Economic Integration and the Foreign Exchange

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Abstract

This paper demonstrates effects of economic convergence processes on the foreign exchange behaviour in a monetary modelling approach. Since the exchange rate represents the relative price of two currencies, commonness of stochastic trends between the fundamental determinants of supply and demand of the underlying monies restricts exchange rate movements to transitory fluctuations. In the spirit of optimal currency areas, this has the potential to serve as a criterion for an all-round integration of two economies. Empirically, such a constellation is found between Australia and New Zealand, whereas diverging trends in money and interest rates characterise the relation of Australia towards the US.

Keywords: Monetary Exchange Rate Model, Convergence, Stationarity, Australia
JEL classification: F31, F41, C32

1 Introduction

The notion of a "fundamental" value of exchange rates has become standard in economic science, media and politics. However, this large circulation is hardly based on extensive success of the underlying theory in applications to real-world issues; far more, the discussion on long-run equilibrium rates is regularly initiated by considerations on the prevalence of allegedly "irrational" exchange rate fluctuations, that is major deviations from equilibrium. The present paper demonstrates that despite this problematic situation, there exists a straightforward link between processes of international economic integration and the fundamental exchange rate behaviour.

The relevant theoretical basis is provided by monetary exchange rate models (Dornbusch (1976), Frankel (1979), and others), which connect the foreign exchange to influences of fundamental variables like income, money supply, interest rate and inflation. In time series econometrics, assessing the implied relationship has attracted a considerable quantity of empirical research; a comparison of modelling approaches is given in Cheung et al. (2005), while Meese and Rogoff (1983) represents a well-known critique. Methodologically, the standard approach has become testing for cointegration between the exchange rate and the fundamental variables of the involved countries, as demonstrated in MacDonald and Taylor (1991).

Moersch and Nautz (2001) however pointed out, that such "reduced-form" estimations lack clear economic interpretability and do not account for the presence of multiple cointegrating vectors in any meaningful way. While these authors stressed the importance of money demand functions and purchasing power parity (PPP) as building blocks of their empirical model, the underlying paper adopts an explicit cross-country perspective: In detail, I concentrate on the consequences of the state of international economic integration for the exchange rate of the involved countries. As such, the exchange rate is basically seen as the relative price of two currencies, which is determined by the interplay of according money demand and supply. Logically, bivariate cointegration between the corresponding determinants of those market forces rules out persistent shocks to the price and so can even lead to stationarity of the exchange rate. Such a situation should typically occur in case of extensive convergence between two countries, mainly regarding real, nominal and policy developments.

This conceptual approach, as described in more detail in the following section, merits featuring at least two points: On the one hand, it explicitly connects various theories of economic integration to the functioning of the foreign exchange. For example, this

involves an interesting view on prerequisites and desirability of common currency areas. On the other hand, useful guidelines for the empirical treatment of time series properties in the monetary exchange rate model are provided. For illustrational purposes, in section 3, I first demonstrate the effects of strong economic integration taking the relationship of Australia and New Zealand as an apparently suitable example. Afterwards, the exchange rate of the Australian dollar towards the world's leading currency, the US dollar, is considered as benchmark case. The last section summarises the main points of the investigation.

2   Economic Integration in a Monetary Model

An exchange rate describes the price of one currency in terms of another. Conventional monetary theory (e.g. Frankel 1979) consequently models this exchange relation as the outcome of the interaction between demand and supply of the involved monies. In a first step, the according domestic and foreign market equilibria can be specified as

$$m_t - p_t = \phi y_t - \lambda i_t - \gamma E_t(\pi_{t+1}) \,, \tag{1}$$

$$m_t^* - p_t^* = \phi y_t^* - \lambda i_t^* - \gamma E_t(\pi_{t+1}^*) \,. \tag{2}$$

Therein, m_t denotes log nominal per capita money, p_t the log price level, y_t log real per capita income, i_t a single-period interest rate, $\pi_t = \Delta p_t$ the according inflation rate and E_t the conditional expectations operator. All coefficients are defined positive, since income naturally raises money demand, whereas the interest and inflation[2] rates, representing opportunity costs of holding money, have an adverse effect. While long-run price homogeneity is assumed in the term $m_t - p_t$, deviations are allowed in the short-run by γ differing from zero. Regarding the income elasticity, one might expect a one-to-one relationship with money demand, hence $\phi = 1$. In the present context, taking per capita values is not typical, but proves useful for adopting the income convergence concept explained below; at the same time, the numerical effect should cancel out between the two concerned aggregates money and income. The simplifying assumption of equal coefficients in (1) and (2) is standard in the exchange rate literature but not necessarily unproblematic. I will reassess this task when presenting the empirical applications.

Through the price levels, the equilibria of national money demand and supply are connected to the formation of the exchange rate s_t (defined as log domestic currency units

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[2]For further interpretation on the role of inflation, see Goldfeld and Sichel (1987).

per foreign currency). A general type of sticky exchange rate adjustment mechanism can be written as

$$E_t(\Delta s_{t+1}) = -\theta(s_t - \overline{s}_t) + \delta E_t(\pi_{t+1} - \pi^*_{t+1}) \, , \tag{3}$$

where the equilibrium rate $\overline{s}_t = p_t - p^*_t$ following PPP. The expectations in (3) are formed assuming that per period, the exchange rate reacts to PPP disequilibria with the adjustment speed θ, which is usually found to take positive values close to zero. The second term allows a possible influence of the expected inflation differential on the exchange rate expectation and thus generalises the model formalisation. δ is not set to unity, because such a restriction would not be compatible with observed substantial deviations from PPP equilibrium.

As the last model equation, the uncovered interest rate parity (UIP) provides a link between exchange rate expectations and the interest differential:

$$E_t(\Delta s_{t+1}) = i_t - i^*_t \, . \tag{4}$$

The zero arbitrage condition requires differences between nominal asset yields to be offset by expectations on revaluation of the currencies underlying the respective investments. The role of potential risk premia is not directly addressed in this paper.

Combining (1), (2), (3) and (4) leads to the following expression for the log exchange rate, which represents the reduced form of the structural model equations:

$$s_t = (m_t - m^*_t) - \phi(y_t - y^*_t) + (\lambda - \frac{1}{\theta})(i_t - i^*_t) + (\gamma + \frac{\delta}{\theta})E_t(\pi_{t+1} - \pi^*_{t+1}) \, . \tag{5}$$

Following straightforward intuition, the right hand side comprises the relations of the variables governing the national monetary sectors: At first, excess supply of the domestic currency logically raises (depreciates) the exchange rate. In contrast, high domestic income drives up money demand, leading to appreciation. With θ normally taking very small values, the interest differential enters with a negative sign: High domestic yields attract capital inflows, which appreciate the exchange rate. Only for θ growing large, the hypothetical case of continuous PPP and flexible prices, the adverse effect λ on money demand would overweigh. Finally, domestic inflation expectations weaken the currency in line with common sense theory.

From an econometric point of view, equation (5) raises the question of integration and cointegration of the variables. If as usually, exchange rates are treated as non-stationary, the level connection from the monetary model implies a cointegrating relation with the fundamentals on the right hand side, which is well-known in the exchange rate literature.

However, taking into regard that all these variables appear as spreads between countries opens a different perspective: In case of sufficient cross-border similarity in real, nominal and policy processes, identical stochastic trends would cancel out in the different pairs of fundamentals and logically could not cause exchange rate non-stationarity. The next paragraph sketches the relevant theoretical approaches substantiating possible cointegration between the different variables of interest.

At first, real convergence in the sense of Bernard and Durlauf (1995) implies a stationary income differential: Since the presence of long-run comovement rules out persistent shocks to the output gap, per capita GDPs are in pairs cointegrated with the vector $(1, -1)$. Furthermore, from the UIP (4) it can be seen that a stationary expectations term requires similarly a stationary interest rate spread for balancing the equation. Likewise, validity of relative PPP, here given by $\Delta s_t = \pi_t - \pi_t^*$, leads to a stationary inflation differential: Given the change on the left hand side is I(0), the I(1) inflation rates must be cointegrated with the vector $(1, -1)$. Solely for the money supply term $m_t - m_t^*$, it is true that establishing a theoretical approach justifying stationarity is not equally clear-cut. Nonetheless, a stationary money spread could easily be imagined if central banks follow comparable monetary policies over time.

In the extreme case fulfilling all the above listed prerequisites, the final equation (5) of the monetary model necessarily predicts a stationary exchange rate. Essentially, if all determinants of demand and supply in the domestic market for money cointegrate with their foreign counterparts, fluctuations in the relative price of the monies are strictly due to transitory deviations from the underlying fundamental equilibria. Obviously, this criterion states a certain "all-round" economic integration encompassing money, output, interest rate and inflation. In contrast, if one or more spreads are non-stationary, the stochastic trends representing permanent deviations from those "inexistent equilibria" should be directly picked up by the exchange rate through relation (5). Since this describes the case of cointegration, a stationary error correction term should exist between those variables, which affects the exchange rate development in addition to the stationary fundamentals spreads already representing distinct cointegrating relations. In the second extreme case, total lack of economic integration would only leave one relevant fundamental equilibrium, namely between the whole set of variables from (5).

The above argumentation is based on validity of the monetary exchange rate model. In this, the factors contributing to exchange rate movements are evidently restricted to the ones from the underlying fundamental theory. The following applications will show that this view is not inappropriate for tackling the main point of this paper, namely the

connection of exchange rate behaviour to economic convergence. Nevertheless, depending on the concrete empirical example, further variables such as government spending or oil prices can clearly be thought of exerting influence on model and time series properties of the exchange rate.

3 Empirical Evidence

3.1 Australia - New Zealand

This study exhibits the consequences of economic convergence between countries for the behaviour of their exchange rate. Therefore, before addressing the popular US dollar example, I first present a case of presumably far-reaching economic integration: Australia and New Zealand. Since 1983, the "Closer Economic Relations" agreement supports an over average growth of bilateral trade, direct investment and migration, amongst others. Today, Australia represents New Zealand's most important partner through all economic domains.

The Australian dollar was officially floated in December 1983, the New Zealand dollar in March 1985. Therefore, the sample comprises the period from 1985 to 2006. The following quarterly data was taken from OECD sources: The exchange rate is defined as quarterly end-of-period AUD/NZD, obtained through the no triangular arbitrage condition towards the US dollar. For the one-period interest rate, annualised yields of 90-day bank bills are employed. The inflation rate is calculated as the first difference of the X-12 seasonally adjusted log GDP deflator, multiplied by 400 in order to attain annualised percentage points. Thereby, the one-period ahead expectations are approximated by real *ex-post* values, as it is common under the assumption of rationality. Income is represented by GDP and money by broad money supply M3, both transformed to real 2000 purchasing power US dollar[3], using the respective GDP deflators and PPP conversion factors from the International Comparison Program of the World Bank. Furthermore, GDP and M3 are seasonally adjusted and calculated per capita, dividing by (linearly interpolated) total population. All time series are presented in Figure 1.

Without going into detail, a close comovement becomes apparent for all pairs of economic aggregates. The exchange rate surely reveals a strong autocorrelation structure, but

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[3]Without applying such a common measuring unit, for instance cointegrating vectors of $(1, -1)$ would not be meaningful.
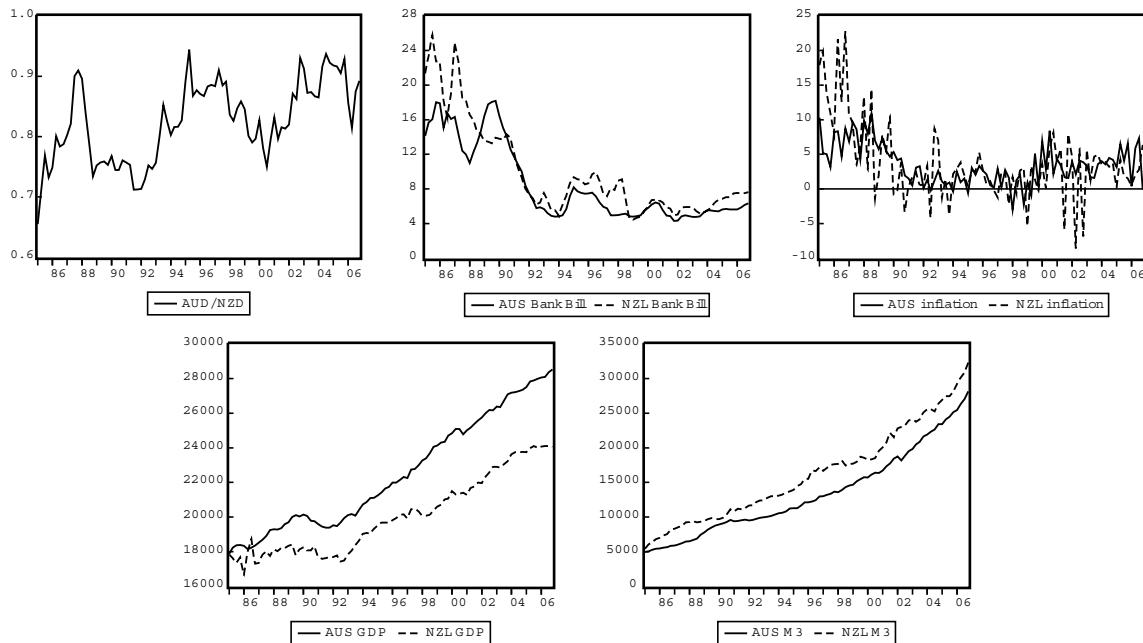
Figure 1: Data for Australia and New Zealand

nonetheless, a tendency of mean reverting can be deduced from the graph. This impression shall be checked by formal unit root tests, since analysing the long-run properties of the monetary exchange rate model requires establishing the degree of integration of the involved variables in a first step. For the empirical procedure, exchange rate, GDP and money are logged and multiplied by 100. Table 1 displays the ADF test results for the null hypothesis of non-stationarity, defining Australia as the domestic and New Zealand as the foreign country. The lag lengths are chosen by the usual information criteria, and a linear trend is included for the visibly ascendant series.

	s	m	m^*	y	y^*	i	i^*	π	π^*
t-value	-4.22^{***}	-1.36	-1.91	-1.72	-1.81	-1.48	-1.85	-1.72	-1.97
deterministics	c	c, t	c, t	c, t	c, t	c	c	c	c
lags	0	0	0	1	2	1	1	5	4
* , ** , *** : H_0 rejected at the 10%, 5%, 1% significance level c: constant, t: linear trend									

Table 1: ADF tests for Australian and New Zealand data

Whereas the exchange rate is found clearly stationary, all the other variables are integrated of order one[4]. This constellation implies that in (5), a stationary exchange rate is

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[4]Further tests for the first differences showed that money could be borderline I(2). Since with I(1) inflation prices are as well I(2), real money can become I(1) by the long-run price homogeneity assumed in equations (1) and (2).

explained by a set of non-stationary regressors. A balanced equation therefore depends on common stochastic trends, which cancel out between the corresponding domestic and foreign variables. For the purpose of checking up on this kind of cointegration, Table 2 presents ADF tests performed on the respective international differentials.

	$m - m^*$	$y - y^*$	$i - i^*$	$\pi - \pi^*$
t-value	-4.39^{***}	-4.92^{***}	-3.05^{***}	-4.44^{***}
deterministics	c	c, t	$-$	$-$
lags	5	0	1	1
*, **, *** : H_0 rejected at 10%, 5%, 1% significance c: constant, t: linear trend				

Table 2: ADF tests for Australian - New Zealand differentials

Since the four spreads are found stationary, they can be treated as cointegrating relations in an error correction model.[5] The fact that cointegration has been achieved while the spreads implicitly restricted the cointegrating vectors to $(1, -1)$ lends credibility to the assumption of equal coefficients in the domestic and foreign money demands (1) and (2). Additionally, the lagged exchange rate level can be interpreted as a single-variable stationary relation, which is necessary for avoiding misspecification. This view is supported by a trace test[6] (Johansen 1995), which confirms the presence of five cointegrating relations between the nine variables on the 5% level, but yields no evidence for any higher rank. Hence, I specify an error correction equation for the exchange rate, initially containing the cointegrating relations, a constant and a linear trend.

In order to enhance efficiency and allow for endogeneity, I add according equations for the remaining eight variables, which form a system of vector error correction type estimated in a seemingly unrelated regression (SUR) framework. Even though the Schwarz and Hannan-Quinn criteria suggested a lag length of zero, in case Box-Pierce tests indicated residual autocorrelation, additional autoregressive lags were added to the particular equation. Regressors insignificant at the 10% level were sequentially deleted from the system. Finally, with standard errors in parentheses below the parameters, the exchange rate equation resulted as

$$s_t = \underset{(2.90)}{-16.79} + \underset{(0.03)}{0.12}t - \underset{(0.16)}{0.37}(y_{t-1} - y_{t-1}^*) - \underset{(0.15)}{0.43}(i_{t-1} - i_{t-1}^*) + \underset{(0.30)}{0.58}(\pi_t - \pi_t^*) + \underset{(0.09)}{0.80}s_{t-1} - \underset{(0.08)}{0.15}s_{t-2} \; . \tag{6}$$

$$R^2 = 0.32 \quad Q(1) = 0.39 \quad Q(4) = 1.87 \quad Q(8) = 2.34 \quad JB = 0.84$$

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[5]While a linear trend has been statistically significant in the the ADF test for the GDP spread, its size is economically irrelevant and therefore does not cast doubt on the hypothesis of income convergence.

[6]The specification of the underlying model is discussed in the following.

As the money spread clearly failed to reach significance, it has been removed. All remaining coefficients carry the expected signs, describing the appreciating effect of GDP and interest rate as well as the depreciating effect of inflation. The exchange rate is included in levels, because it has been found stationary. Note that this represents a simple autoregressive reparameterisation of the conventional error correction form, which does not alter the underlying model structure. For calculating the long-run impacts on the exchange rate, one has to take the according lag polynomial into account. In this, the income elasticity amounts to $-0.37/(1 - 0.80 + 0.15) = -1.06$, which is not different from the expected -1 in a likelihood ratio (LR) test with a p-value of 0.87. Turning the attention to interpreting the interest and inflation parameters, first recall that the annualisation effectively requires quadrupling the estimates. The interest rate semi-elasticity results as $-0.43/(1 - 0.80 + 0.15) = -1.23$, being a sensible value for the coefficient $(\lambda - \frac{1}{\theta})$ from equation (5): Whereas in the money demand literature, λ is often quantified between 4 and 5, the PPP adjustment parameter θ remains near zero. Likewise, the inflation semi-elasticity of $0.58/(1 - 0.80 + 0.15) = 1.66$ lies in the expected range for $(\gamma + \frac{\delta}{\theta})$.

Stationarity of the exchange rate between the Australian and New Zealand currencies emerges as a product of its determinants being cointegrated. In this, each of the according cross-country long-run equilibria has to be maintained by systematic adjustment taking place in at least one of the countries. Logically, leadership in the international relations can be discussed in this context as an additional feature: In the above-mentioned SUR error-correction equations for income, interest rate, inflation and money, without exception the New Zealand variables react significantly stronger to equilibrium deviations than their Australian counterparts. Those might not be completely weakly exogenous, but Australia clearly catches the leading role in the bilateral relations.[7]

3.2   Australia - United States

For Australia and New Zealand, extensive economic integration appropriately explains exchange rate stationarity in the light of the argumentation from section 2. Now, this section shall provide complementary evidence on the external relations of Oceania. For this purpose, I concentrate on Australia because of its size and probable leading role; thereby, representing the common benchmark case, the United States are chosen as the foreign country. Basically, the same comments on data as in the forestanding section

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[7]Note however, that such statements on causality are naturally based on the considered information set; Australia is not likely to be the only essential factor for New Zealand.

apply. However, the sample can now already start in 1984:1, comprising the whole AUD floating period. The US interest rate is represented by the 3-month CD rate, and money supply now by narrow money M1, which produced much more logical results than M3. The graphs are displayed in Figure 2.
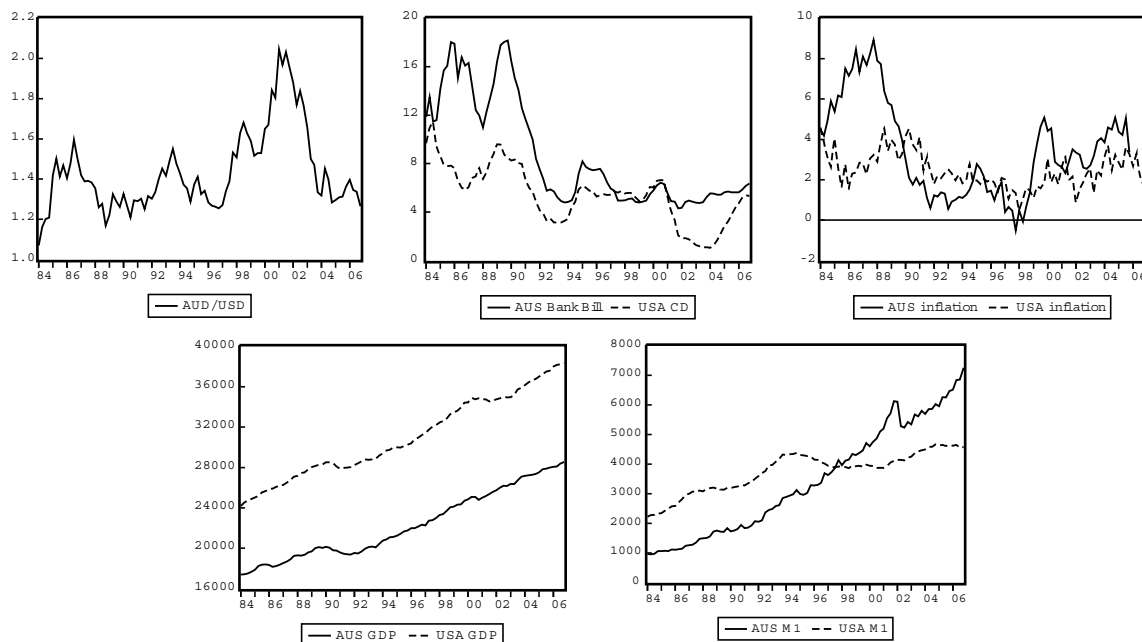

Figure 2: Data for Australia and the United States

Apparently, the comovement proves much weaker than in the case of New Zealand. Especially the policy-relevant variables M1 and short-term interest rate do not seem to be predominantly governed by common forces. Before addressing cointegration, at first Table 3 gives an idea about data integration.

	s	m	m^*	y	y^*	i	i^*	π	π^*
t-value	-2.25	-1.22	-2.26	-1.77	-2.89	-1.30	-2.23	-2.13	-2.49
deterministics	c	c, t	c, t	c, t	c, t	c	c	c	c
lags	0	0	1	1	2	1	1	3	2
*, **, *** : H_0 rejected at the 10%, 5%, 1% significance level c: constant, t: linear trend									

Table 3: ADF tests for Australian and US data

Unsurprisingly, all variables are found non-stationary, including the exchange rate. Therefore, following the argumentation from section 2, at least one of the Australian-US differentials can be expected to be I(1). Table 4 shows the according ADF test results.

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	$m - m^*$	$y - y^*$	$i - i^*$	$\pi - \pi^*$
t-value	-2.03	-3.75^{**}	-2.07	-3.23^{***}
deterministics	c, t	c, t	c	$-$
lags	0	0	1	1
*, **, *** : H_0 rejected at 10%, 5%, 1% significance c: constant, t: linear trend				

Table 4: ADF tests for Australian - US differentials

Obviously, the income convergence[8] and relative PPP hypotheses can be maintained. In contrast, no cointegration is found for the money supply[9] and interest rate pairs, respectively. Even though only ADF results are displayed, various alternative methods equally failed in establishing cointegration. Since these include Johansen tests with unrestricted coefficients, furthermore the negative outcome cannot simply be triggered by the assumption of equal parameters in the money demands.

In the case of Australia and New Zealand, it was probably comparable monetary policies in addition to real and nominal coherence, which led to exchange rate stationarity. Whereas integration in the real sector also seems to take place between Australia and the US, the policy-relevant variables money supply and short-term interest rate evidently follow distinct idiosyncratic courses. Most likely, sustainability of these deviations from the guidelines of the superpower US is supported by the stable and freely floating Australian currency. As the case may be, the stochastic trending of the exchange rate is obviously triggered by persistencies in the money and interest rate behaviour.

Before an empirical monetary model can be specified, it is necessary to verify cointegration between the non-stationary variables exchange rate, M1 differential and interest rate spread. A trace test (with constant, trend and no lags, as suggested by the Schwarz and Hannan-Quinn criteria) can reject the hypothesis of no cointegrating relation with a p-value of 0.03, but a higher rank is not within reach. When the cointegrating parameter of the exchange rate is normalised to unity, restricting the money coefficient to -1 cannot be rejected by an LR test (p-value = 0.13). Therefore, I follow equation (5) in specifying the error correction term as $s_t - (m_t - m_t^*) + \beta(i_t - i_t^*)$, where β is still to be estimated in the SUR model.

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[8]Again, the linear trend is economically irrelevant.

[9]Taking M3 instead of M1 does not change this result. Note that although money could again be borderline I(2), the spread emerges as I(1). However, no evidence of polynomial cointegration could be found.

The same proceeding as in the previous section leads to the exchange rate equation

$$\Delta s_t = \underset{(0.04)}{-0.17} t - \underset{(0.18)}{0.84}(y_{t-1} - y_{t-1}^*) - \underset{(0.03)}{0.14}[s_{t-1} - (m_{t-1} - m_{t-1}^*) + \underset{(1.40)}{3.39}(i_{t-1} - i_{t-1}^*)] + \underset{(0.19)}{0.57}(\pi_t - \pi_t^*).$$
(7)

$$R^2 = 0.24 \quad Q(1) = 0.33 \quad Q(4) = 2.07 \quad Q(8) = 7.26 \quad JB = 2.13$$

Again, the signs of the coefficients do not lack plausibility. For determining the long-run impacts quantitatively, again the lag polynomial in the level representation of (7) has to be considered. While the money elasticity had already been restricted to unity, the high[10] values for interest rate (-3.39) and inflation ($0.57/(1 - 0.86) = 4.07$) are likely to be explained by a low PPP adjustment parameter θ; in contrast, evidence from the previous section showed that deviations from the law of one price between Australia and New Zealand are probably corrected much faster. With an elasticity of $-0.84/(1 - 0.86) = 6$, the development of the GDP differential exerts an extraordinary effect on the exchange rate.

4   Concluding Summary

In a word, this paper demonstrated the influence of real and nominal economic integration processes between two countries on their exchange rate. Theoretically, the monetary approach connects the fundamental variables money, income, interest rate and inflation to the value of the currency. In case of cross-country convergence of these determinants, marked by stationary international differentials, exchange rate stationarity comes as a logical consequence. Therefore, this can be interpreted as a criterion for full economic integration in real, nominal and policy terms.

An interesting implication refers to the theory of the optimal size of currency unions between countries: In case of symmetric behaviour of the most important macroeconomic variables, maintaining an autonomous monetary policy exclusively orientated towards domestic needs loses its necessity. By the same token, the importance of absorbing country-specific shocks through reactions of a flexible exchange rate would shrink considerably, since in presence of cointegration, the concerned variables will revert to their long-run equilibria. Consequently, this describes a situation, where potential merits of a common currency are likely to exceed the costs, which are mainly connected to the loss of sovereign monetary policy and exchange rate flexibility. Note however that cointegration only refers to comovement in the persistent components and thus leaves space for sizeable transitory

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[10]Again, bear in mind the annualisation.

deviations. Since those are far from meaningless in a monetary policy context, it is worth considering the speed of adjustment to disequilibria as well as the degree of synchrony between the domestic and foreign cyclical fluctuations. For example, the present study could be complemented by a common trends common cycles approach as in Weber (2007).

As an intuitive example, a constellation as described above has been shown characterising the relationship of Australia and New Zealand. The differentials between the fundamentals money, income, interest rate and inflation were interpreted as cointegrating relations affecting the course of the exchange rate as implied by the monetary model. Besides focusing the attention to the issue of a common currency area, the results give support to the current political efforts in creating a unified internal market in the two Oceanic countries.

In contrast, money and interest rate of the United States did not cointegrate with their Australian counterparts, indicating substantial differences mainly in monetary policy. Nevertheless, cointegration between the exchange rate and the money and interest differentials led to a sensible specification of the monetary model. Therefore, the non-stationarity of the AUD/USD exchange rate is evidently linked to the stochastic trending factors in interest rates and monies. Of course, depending on the exact choice of data, sample, methodology and model specification one may in general arrive at differing conclusions about the cointegrating properties of the model variables. Nevertheless, the two empirical case studies exemplify the essential principal behind the present economic approach.

The main contribution of the underlying study lies in explicitly connecting convergence processes to the foreign exchange and uniting basic economic intuition with formalised econometrics. Analysing the time-series properties of the theoretically relevant variables allows both determining areas of strong economic integration as well as identifying the sources of non-stationary exchange rate behaviour. In this respect, the current approach should therefore be able to improve on precedent exchange rate modelling. Admittedly, broad empirical evidence on exchange rate properties seems to make it unlikely finding a relevant number of cases fulfilling the stationarity criterion. Even so, many pairs of countries, which are generally under-represented in the US dollar orientated literature and for which the perspective of a common currency might appear promising, probably bear a definite potential for future research.

References

[1] Bernard, A.B., S.N. Durlauf (1995): Convergence in international output. Journal of Applied Econometrics, 10, 97–108.

[2] Cheung, Y.W., M.D. Chinn, A.G. Pascual (2005): Empirical exchange rate models of the nineties: Are any fit to survive? Journal of International Money and Finance, 24, 1150-1175.

[3] Dornbusch, R. (1976): Expectations and Exchange Rate Dynamics. Journal of Political Economy, 84, 1161–1175.

[4] Frankel, J.A. (1979): On the Mark: A Theory of Floating Exchange Rate Based on Real Interest Differentials. American Economic Review, 69, 610–627.

[5] Goldfeld, S.M., D.E. Sichel (1987): Money demand: the effects of inflation and alternative adjustment mechanisms. Review of Economics and Statistics, 69, 511-515.

[6] Johansen, S. (1995): Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. Oxford University Press, Oxford.

[7] MacDonald, R., M.P. Taylor (1991): The monetary approach to the exchange rate. Economics Letters, 37, 179-185.

[8] Meese, R.A., K. Rogoff (1983): Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample? Journal of International Economics, 14, 3-74.

[9] Moersch, M., D. Nautz (2001): A note on testing the monetary model of the exchange rate. Applied Financial Economics, 11, 261-268.

[10] Weber, E. (2007): Regional and Outward Economic Integration in South-East Asia. CRC 649 Discussion Paper 2007-019, Humboldt-Universität zu Berlin.