monetary Policy Rule

$$R_t = r_t^* + \left(1 + \frac{\lambda(1-\rho)}{\alpha\rho}\right)\mathbf{E}_t \pi_{t+1}$$

$$R_t^F = r_t^{F*}$$

$$e_t = p_{t-1} + (\frac{\alpha - \lambda}{\alpha})\psi u_t - \mathbf{E}_t \sum_{i=0}^{\infty}(r_{t+i}^* - r_{t+i}^{F*})$$

$r^*_t = \boldsymbol{E_t}\, \Delta\, a^F_t + \boldsymbol{E}_t\, \Delta\, a_t$, $r^{F*}_t = \boldsymbol{E_t}\, \Delta\, a^F_t$ and $\boldsymbol{E}_t\pi_{t+1} = \rho\psi u_t$ and $p_{t-1} = \Sigma_{i=1,\infty}\psi u_{t-i}$.

Thus optimal policy in the open economy *a forward looking Taylor rule*

The optimal policy rule features a time varying r^*_t

Only the country specific component of (present and future) r^*_t impacts e_t

Global r^*_t shocks pass though one for one to policy rates, no impact on exchange rate

Also note the 'bad news=good news' possibility for u_t inflation shocks

Implications

- If countries are adjusting policy in response to common , global neutral real rate shocks, this will obviously impart a positive *correlation* in policy even in the absence policy coordination or *cooperation.*

-With the parameter assumption we have made , there is *no gain* to policy cooperation in this model so that the Nash best response policy rules which here take the form of Taylor type rules - lead to the maximum level global welfare that can be obtained under discretion.

-Exchange rate depreciation in the face of a persistent country specific r* shock is not a 'beggar thy neighbor' policy in either motive or realization. In this simple model, trade is balanced period by period and so the exchange rate adjustment that occurs is required to maintain goods market equilibrium with balanced trade and not to generate a trade surplus.

Implications (cont'd)

- By contrast, at least under optimal policy, *exchange rates do not need to adjust to the global component in neutral policy rates*, realized or expected. In response to a global shock, a common global decline in real policy rates can 'do all the work' to generate global aggregate demand in line with aggregate supply;

-This may look like, but is not a globally inefficient 'currency war' defined as a 'race to the bottom' in policy rates as countries seek to avoid home currency appreciation as other countries cut interest rates.

Allowing for International Spillovers

Can modify the analysis (as in CGG 2002) to allow for international spillovers so that there may be theoretical gains to monetary policy coordination and even formal cooperation.

In this more general set up, and regardless of how the model is closed, we can still write the nominal exchange rate

$$e_t = p_t - p_t^F + \frac{(\sigma+1)}{2}(x_t - x_t^F) - \mathbf{E}_t \sum_{i=0}^{\infty}(r_{t+i}^* - r_{t+i}^{F*})$$

as a function of a PPP term, a business cycle term, and a forward looking neutral real rate term where $1/\sigma < 1$ is intertemporal elasticity of substitution.

The nominal exchange rate will still reflect the entire expected future time path of the country specific component in the neutral real interest rate *but ceteris paribus does not adjust to the global component in the neutral policy rate.*

Again, Exchange rate depreciation in the face of a persistent country specific r* shock is not a 'beggar thy neighbor' policy in either motive or realization.

r* in the more general model

Each country's r* is determined in global general equilibrium

$$r_t^* = \frac{(\sigma+1)}{2} E_t \Delta \bar{y}_{t+1}(\Delta a_{t+1}, \Delta a_{t+1}^F, \Delta x_{t+1}, \Delta x_{t+1}^F) + \frac{(\sigma-1)}{2} E_t \Delta y_{t+1}^F(\Delta a_{t+1}, \Delta a_{t+1}^F, \Delta x_{t+1}, \Delta x_{t+1}^F)$$

$$r_t^{F*} = \frac{(\sigma+1)}{2} E_t \Delta \bar{y}_{t+1}^F(\Delta a_{t+1}, \Delta a_{t+1}^F, \Delta x_{t+1}, \Delta x_{t+1}^F) + \frac{(\sigma-1)}{2} E_t \Delta y_{t+1}(\Delta a_{t+1}, \Delta a_{t+1}^F, \Delta x_{t+1}, \Delta x_{t+1}^F)$$

In the more general case each country r^*_t is a function of home and foreign productivities as well as home and foreign business cycle factors, **even if the factors themselves are uncorrelated, the r*'s will be.**

The best non – cooperative monetary policy is still a forward looking Taylor type rule

$$R_t = r^*_t + \left(1 + \frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right) E_t \pi_{t+1}$$

$$R_t = r^{F*}_t + \left(1 + \frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right) E_t \pi^F{}_{t+1}$$

Potential Gains to Monetary Policy Coordination

The best Nash policy in this two country model is a Taylor-type rule

- Depends on r^*_t which in turn is function of a_t ,a^F_t ,x_t ,x^F_t

-and r^{F*}_t is a function of a_t ,a^F_t ,x_t ,x^F_t

To the extent the foreign central bank has some comparative advantage in nowcasting or forecasting a^F_t and x^F_t …..

Sharing this information or even pooling these nowcasts/forecasts with the home central bank could improve its estimate of the r^*_t and thus the effectiveness of its policy rule in meeting its domestic objectives .

In practice r^*_t is not observable and coordination in such signal extraction efforts could be very valuable.

Theoretical Gains to Monetary Policy Cooperation

When there are spillovers, Nash policy rules that feedback solely on domestic variables don't maximize world welfare

The CGG model is simple enough that the policy rule under binding cooperation can be solved in closed form and for the home country is given by

$$R_t = r^*_t + \left(1 + \frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right)E_t\pi_{t+1} + \frac{\sigma-1}{\sigma+1+2\varphi}\left(\frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right)E_t\pi^F_{t+1}$$

So the optimal cooperative policy is a Taylor type rule that is a function of a weighted average of home and foreign inflation

Importantly, under cooperation r^*_t shocks are still fully passed through to the policy rate

And the prior results on exchange rates and r^*_t shocks continues to hold

But Also Practical Problems with Monetary Policy Cooperation

$$R_t = r^*_t + \left(1 + \frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right)E_t\pi_{t+1} + \frac{\sigma-1}{\sigma+1+2\varphi}\left(\frac{\lambda(1-\rho)}{\alpha\rho}\frac{\sigma+1}{2}\right)E_t\pi^F{}_{t+1}$$

Threat to the credibility of the central bank , communication, and loss of public support
from this 'we are the world' reaction function

If home inflation is above target but foreign inflation is below target, the optimal policy rule under cooperation calls for the home (real) policy rate to be lower – more accommodative – than it would be in the absence of cooperation

In practice credibility appears to be a function of central bank communication and as well the policies actually implemented

In practice, central banks could have a hard time maintaining credibility as well as communicating a policy that reacts to foreign inflation especially if substantial divergence

Imagine the case with home inflation below target when foreign inflation is above target.

In this case, the optimal policy rule calls for the home (real) policy rate to be higher – less accommodative – than it would be in the absence of cooperation, not because home inflation is too high, but because foreign inflation is !

In Sum

We have reviewed some simple examples based on rigorous models which can

i) generate monetary policy correlation – via the global factor present in each country's equilibrium real interest rate – and what might appear to be – but are not – beggar thy neighbor exchange rate policies or currency wars…

ii) rationalize the benefits to monetary policy coordination ; but

iii) provide some intuition for why binding monetary policy cooperation may be rare in practice

In general r* shocks will require adjustments in policy rates as well as in equilibrium exchange rates, unless the shocks are common and equal

More elaborate models may introduce additional drivers of r^*_t - asset market frictions, household desire and institutional requirements to hold safe assets – but the framework here is rich enough to shed light on the importance of global general equilibrium considerations in accounting for and inferring shifts in country neutral policy rates.