DEPARTMENT OF ECONOMICS

DISCUSSION PAPER SERIES

Taylor rules, fear of floating and the role of the exchange rate in monetary policy: a case of observational equivalence

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WP 2012 - 07
Taylor rules, fear of floating and the role of the exchange rate in monetary policy: a case of observational equivalence

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Abstract

This paper considers the role of the exchange rate in monetary policy rules. It argues that much recent research aimed at determining the extent of concern for exchange rate stabilisation on the part of central banks is potentially flawed. If policy makers are subject to fear of floating – whereby they aim to stabilise exchange rates but without revealing this to the public – current estimated models may provide insufficient information to determine policy objectives. In effect, several structural models may yield observationally equivalent interest rate rules. The paper uses two small open economy models to highlight this issue.

Keywords: Small open economies; monetary policy; exchange rates; Taylor rule; Fear of floating

JEL Classification: E52; E58; F41
1 Introduction

Taylor-type rules (Taylor, 1993) – where interest rates react only to inflation and the output gap – feature prominently in the literature on monetary theory and policy. Such rules have often been used to describe and characterise actual policy, but they have also been analysed in terms of the macroeconomic consequences that they imply. Rather surprisingly, much of the literature on optimal policy rules has found that moving to a Taylor-type rule does not result in large deteriorations in welfare. In other words, Taylor rules are remarkably robust across models.1 Given their simplicity, they have gained wide appeal in policy circles.

However, much of the early literature focused on closed economies. Extending the analysis to a small open economy context introduces the exchange rate both as a source of disturbances and also as a policy channel. One would therefore expect to find that Taylor rules expanded to react to exchange rate movements would be superior to their closed economy counterparts. Whilst such a result has been found in some models such as Ball (1999) and Svensson (2000), the majority of the literature tends to find that welfare improvements from adding the exchange rate to a Taylor rule are minimal.2 In other words, the original Taylor rule requires little modification, even when considering a small open economy. The reason is that in many of these models the exchange rate provides little or no additional information that is useful for stabilising the economy.

In practice, do central banks react to exchange rates, and if so, why? These questions are generally addressed by estimating a small open economy model with an expanded interest rate rule to test whether including the exchange rate in the said rule provides a better fit.3 If the model without the exchange rate explains the data best, then this is taken to imply that central banks are not concerned about exchange rate movements. The opposite case is interpreted as a desire on the part of the policy maker to avoid exchange rate volatility; that is, the monetary authority’s loss function contains an exchange rate volatility term. Using this approach Lubik and Schorfheide

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1 See for example, Levin et al. (1999).
2 Representative of this view are Leitemo and Soderstrom (2005), Clarida et al. (2001) and Adolfson (2007).
3 Alternatively, one may simply estimate a Taylor-type rule rather than a full model but the main conclusions remain valid.
(2007) estimate a small open economy New Keynesian model using Bayesian methods and find that the central banks of Australia and New Zealand do not react to exchange rate movements, whereas those of Canada and the United Kingdom do.

The above analysis is an example of attempting to extract policy objectives – the central bank’s loss function – from observed behaviour. Whilst intuitive, this line of research is not as straightforward as the reverse, solving for the equilibrium behaviour of interest rates given a model and policy objectives, and is fraught with serious limitations. Lubik and Schorfheide (2007) argue that the Bank of Canada and the Bank of England targeted the exchange rate because it entered their interest rate rules. As Kam et al. (2009) point out, central banks may include the exchange rate in their policy rules not because such a variable is a policy target but because they aim to stabilise other variables, such as the output gap and inflation, and reacting to the exchange rate helps achieve that outcome. Kam et al. (2009) demonstrate this by analysing a small open economy model that includes the policy maker’s objectives and then estimate the optimal interest rate rule, finding that the best fit is provided by a model where policy makers are not concerned by exchange rate volatility itself but nevertheless include the exchange rate in their rule.

Therefore, the results from the recent literature on whether central banks are concerned about exchange rate volatility can be summarised into three groups. First, the absence of the exchange rate in the Taylor rule is interpreted as a lack of concern for exchange rate stability; second, central banks are concerned about exchange rate volatility and thus it is present in the Taylor rule. Third, central banks may react directly to exchange rates but not because they are concerned by its volatility per se but because it aids in stabilising other variables of interest, such as the inflation rate. Estimation of a full model may help distinguish between the last two.

The aim of this paper is to highlight the fact that a fourth category exists that is not only quantitatively possible but also plausible, with the implication that attempts to determine policy objectives – or central bank preferences – from observed behaviour may be a futile exercise. If central banks exhibit some degree of fear of floating their announced policy will be one of flexible

4This is the case for Australia and New Zealand; for Canada they find that a model where the central bank responds to the exchange rate is just as likely as one where it does not.
exchange rates but in practice they will act to offset exchange rate movements in an indirect manner. As a result, they will be reacting to exchange rates but this will not be directly observable to the econometrician and may be observationally equivalent to a policy maker that is not concerned about the exchange rate. Hence, this fourth category may be indistinguishable from the first one discussed above.

The concept of fear of floating (FF) was first put forward by Calvo and Reinhart (2002). Simply put, it is the premise that countries that purport to follow a policy of flexible exchange rates in fact do act to stabilise them. From a modelling perspective, fear of floating could be interpreted as a monetary policy where the true objectives include an exchange rate volatility term but where the policy rule depends on variables other than the exchange rate. In that case, the coefficients on the output gap and inflation in the Taylor rule could be chosen to stabilise not only these two variables but the exchange rate as well. However, for fear of floating to be present but unobservable to the econometrician the effects of FF on the Taylor rule should be small enough so as to make it observationally equivalent to a model where FF is absent.

This paper uses two models. The first model, taken from Leiteno and Soderstrom (2005), whilst based on the New Keynesian framework, is primarily empirically motivated as it is generally acknowledged among practitioners that monetary policy affects the economy with long lags, a feature that more theoretical models have difficulty in capturing. The second model is based on the theoretical contribution of Monacelli (2005) and uses the values estimated by Justiniano and Preston (2010) on Australian data.

As both models are explained in detail in the two papers cited above, their exposition below will be kept brief.

The main result of this paper is that in both of these models, if the policy maker exhibits fear of floating the Taylor rule coefficients will be virtually indistinguishable from that where the central bank is not concerned about exchange rate volatility. This supports the view that extracting policy preferences from the behaviour of policy instruments is a more subtle exercise than has hitherto been considered.
2 Two New Keynesian Small Open Economy Models

This section describes the two models considered in this paper. Both are variants of the New Keynesian framework and form part of the new open economy macroeconomics, with sticky prices being a common element in deriving the supply side.

In both cases the models are written in terms of log linearised equations so that the variables represent percentage deviations from their steady state values and monetary policy is modelled in the form of Taylor-type rules.

2.1 The Leitemo-Soderstrom (LS) model

The first model is based on Leitemo and Soderstrom (2005) and is recognisably New Keynesian, albeit with a high degree of inertia in both inflation and output. As in the standard New Keynesian model, in the presence of nominal rigidities monetary policy affects the real economy via the IS equation, where changes to nominal interest rates translate into changes in real rates. However, the open economy introduces the role of the exchange rate as an additional policy channel. This is both through the price of imported goods in domestic currency, a component in the consumer price index, as well as through the prices of domestic goods in foreign currency and the behaviour of importing firms.

Domestic inflation, $\pi^d$, is determined by an open economy New Keynesian (NK) hybrid Phillips curve, so that it is not fully forward looking but also exhibits some intrinsic persistence. Inflation depends positively on both the output gap $y$ and the real exchange rate $q^*$. The latter, as in McCallum and Nelson (2000), can be motivated under the assumption that domestic firms use imported intermediate inputs in their production. The fact that inflation depends on previously expected variables can be rationalised – as in Rotemberg and Woodford (1997) – on the grounds that firms make decisions, here in terms of pricing, one period in advance. Consequently, the

\[^5\text{Asterisks are used to denote foreign variables.}\]
domestic NK Phillips curve can be written as

\[ \pi^d_t = \psi \pi^d_{t-1} + \gamma_y E_{t-1} y_t + \gamma_q E_{t-1} q_t + \epsilon^\pi_t \]  

(1)

\( \epsilon^\pi \) is a white noise process with variance \( \sigma^2_{\pi} \) that can be interpreted as a shock to firms’ markup over marginal cost.

The output gap is driven by an open economy Euler equation for consumption so that it is partly dependent on the expected future output gap and the real interest rate, where \( i \) denotes the annualised interest rate on domestic one period bonds. The real exchange rate captures two effects: that on the real interest rate which affects consumers, as well as the consumption price of domestic goods. The preference shock \( \epsilon^y \) is assumed to be a white noise process with variance \( \sigma^2_{y^t} \), so that the output gap is given by

\[ y_t = \beta_y \left[ \psi y_{t-1} y_{t+1} + (1 - \psi_y) y_{t-1} \right] - \beta_r \left( i_t - 4 E_{t-1} \pi^d_t \right) + \beta_q q_{t-1} + \beta_{y^*} y^*_t + \epsilon^y_t \]  

(2)

The nominal exchange rate \( s \) is determined by an uncovered interest parity condition of the form

\[ s_t = E_t s_{t+1} + \frac{1}{4} \left[ i^*_t - i_t \right] + u^s_t \]  

(3)

where \( u^s \) represents a risk premium shock, assumed to follow

\[ u^s_t = \rho_s u^s_{t-1} + \epsilon^s_t \quad \epsilon^s \sim i.i.d.N(0, \sigma^2_s) \]  

(4)

Similarly, real exchange rates \( q \) are given by
\[ q_t = s_t + p_t^* - p_t^d \]  

(5)

where \( p_t^d = \pi_{t-1}^d + p_{t-1}^d \).

Import prices, \( p^f \), respond instantaneously to exchange rate movements, so that imported goods inflation \((\pi_t^f = p_t^f - p_{t-1}^f)\) is determined by

\[ \pi_t^f = \pi_t^* + \Delta s_t \]  

(6)

Therefore, CPI inflation is defined as

\[ \pi_t = (1 - \alpha) \pi_t^d + \alpha \pi_t^f \]  

(7)

where \( 0 \leq \alpha \leq 1 \) denotes the weight of imported goods in aggregate consumption and consumer price inflation is denoted by \( \pi_t \equiv p_t - p_{t-1} \), with \( p \) being the logarithm of the consumer price level.

Given the assumption of a small open economy the foreign block is assumed to be independent of the domestic economy. Foreign inflation and output are determined autoregressive processes and interest rates are described by a Taylor rule, responding to annual inflation

\[ y_t^* = \rho_y y_{t-1}^* + \epsilon_t^y \]  

(8)

\[ \pi_t^* = \rho_\pi \pi_{t-1}^* + \epsilon_t^\pi \]  

(9)

\[ i_t^* = g_{\pi} \pi_t^* + g_y y_t^* \]  

(10)
where $\pi^*_t = \sum_{\tau=0}^{3} \pi^*_{t-\tau}$ (and likewise for $\pi$).

Lastly, the central bank is assumed to follow a simple Taylor-type rule of the form

$$i_t = f_\pi \pi_t + f_y y_t$$

(11)

where $f_\pi$ and $f_y$ ($0 \leq f_\pi$, $0 \leq f_y$) are chosen to minimise the policy maker’s loss function, to be described below.

### 2.2 The Justiniano-Preston (JP) model

The model used by Justiniano and Preston (2010) is an extension of Monacelli (2005). Households consume both foreign and domestic goods, and nominal rigidities are introduced by assuming that Calvo pricing applies to both the domestic and the import sector. The latter, combined with the fact that importers price to market, results in incomplete exchange rate pass-through. Justiniano and Preston (2010) extend this model by allowing for partial indexation of prices to past inflation as well as habits in consumer preferences. These two modifications result in greater inertia in the model’s endogenous variables.

The consumption Euler equation in the presence of habits is given by

$$c_t - hc_{t-1} = E_t c_{t+1} - h c_t - \frac{1-h}{\sigma} \left[ i_t - E_t \pi_{t+1} - u^\theta_t + E_t u^\theta_{t+1} \right]$$

(12)

where $c$ is aggregate consumption – so that it contains both domestically produced and imported goods – and $i$ is the interest rate on domestic nominal one-period bonds. As mentioned above, past consumption affects current consumption due to the presence of habits, here measured by $h$, whilst

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6The presentation here will be kept brief; the reader should consult Justiniano and Preston (2010) for a detailed exposition.
\( \sigma \) is the inverse elasticity of intertemporal substitution. The Euler equation includes a shock term \( u^g \) that is caused by, say, preferences. These are assumed to follow an autoregressive process

\[
 u^g_t = \rho u^g_{t-1} + \epsilon^g_t \tag{13}
\]

The real exchange rate is given by

\[
 q_t = s_t + p^*_t - p_t \tag{14}
\]

As households can save in nominal one-period bonds denoted in either domestic or foreign currency, the real interest parity condition is given by

\[
 [i_t - E_t \pi_{t+1}] - [i_t^* - E_t \pi^*_{t+1}] = E_t \Delta q_{t+1} - \chi a_t - u^q_t \tag{15}
\]

where \( a \) is the domestic economy’s net foreign asset position and \( u^q \) is a risk premium shock, also assumed to be an autoregressive process. The parameter \( \chi \) represents the elasticity of the foreign exchange risk premium to the net foreign asset position.

\[
 u^q_t = \rho u^q_{t-1} + \epsilon^q_t \tag{16}
\]

The net foreign asset position depends on the gap between income and consumption as well as the real exchange rate, where \( \beta \) is the household’s discount factor and \( \alpha \) represents the proportion of imported goods in the consumption basket

\[
 a_t = \frac{1}{\beta} a_{t-1} + y_t - c_t - \alpha \left[ s_t + p^*_t - p^f_t \right] \tag{17}
\]
Monopolistic competition and Calvo pricing with indexation in the domestic goods sector lead to the following New Keynesian Phillips curve for $\pi^d$

$$
\pi^d_t = \frac{\beta}{1 + \beta \delta_d} E_t \pi^d_{t+1} + \frac{\delta_d}{1 + \beta \delta_d} \pi^d_{t-1} + \frac{(1 - \theta_d) (1 - \beta \theta_d)}{\theta_d (1 + \beta \delta_d)} \mu_t + \epsilon^\pi_t
$$

(18)

where $(1 - \theta_d)$ is the proportion of firms that are able to reset their prices optimally each period. Those firms unable to re-optimize partially index their prices to the previous period’s inflation rate with indexation parameter $\delta_d$, therefore generating intrinsic inflation persistence. The variable $\mu_t$ represents real marginal cost whilst $\epsilon^\pi_t$ is an i.i.d. shock to firms’ markup over marginal cost with variance $\sigma_{\pi_d}$. The latter was not considered in the original Justiniano and Preston (2010) model but as it has important implications for the conduct of monetary policy in a closed economy it is worth including, as in Dennis et al. (2007). Real marginal costs in the domestic sector can be written as

$$
\mu_t = \phi y_t - (1 + \phi) u_t^a + \alpha s_t + \sigma \frac{1}{1 - h} [c_t - hc_{t-1}]
$$

(19)

where $\phi$ is the inverse elasticity of labour supply and $u_t^a$ is an autoregressive technology shocks that follows

$$
u_t^a = \rho_a u_{t-1}^a + \epsilon_t^a
$$

(20)

The imported goods sector is also characterised by monopolistic competition and Calvo pricing with parameter $\theta_f$. The indexation parameter in this sector is given by $\delta_f$, so that inflation in this sector, $\pi^f$, follows

$$
\pi^f_t = \frac{\beta}{1 + \beta \delta_f} E_t \pi^f_{t+1} + \frac{\delta_f}{1 + \beta \delta_f} \pi^f_{t-1} + \frac{(1 - \theta_f) (1 - \beta \theta_f)}{\theta_f (1 + \beta \delta_f)} \psi_t + \epsilon_t^\pi
$$

(21)
As in the domestic goods sector, \((1 - \theta_f)\) represents the proportion of importing goods firms that are able to reset their prices optimally each period, \(\delta_f\) denotes the extent of indexation to past inflation and \(\psi_t\) denotes the deviation in the law of one price

\[
\psi_t = s_t + p^*_t - p^f_t
\]  

(22)

In equation (21) above, \(u^\pi_f\) is a shock to the markup of import prices over marginal cost, again assumed to follow an autoregressive process

\[
u^\pi_f = \rho^\pi u^\pi_{f,-1} + \epsilon^\pi_f
\]  

(23)

CPI inflation is defined as a weighted average of domestic and imported goods inflation

\[
\pi_t = (1 - \alpha)\pi^d_t + \alpha\pi^f_t
\]  

(24)

Market clearing implies that domestic output follows

\[
y_t = (1 - \alpha)c_t + \alpha\eta(2 - \alpha)s_t + \alpha\eta\psi_t + \alpha y^*_t
\]  

(25)

with \(\eta\) representing the elasticity of substitution between domestic and imported goods.

Given our small open economy model, the foreign block is assumed to follow an exogenous vector autoregressive model

\[
\begin{bmatrix}
\pi^*_t \\
y^*_t \\
i^*_t
\end{bmatrix} = \sum_{j=1}^{2} B_j
\begin{bmatrix}
\pi^*_t-j \\
y^*_t-j \\
i^*_t-j
\end{bmatrix} +
\begin{bmatrix}
\epsilon^*_t \\
\epsilon^*_y \\
\epsilon^*_i
\end{bmatrix}
\]
The variables $\epsilon^{\pi^*}_t$, $\epsilon^r_t$ and $\epsilon^y_t$ are i.i.d shocks with zero means and variances given by $\sigma^2_{\pi^*}$, $\sigma^2_y$ and $\sigma^2_r$, respectively.

Lastly, the model is closed by assuming that the central bank follows a Taylor-type rule of the form

$$i_t = f_\pi \pi_t + f_y y_t$$  \hspace{1cm} (27)

Where the two coefficients $(0 \leq f_\pi, 0 \leq f_y)$ are chosen optimally, an issue to which we turn next.

3 Policy objectives and optimal monetary policy

Both models above are analysed in terms of optimal monetary policy. In particular, it is assumed that the policy maker’s loss function is given by

$$E_0 = \sum_{t=0}^{\infty} \beta^t \left[ \pi_t^2 + \lambda y_t^2 + \nu \Delta i_t^2 + \nu_s \Delta s_t^2 \right]$$  \hspace{1cm} (28)

So that the parameters $\lambda$ and $\nu$ represent the concern with output stabilisation and interest rate stabilisation, respectively. In the presence of fear of floating the policy maker follows one of the Taylor-type rules above that excludes a direct response to the exchange rate, whilst at the same time it implies that $\nu_s > 0$ in the loss function.\footnote{It is worth noting that in both of the models considered above the optimal interest rate response to the exchange}
Table 1: Structural parameters in the LS model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Parameter</th>
<th>Value</th>
<th>Parameter</th>
<th>Value</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_y$</td>
<td>0.9</td>
<td>$\psi_\pi$</td>
<td>0.5</td>
<td>$\rho_y^*$</td>
<td>0.8</td>
<td>$\sigma^2_y$</td>
<td>0.844</td>
</tr>
<tr>
<td>$\psi_y$</td>
<td>0.3</td>
<td>$\gamma_y$</td>
<td>0.05</td>
<td>$\rho_{\pi^*}$</td>
<td>0.8</td>
<td>$\rho_q$</td>
<td>0.3</td>
</tr>
<tr>
<td>$\beta_r$</td>
<td>0.15</td>
<td>$\gamma_q$</td>
<td>0.01</td>
<td>$g_{y^*}$</td>
<td>0.5</td>
<td>$\lambda$</td>
<td>0.5</td>
</tr>
<tr>
<td>$\beta_q$</td>
<td>0.05</td>
<td>$\alpha$</td>
<td>0.35</td>
<td>$g_{\pi^*}$</td>
<td>1.5</td>
<td>$\nu$</td>
<td>0.1</td>
</tr>
<tr>
<td>$\beta_{y^*}$</td>
<td>0.12</td>
<td>$\sigma^2_\pi$</td>
<td>0.389</td>
<td>$\sigma^2_{y^*}$</td>
<td>0.083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\sigma^2_y$</td>
<td>0.656</td>
<td>$\sigma^2_{\pi^*}$</td>
<td>0.022</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Equation (28) above is clearly ad hoc. The aim of this paper is to highlight the fact that recovering the macroeconomic policy objectives of open economy central banks is fraught with difficulties and the loss function above helps to clarify this point. The paper does not make a normative contribution and most importantly, loss functions of this type have been used in the literature to identify the extent that central banks react directly to exchange rates, over and above their reaction to CPI inflation.

4 Parameter values

The calibrated values used by Leitemo and Soderstrom (2005) are shown in Table 1 and are chosen to match the dynamic properties of a small open economy.

The value of $\phi$ implies a considerable degree of output persistence, whilst inflation is more forward looking, with $\phi_{\pi}$ being set to 0.5. The weight on imported goods in the consumption basket is set at 0.35, consistent with the weights found in Norway and Sweden. The foreign block exhibits a large amount of persistence in both output and inflation, while the foreign interest rule is described by a simple Taylor rule.

rate when $\nu_s \neq 0$ is non-zero. However, as the main objective of this paper is to highlight the fact that non-reaction to exchange rates does not imply lack of concern towards $s$ the models with the enhanced interest rate rules are not reported. These are available from the author on request.
Table 2: Structural parameters in the JP model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$</td>
<td>0.185</td>
</tr>
<tr>
<td>$\theta_d$</td>
<td>0.7935</td>
</tr>
<tr>
<td>$\rho_{\pi f}$</td>
<td>0.9352</td>
</tr>
<tr>
<td>$\sigma^2_s$</td>
<td>0.844</td>
</tr>
<tr>
<td>$h$</td>
<td>0.33</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.99</td>
</tr>
<tr>
<td>$\theta_f$</td>
<td>0.5511</td>
</tr>
<tr>
<td>$\rho_q$</td>
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<tr>
<td>$\rho_g$</td>
<td>0.9257</td>
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<tr>
<td>$\sigma_g$</td>
<td>0.1610</td>
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<tr>
<td>$\chi$</td>
<td>0.01</td>
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<td>0.0499</td>
</tr>
<tr>
<td>$\phi$</td>
<td>1.1157</td>
</tr>
<tr>
<td>$\eta$</td>
<td>0.5824</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>1.309</td>
</tr>
<tr>
<td>$\rho_a$</td>
<td>0.6936</td>
</tr>
<tr>
<td>$\sigma_a$</td>
<td>0.3665</td>
</tr>
<tr>
<td>$\delta_f$</td>
<td>0.0693</td>
</tr>
<tr>
<td>$\sigma_q$</td>
<td>0.3470</td>
</tr>
<tr>
<td>$\sigma_{\pi a}$</td>
<td>0.083</td>
</tr>
</tbody>
</table>

The second model is parameterised using the values estimated by Justiniano and Preston (2010) for the Australian economy. The habits parameter $h$ as well as the degrees of indexation in both the domestic and imported goods sectors – $\delta_d$ and $\delta_f$, respectively – suggest that the extent of intrinsic persistence in inflation and output in this model is moderate.

Lastly, the parameters that capture the policy maker’s preferences, $\lambda$ and $\nu$, are set exogenously in both models.

5 Results

Table 3 shows the optimal coefficient on inflation and output in the simple Taylor rule under fear of floating for the LS model. The striking result is that changes to the weight on nominal exchange rate stabilisation in the loss function – $\nu_s$ – do not result in drastically different coefficients. The relative parameter constancy remains even as $\nu_s$ range from zero – no concern for exchange rate stabilisation – to unity, where it is just as important as inflation stabilisation. This is driven partly because CPI inflation and output gap stabilisation also results, to an extent, in exchange rate stabilisation. In the case of the former this is more intuitive as it involves an implicit reaction to the exchange rate. As $\nu_s$ increases, the optimal coefficients on both inflation and output decrease. This can be attributed to the uncovered interest parity condition: a strongly responsive Taylor rule will generate greater interest rate volatility, thereby affecting the exchange rate.

Dennis et al. (2007) use the same model and they also provide a value for $\sigma_{\pi a}$ and for the foreign block. Justiniano and Preston (2010) calibrated the parameters $\alpha$, $\beta$ and $\chi$. 
However, the crucial fact remains that even when policy makers are concerned about stabilising the nominal exchange rate as an end in itself, it would not be apparent from the coefficients in the Taylor rule. These results are nevertheless obtained from a specific model calibrated for a Nordic economy. Consequently, it remains to be seen how robust such a conclusion would be in other small open economy models.

The results of the same exercise applied to the Justiniano-Preston model are shown in Table 4. Once again, the optimal coefficients show little variation as the weight on exchange stabilisation changes. Greater concern for exchange rate stabilisation is reflected in a lower optimal value of $f_\pi$, as in the earlier model, whilst that on $f_y$ increases slightly. The same rationale as in the LS model can be applied here with regard to the response to inflation. The different response to the output gap may be attributable to the market clearing condition \( \text{(25)} \) and the net foreign asset position equation \( \text{(17)} \). There is a positive relationship between output and the nominal exchange rate. Consequently, greater stabilisation of the former will result in decreased exchange rate volatility.

Table 3: Optimal Taylor rule coefficients in the LS model with varying degrees of fear of floating
Table 4: Optimal Taylor rule coefficients in the JP model with varying degrees of fear of floating

<table>
<thead>
<tr>
<th>ν_s</th>
<th>f_π</th>
<th>f_y</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.07</td>
<td>0.04</td>
<td>5.6492</td>
</tr>
<tr>
<td>0.1</td>
<td>2.04</td>
<td>0.06</td>
<td>7.3081</td>
</tr>
<tr>
<td>0.2</td>
<td>2.01</td>
<td>0.08</td>
<td>8.9579</td>
</tr>
<tr>
<td>0.3</td>
<td>2.00</td>
<td>0.10</td>
<td>10.5999</td>
</tr>
<tr>
<td>0.4</td>
<td>1.98</td>
<td>0.11</td>
<td>12.2347</td>
</tr>
<tr>
<td>0.5</td>
<td>1.96</td>
<td>0.12</td>
<td>13.8635</td>
</tr>
<tr>
<td>0.6</td>
<td>1.95</td>
<td>0.14</td>
<td>15.4866</td>
</tr>
<tr>
<td>0.7</td>
<td>1.94</td>
<td>0.15</td>
<td>17.1046</td>
</tr>
<tr>
<td>0.8</td>
<td>1.92</td>
<td>0.16</td>
<td>18.7179</td>
</tr>
<tr>
<td>0.9</td>
<td>1.91</td>
<td>0.17</td>
<td>20.3268</td>
</tr>
<tr>
<td>1</td>
<td>1.90</td>
<td>0.18</td>
<td>21.9318</td>
</tr>
</tbody>
</table>

More importantly, the optimal Taylor rule coefficients in the JP model for the range of ν_s considered above are both within the 95% confidence intervals estimated by Justiniano and Preston (2010), so that concern for exchange rate stability can easily be disguised under fear of floating to a case of simple inflation targeting.

In both models the desire to reduce exchange rate volatility results in a lower optimal response of interest rates to inflation. This is driven by the need to lower the volatility of the nominal interest rate, which is linked to that of Δs via the uncovered interest parity condition. A similar rationale applies to the Taylor rule coefficient in the LS model. In the case of the JP model as ν_s increases so does the optimal f_y. The reason for the difference may be attributed to the fact that the domestic goods Phillips curve in the JP model, equation (18), is primarily forward looking and the policy maker may compensate for the lower f_π by increasing the response of interest rates to the output gap. This would enable the policymaker to have some effect on expectations of future inflation.
5.1 Robustness

The results above may lead one to believe that lack of sensitivity of the optimal coefficients in the Taylor rule as $\nu_s$ varies is a feature of New Keynesian small open economies. However, this is not the case; rather, it is the combination of the different shocks that causes optimal policy to remain largely invariant. As shown in Table 4, the Taylor rule coefficients do vary with $\nu_s$, and the changes are more pronounced than in the LS model. However, the magnitude of the changes is such that the coefficients – when seen in isolation – could be easily attributed to a pure inflation targeting framework with no concern for the exchange rate. Under a different parameterisation it is plausible that the Taylor rule coefficients would change to such an extent that the econometrician could determine that something was 'missing' from the model – in our case, concern for the exchange rate – and hence policy makers would be unable to disguise their fear of floating.

An example where the Taylor rule coefficients do exhibit greater change is provided by Table 5, which shows the optimal coefficients in the absence of shocks to the markup of import prices over marginal cost, $u_{\pi f t}$. In this case the coefficients vary far more than in the more general model although they remain within a plausible range.

6 Conclusion

This paper has considered whether one can truly extract the objectives of a central bank – its loss function – from its observed behaviour in terms of interest rate rules, focusing on the extent the monetary authority is concerned about exchange rate volatility.

It has been argued (Calvo and Reinhart, 2002) that fear of floating is pervasive so that policy announcements of flexible exchange rates do not necessarily mean that central bankers disregard exchange rate movement; indeed, in practice it may imply the opposite. For the two models considered in this paper the main result is that when central bankers are concerned about exchange rate stabilisation but wish to act as if they were not, the effects on simple interest rate rules is too
Table 5: Optimal Taylor rule coefficients in the JP model with $\sigma_{\pi,\pi} = 0$.

<table>
<thead>
<tr>
<th>$\nu_s$</th>
<th>$f_\pi$</th>
<th>$f_y$</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.81</td>
<td>0.85</td>
<td>4.0139</td>
</tr>
<tr>
<td>0.1</td>
<td>1.83</td>
<td>0.88</td>
<td>4.7785</td>
</tr>
<tr>
<td>0.2</td>
<td>1.86</td>
<td>0.93</td>
<td>5.5418</td>
</tr>
<tr>
<td>0.3</td>
<td>1.88</td>
<td>0.97</td>
<td>6.03039</td>
</tr>
<tr>
<td>0.4</td>
<td>1.90</td>
<td>1.02</td>
<td>7.0648</td>
</tr>
<tr>
<td>0.5</td>
<td>1.93</td>
<td>1.07</td>
<td>7.8243</td>
</tr>
<tr>
<td>0.6</td>
<td>1.96</td>
<td>1.13</td>
<td>8.5826</td>
</tr>
<tr>
<td>0.7</td>
<td>1.99</td>
<td>1.20</td>
<td>9.34</td>
</tr>
<tr>
<td>0.8</td>
<td>2.02</td>
<td>1.26</td>
<td>10.095</td>
</tr>
<tr>
<td>0.9</td>
<td>2.05</td>
<td>1.33</td>
<td>10.8495</td>
</tr>
<tr>
<td>1</td>
<td>2.10</td>
<td>1.43</td>
<td>11.6024</td>
</tr>
</tbody>
</table>

small to be distinguishable from the case where the policy maker has no concern for exchange rate stability. Fear of floating can disguised as simple inflation targeting.

Reacting to inflation and the output gap yields reasonably good outcomes in terms of exchange rate volatility and this may lie behind the relative stability in the interest rate coefficients. Moreover, in the paper I have used two small open economy models that can be regarded as fairly conventional within the New Keynesian framework to ensure that the conclusions are not specific to either a the use of a single or a very specific model.

Notwithstanding the above, if fear of floating truly is a feature of many small open economies, then it can rationalise the indirect manner in which some central banks may wish to react to exchange rates without this being obvious to the public. Moreover, there is one other scenario where the results of this paper may be applicable. In a referendum held in 2003 the Swedish public voted against joining the euro despite all the major parties being in favour. Currently, the political desire to join the euro remains, including in the governing coalition. At the same time, the Swedish central bank is an inflation targeter. If the preferences of the central bankers are similar to those of the
politicians then they may be concerned about exchange rate volatility despite it not being part of their remit. This paper has therefore shown that simply showing that central bankers only directly respond to inflation and output will not necessarily reveal whether they are also secretly reacting—indirectly—to the exchange rate. Just as when central banks react to exchange rate movements does not automatically imply concern for exchange rate volatility, similarly this paper has shown that its exclusion from the policy rule should not be interpreted as absent from the policy maker’s loss function without further investigation.

References


