ELSEVIER

Journal of Monetary Economics 49 (2002) 941–946

Journal of MONETARY ECONOMICS

www.elsevier.com/locate/econbase

Comment on: Exchange rate pass-through, exchange rate volatility, and exchange rate disconnect ☆

Margarida Duarte[a], Alan C. Stockman[b,c,*]

[a] Research Department, Federal Reserve Bank of Richmond, Richmond, VA 23261, USA

[b] Department of Economics, University of Rochester, 222 Harkness Hall, Rochester, NY 14627, USA

[c] National Bureau of Economic Research, Cambridge, MA 02138, USA

Received 16 November 2001; accepted 7 April 2002

The Devereux–Engel paper addresses two long-standing puzzles in international economics: exchange rate volatility and its disconnect.[1] Solutions to these puzzles have eluded standard macroeconomic models, which typically underpredict the magnitude of exchange rate volatility and predict strong counterfactual relationships between exchange rates and macroeconomic aggregates. Devereux and Engel introduce irrational expectations via "noise trading" into a standard two-country model and explore conditions potentially sufficient to solve these puzzles. Our comments on their paper will focus on the key features of the model, the conditions imposed upon it, the model's implications for other variables, the model's limitations and potential for extensions, and alternatives to the key features of the model.

The paper's main argument is straightforward. If we impose conditions on a model so that the exchange rate is (approximately) irrelevant to product markets—by eliminating substitution and wealth effects of exchange-rate changes—then "noise" or irrational speculation can generate any degree of exchange-rate volatility without affecting macroeconomic aggregates, potentially solving the volatility and disconnect puzzles. Devereux and Engel illustrate that point with the following conditions: (i) local currency pricing, (ii) incomplete markets, (iii) an import market that includes both direct sales to consumers and sales through intermediaries (local distributors), and (iv) noise traders in foreign exchange markets (dealers with biased expectations about the future spot exchange rate).

☆ This comment on "Exchange rate pass-through, exchange rate volatility, and exchange rate disconnect" by Michael B. Devereux and Charles Engel was prepared for the November 2001 Carnegie–Rochester Conference.

*Corresponding author. Tel.: 1-716-275-7214; fax: +1-716-256-2309.

E-mail address: stoc@troi.cc.rochester.edu (A.C. Stockman).

[1] See Baxter and Stockman (1989), and Flood and Rose (1995).

PII: S0304-3932(02)00131-9

The first condition, local-currency pricing (preset nominal prices in buyers' currencies), eliminates substitution effects of unexpected exchange-rate changes, because those changes do not affect the home-currency nominal prices that consumers pay for foreign goods, thereby leaving unchanged the relative prices of domestic to imported goods.[2] Manyrecent papers have employed local-currency pricing for that reason.[3] The second condition, incomplete markets, is necessary, but not sufficient, to eliminate wealth effects of exchange-rate changes.[4] This follows from standard optimal-sharing conditions under complete markets.[5] The third condition, involving distributors, helps to eliminate wealth effects of exchange rate changes (see below). The fourth condition, the presence of 'noise traders' as in Jeanne and Rose (2000), generates non-fundamental shocks that create exchange-rate variability without directly affecting macroeconomic variables.[6]

The exchange-rate disconnect puzzle—near-absence of any sizable correlation with other macroeconomic variables (such as GDP, investment, and net exports)—is perhaps more puzzling than the high volatility of exchange rates relative to those variables.[7] If exchange rates and other macrovariables (or their cross-country ratios) were highly correlated, the issue would resemble a standard macroeconomic issue involving business cycles: where are the observable fundamental shocks that are large enough to generate the observed fluctuations in the data? A large macroeconomics literature has sought "multiplier" mechanisms to address this question.[8] Note that the disconnect puzzle implies that (a) shocks with important effects on key macroeconomic variables do not explain a large fraction of the variation in exchange rates, and (b) shocks that explain a sizable share of exchange-rate volatility do not explain a large share of the variation in other macroeconomic variables. Devereux and Engel address these issues by introducing "noise traders" into financial markets. "Noise shocks" can potentially create large changes in exchange rates and (through biased expectations of noise traders) deviations from uncovered interest-rate parity.

Two alternatives to the noise-trader assumption have been proposed recently. Duarte and Stockman (2001) assume that "information shocks" affect the risk premia required by foreign-exchange markets. Potentially, such information shocks could have negligible effects on key macroeconomic variables but large effects on

[2] Note that with persistent changes in exchange rates (as in the data), prices would respond with a lag (determined by the duration of price stickiness); see our discussion below.

[3] See Betts and Devereux (1996, 2000), and Duarte (2001).

[4] "Not sufficient" if, e.g., nation-specific productivity shocks create (optimal) variation in national labor inputs, and utility is non-separable in leisure and consumption.

[5] See Grauer et al. (1976); Sercu and Uppal (2000); Ohanian and Stockman (1998). Section 1.1 of the paper cites Chari, Kehoe, and McGrattan (2001) for the risk-sharing condition.

[6] The presence of noise traders also generates stochastic deviations from uncovered interest rate parity; see our discussion below.

[7] The paper clearly distinguishes the two puzzles in the introduction, but tends to identify them in other places.

[8] The analogous question for stock prices has generated many papers. Stock prices also have their own "disconnect puzzle", involving their common market component (whereas individual stock prices, relative to that component, are often explainable with observable, firm- or industry-specific shocks.

exchange rates and risk premia (generating deviations from uncovered interest-rate parity). Gourinchas and Tornell (2001) assume that irrational expectations cause interest rates to respond slowly to fundamentals—underreacting relative to a rational-expectations model—and show that this generates exchange-rate volatility, negative coefficients in regressions of exchange-rate changes on forward premia (as in Fama, 1984), and delayed overshooting of exchange rates (as in Eichenbaum and Evans, 1995). Like Duarte and Stockman (2001), Gourinchas and Tornell assume that shocks affect second moments rather than first moments, helping to make the model consistent with the disconnect puzzle.

The Devereux–Engel assumption involving distributors is unusual, so it warrants some discussion. This assumption helps to reduce the wealth effects of exchange-rate changes. As in Devereux, Engel, and Tille (1999), a fraction of firms export to foreign-owned distributors, while the remaining firms export directly to foreign consumers. When a firm sells to a foreign distributor, the distributor pays a price that was preset in home currency. The foreign distributor then resells the product to consumers in its own (foreign) country, at a price that it presets in its own (foreign) currency. If foreign currency appreciates between purchase and resale, the distributor profits; if foreign currency depreciates, the distributor takes a loss. These profits and losses accrue to the owners of the foreign distribution firm, which are foreign households. Consequently, the distributor is essentially a buying agent for those households. Therefore the wealth effects of exchange-rate changes are the same as if foreign consumers were buying directly from home firms, paying prices preset in home currency.[9] Specifically, a fraction μ of domestic firms sell directly to foreign consumers at prices preset in foreign currency, while the remaining 1μ firms sell to foreign distributors at prices preset in domestic currency. Those foreign distributors then resell to foreign consumers at prices set in foreign currency. If $\mu + \mu^* = 1$, then exchange-rate changes have no wealth effects. On the one hand, domestic-currency depreciation raises domestic income from profits of the μ domestic firms that sell directly to foreign consumers at pre-set foreign prices and thereby receive higher domestic-currency revenue. On the other hand, domestic-currency depreciation reduces domestic wealth through the reduced profits of the $1 - \mu^*$ domestic distributors (owned by domestic households) that import from foreign firms. When $\mu = 1 - \mu^*$, these two wealth effects exactly cancel.

The paper, like many others, abstracts from enormous impacts of exchange-rate changes on financial systems (with tragic consequences in many recent real-life episodes). Aside from those impacts, however, the real-life wealth effects of exchange-rate changes are relatively small for most developed countries. One reason involves trade shares: Although the share of imports in GDP is one-half in the Devereux–Engel model, empirically that share is much smaller for most countries,

[9] In the Devereux–Engel model, substitution effects of exchange-rate changes remain zero because, unlike McCallum and Nelson (2000) or Obstfeld (2001), distributors do not substitute between imports and domestically produced products when the exchange rate changes their relative price. (See their discussion in Section 2.)

making wealth effects of exchange-rate changes smaller than the model—even without distributors—would predict.[10]

Elimination of the substitution and wealth effects of exchange-rate changes—divorcing exchange rates from product markets—still leaves open connections between exchange rates and financial markets. A key connection involves uncovered interest parity, which states that expected returns of similar assets in different countries are equal when expressed in the same currency. Ex ante, the expected return on domestic deposits should equal the expected home-currency return on foreign deposits. Uncovered interest-parity links expected changes in the exchange rate with the nominal-interest differential. However, it is strongly rejected in the data. A key question concerns why. Two possible answers involve (1) irrational variation in expectations (as in Devereux and Engel, or Gourinchas and Tornell) or variation in risk premium (as in Duarte and Stockman).[11] To the extent that variation in risk premia result from changes in expectations (altering the relative amounts of risk on home- and foreign-currency assets), both possibilities are similar; subtle distinctions would involve interpretations of "rationality" or the details of the factors affecting expectations.

The data show strong persistence, as well as volatility, in exchange rates and deviations from uncovered interest parity. The Devereux–Engel model, however, does not generate this persistence in either variable.[12] To do so, persistent noise shocks would need to replace the i.i.d. noise shocks in the model.[13] Technically this is difficult: the solution in the paper requires i.i.d. shocks and is not easily extendable to more general processes. Economically, one might wonder what it would mean for "noise shocks" to be persistent? A persistent (but stationary) noise shock would mean that, starting from a steady state where statistical and traders' conditional forecasts coincide, an innovation to traders' forecasts would die out only gradually; that is, their forecasting mistakes would be long-lived. One mechanism to generate these persistent expectational errors would involve gradual learning, possibly along the lines of Gourinchas and Tornell (2001). Persistent noise shocks would also likely affect the optimal price-setting decisions of firms, and thereby affect other features of the model. It may also be difficult to maintain "disconnect" while adding persistence to the model (e.g. through non-i.i.d. noise shocks), because non-i.i.d. expected changes in exchange rates may affect other variables with delay, creating links between (lagged) exchange-rate changes and other macroeconomic aggregates.

The paper has two sources of exchange-rate volatility: noise shocks and shocks to fundamentals (money supplies, in their model). They assume that both shocks are

[10] However, temporary noise shocks, as in the model, create smaller wealth effects than the more persistent exchange-rate changes seen in the data.

[11] See footnote 3 of the paper.

[12] This model has no sources of persistence since prices are preset in advance for one period only and the noise shock is *i.i.d.* In fact, bond holdings are a source of persistence in the model. This mechanism, however, is ignored in the solution of the model.

[13] Because volatility in exchange rates can result from either a "multiplier" that generates large effects of small fundamental shocks, or "noise", persistence in deviations from uncovered-interest parity can help to create a multiplier effect (see Duarte and Stockman, 2001).

i.i.d. They also assume, following Jeanne and Rose, that the conditional variance of the noise shock is proportional to the conditional variance of the exchange rate itself. This assumption is convenient but not well-motivated: why should noise shocks have this property? This assumption allows exchange-rate volatility to rise without bound for certain parameter values. It also places questionable limits on "irrational" expectations; for example, it prevents expected exchange-rate movements in a fixed-exchange rate regime.

The distinctions between models of "irrational expectations" (whether noise-trader or other) and models of ("rational") changes in the risk premium are very subtle, and would be difficult to detect in the data. Almost by definition, one cannot associate noise shocks or other "irrational" shocks to expectations with observable fundamentals, while the statistical connections between changes in risk premia and observable fundamentals may be difficult to establish.[14] The persistence of deviations from uncovered interest parity reduces the plausibility of a noise-trader interpretation. Either model may "explain" the data, if only in the sense of labeling our ignorance, or might promote better understanding of the issues. But these kinds of success have limits: they do not imply that a model is appropriate for analyzing welfare, or policies.

The predictions of the Devereux–Engel model about the behavior of excess returns is not consistent with the data. With a constant risk premium (as in the paper), the model implies that Fama type regressions of exchange-rate changes on the forward premium should generate coefficients between zero and one, while they tend to be negative in the data.[15]

An interesting empirical implication of the model involves the cross-sectional distribution of firms' profits and stock returns. The model predicts that noise shocks create a negative correlation between the profits, and stock returns, of exporting firms and distributors. A noise shock that depreciates domestic-currency (a) reduces profits and ex post stock returns of domestic firms that sell directly to foreign consumers, and (b) raises profits and ex post stock returns of domestic distributors.[16] Any extension of the model to incorporate persistence (as in the data) is likely to extend that prediction to stock prices as well. One could check this prediction in the data by identifying firms or industries (such as retail trade) that proxy for "distributors" in the model.

Noise traders may very well play a role in exchange-rate volatility, but the question remains very open. As the Devereux–Engel paper emphasizes, certain implications follow in order to generate volatility simultaneously with exchange-rate disconnect from other macroeconomic variables. Future work cannot avoid those implications.

[14] The difficulties are increased by the facts that people do not have point expectations, that marginal and average expectations may differ, that people's expectation distributions may be heterogeneous; that aggregation of expectations into a point or even a single distribution may be impossible, and that info costs and info processing costs are important.

[15] The model actually implies that the coefficient would be one, though an extension of the model to allow non-*i.i.d.* noise shocks would likely produce positive coefficients below unity.

[16] It has no effect on firms that export to foreign distributors.

For further reading

The following reference may also be of interest to the reader: Ohanian and Stockman (1997).

References

Duarte, M., 2001. Why don't macroeconomic quantities respond to exchange rate variability? Comparing Fixed and Floating Exchange Rate Systems, Mimeo, Federal Reserve Bank of Richmond.

Eichenbaum, M., Evans, C., 1995. Some empirical evidence on the effects of shocks to monetary policy on exchange rates. Quarterly Journal of Economics 110, 975–1009.

Fama, E., 1984. Forward and spot exchange rates. Journal of Monetary Economics 14, 319–338.

Gourinchas, P.-O., Tornell, A., 2001. Exchange Rate Dynamics Learning, and Misperception Mimeo. Princeton University and University of California, Los Angeles.

Grauer, F., Litzenberger, R., Stehle, R., 1976. Sharing rules and equilibrium in an international capital market under uncertainty. Journal of Financial Economics 3, 233–256.

Ohanian, L., Stockman, A., 1997. Arbitrage Costs and Exchange Rates, Mimeo. University of California and University of Rochester, Los Angeles.

Sercu, P., Uppal, R., 2000. Exchange Rate Volatility, Trade, and Capital Flows under Alternative Exchange Rate Regimes. Cambridge University Press, Cambridge.