

THE COST OF CRISES AND LEARNING TO LIVE WITH EXCHANGE RATE VOLATILITY: EVIDENCE FROM SURVEY MEASURES OF CONSUMER AND BUSINESS EXPECTATIONS

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Introduction

In many emerging economies there is widespread concern about the possible negative effects of exchange rate volatility on trade, investment and economic growth.¹ There is, indeed, an enormous empirical and theoretical literature on the possible effects of exchange rate volatility on an economy.² Not surprisingly in such a big literature, the results are ambiguous.

Even if exchange rate volatility is potentially costly, there are two main arguments for thinking that it will not in fact end up hurting economic activity as much as anticipated. The first is that those who are concerned about exchange rate volatility can use financial markets to insure and protect themselves against it. Exporters and importers, for example, can hedge against future possible exchange rate movements through forward, future, swap and options markets. These markets can be substantial. Figure 9.1, for example, shows average daily onshore spot and derivatives trade in the Australian dollar since 1990. While the spot market has grown, it is much smaller than the derivatives market (which mostly comprises swaps): there is an average of about A\$50 billion traded in Australian dollar derivatives in Australia each day. Even more than this is traded offshore.³

Insurance is not free, so there are costs associated with hedging. If the economic costs of hedging are smaller than the economic costs of volatility, something is gained by hedging. But there are two important limitations to the claim that households and firms can hedge their risks. One is that hedging markets may not be well developed in emerging markets. The BIS (2002) survey estimates of trading in financial markets show that derivatives trading in foreign exchange in emerging East Asian economies is relatively low (Table 9.1). Another limitation to the view that financial risk can be managed by using derivatives is that some sections of business, notably small

business, may not fully use hedging even if it exists. This may be because of the up-front costs involved or because of a lack of business sophistication.⁴

[FIGURE 9.1 NEAR HERE]

[TABLE 9.1 NEAR HERE]

The second argument for thinking that the costs of exchange rate volatility need not turn out to be all that high is that even if volatility is initially costly, people eventually learn to live with it and so it becomes less costly to them over time. In the context of the debate about exchange rate volatility in East Asia, adaptive learning implies that the rise in volatility associated with a shift toward more flexible exchange rate regimes is a transitory adjustment cost.

There is some appeal in this argument. The rational expectations revolution showed the importance of expectations in explaining economic activity, and highlighted the notion that people who take account of all available information adjust their behaviour as the environment around them changes.⁵ The ever-expanding literature on the impact of ‘news’ on economic variables, especially financial variables, is a demonstration of the importance of how people respond to new information.⁶ More recently, the literature has focused on adaptive learning mechanisms in models of expectations. These highlight the notion that ‘rational expectations’ is an equilibrium concept and that learning and adaptation are part of the process in reaching the rational expectations equilibrium over time.⁷

The insight from the learning models can be brought to bear in thinking about the costs of exchange rate volatility and whether they dissipate as people learn that exchange rates go up and down over time (even if they are not mean-reverting processes). One way to examine this is to test whether exchange rate volatility affects expectations of households and firms – and implicitly, if expectations are important, their economic behaviour. In this paper, private expectations are measured by statistical surveys of household and business sentiment. Survey measures are a good, but imperfect,⁸ measure of expectations.

The effects of exchange rate volatility on survey measures of household and business expectations are assessed for a range of East Asian economies. These include Australia, Japan, Korea, Malaysia, and Singapore. All these countries have survey

measures of consumer and/or business sentiment and have (or have had) flexible exchange rate systems with some variability in the exchange rate.

The methodology is straightforward. The measure of sentiment is regressed not just on the recent values of exchange rate volatility but also on lags of the dependent variable and past values of the exchange rate, economic growth, the interest rate and stock prices. These conditioning variables are included to minimise the risk of bias from omitted variables.

Time-varying effects of volatility on expectations are shown by looking at sub-sample effects and plots of recursive estimates of the coefficient on volatility. Recursive estimates show how the estimated relationship evolves over time as more observations are added to the sample, so they are especially useful for examining the impact of particular events (like financial crises) and how the expectations of households and firms in countries with longstanding flexible exchange rate arrangements have evolved.

Examining how expectations and the behaviour of consumers and firms have been affected by exchange rate volatility is a way to answer the question posed by the learning models about whether the adverse effect of volatility diminishes over time, as would be the case if people learned to deal with uncertainty.

It also allows a second, more general, question to be addressed: under what conditions does volatility in the exchange rate adversely affect expectations about the future? In particular, recursive estimates provide insight into whether there is a difference between the impact of exchange rate volatility on household and firm expectations in 'normal' times as opposed to extreme events like financial or currency crises. If exchange rate volatility affects sentiment largely only in crises, then the onus is on policymakers to create regimes which reduce the risk of crisis (rather than focusing primarily on regimes which seek to reduce exchange rate volatility).

For the purposes of this analysis, exchange rate volatility is measured by the period standard deviation of the daily percentage change in the nominal bilateral US dollar exchange rate, where the period is either a month or a quarter, depending on the periodicity of the sentiment series.⁹ The focus is on the volatility of the nominal bilateral dollar exchange rate because this is the exchange rate which people actually trade and is the one which is reported in the media.

The paper has the following structure. The next section outlines the results from regressing measures of business sentiment in selected East Asian countries on exchange rate volatility and a set of conditioning variables. The section after that does the same for measures of consumer sentiment. The results for both sets are discussed together in the assessment. A conclusion closes the paper. Descriptions and sources of the data used in the paper are set out in Appendix 9.1.

Business sentiment and exchange rate volatility

This section explores the relationship between measures of business sentiment and exchange rate volatility for selected economies in East Asia. Graphs and tables introduce the data and the results. Figure 9.2 plots the series for Australia, Japan, Korea, Malaysia and Singapore. Table 9.2 presents the results of simple models of survey measures of business sentiment for these countries.¹⁰ Business sentiment is regressed in each case on its own lags, recent lags of growth in output (GDP) and recent lags of exchange rate volatility, the short-term money market interest rate, and percentage changes in the period-end exchange rate and stock price.

[FIGURE 9.2 NEAR HERE]

[TABLE 9.2 NEAR HERE]

Contemporaneous values of the regressors – notably, exchange rate volatility – are not included in the equation. This is to avoid the problem of simultaneity.¹¹ The results are reported for the full sample period.

[FIGURE 9.3 NEAR HERE]

What is of interest is not just the effect of recent exchange rate volatility on sentiment over the full sample period but also how it has evolved over time. One way of seeing this is to estimate the regression recursively over time, starting with a small sample period and extending it one observation at a time. Figure 9.3 plots the recursive estimate of the regression coefficient of business sentiment on exchange rate volatility and its two standard error bands, starting with 10 degrees of freedom at the start of the sample period and ending up with the final estimate shown in Table 9.2.

The data and results have two striking elements.

First, the equations generally explain business sentiment well. There are a number of plausible regularities. Sentiment tends to be sluggish and persistent (this is especially the case in Japan and Korea). It generally improves when the economy has

been growing and stock prices on the domestic exchange have been rising. Sentiment tends to fall when interest rates are rising, and, for Japan and Singapore, this is statistically significant. It also tends to fall when the exchange rate depreciates (as measured, a rise in the exchange rate), although this is statistically significant only for Malaysia.

Second, exchange rate volatility negatively affects business sentiment but it is only statistically significant in the cases of Korean business sentiment and Singaporean business sentiment. In both cases, the relationship is only statistically significant from the Asian financial crisis onwards, and in the Singaporean case, it is not significant at the 5 per cent level (as shown in Figure 9.3). As shown by the recursive estimates, the negative effect of exchange rate volatility on business sentiment became bigger during the East Asian financial crisis in all economies except Malaysia, which fixed its exchange rate to the US dollar in September 1998. The effects for Singapore depend on the industry: manufacturing firms, for example, are more sensitive than those in the finance sector to exchange rate volatility.¹²

The results for the full sample and the recursive regressions point to two tentative assessments about the impact of exchange rate volatility, to which I return in the assessment section. In the first place, exchange rate volatility has an unambiguously negative effect on firms' expectations about the future, but it is not generally significant. Furthermore, what really hurts firms' assessment of their economic prospects is the variability and uncertainty associated with financial crises. Crises matter; exchange rate volatility in normal times does not.

Consumer sentiment and exchange rate volatility

This section attempts to model how householders respond to exchange rate volatility. Figure 9.4 plots the various survey measures of consumer sentiment and exchange rate volatility for Australia, Japan, Korea and Malaysia.

[FIGURE 9.4]

Table 9.3 presents regression results for the overall sample for each country. Consumer sentiment is regressed on its own lags, lags of real income or household consumption growth, lags of the interest rate, exchange rate volatility, and percentage changes in the period-end exchange rate and domestic stock price. Figure 9.5 plots the

recursively estimated regression coefficient of consumer sentiment on exchange rate volatility, from 10 degrees of freedom to the end of the sample period.

[TABLE 9.3 NEAR HERE]

There are two points to note. First, as for business sentiment, consumer sentiment can be well explained by a series of economic features. Consumer sentiment is fairly persistent and it generally improves when demand is growing. It is negatively associated with domestic short-term interest rates (but only significantly in the case of Australia) and exchange rate depreciations (but only significantly for Australia and Malaysia). It is positively associated with domestic stock market changes (significantly so for Australia and Japan).

Second, consumer sentiment does not generally fall when exchange rate variability has risen in the recent past, with the notable exception of Malaysia. In this case, the association was statistically significant during the mid-1990s. The negative effect of exchange rate volatility on consumer sentiment in Malaysia dissipated sharply with the introduction of a fixed parity to the US dollar in September 1998. For Australia and Japan, unlike for business sentiment, the rise in volatility associated with the East Asian financial crisis does not appear to have had a notable adverse impact on consumer sentiment.

[FIGURE 9.5 NEAR HERE]

Assessment

Many of the graphs of business and consumer sentiment with exchange rate volatility in Figures 9.2 and 9.4 suggest that these measures of sentiment react negatively to exchange rate volatility. It is misleading to read too much into this.

In the first place, bivariate graphical representations may suggest a relationship which does not exist when tested in a multivariate statistical framework. While the figures may suggest that movements, especially rises, in exchange rate volatility are associated with falls in consumer and business confidence, this does not always mean that there is a statistically significant relationship in a multivariate context with the right set of conditioning variables. As shown in Figure 9.2, Japanese business sentiment fell sharply and yen volatility peaked in 1998. This does not mean that the latter caused the former: this episode is explained by the sharp fall in Japanese stock prices at the time.¹³

Moreover, there is a risk in over-interpreting the statistical significance of the volatility variable. While statistical significance may indicate that expectations about the future are affected by volatility, it may be the case that volatility is merely capturing some other effect. If the exchange rate is an endogenous price in the economy, volatility in the exchange rate may reflect some other factor or shock in the economy, like a domestic policy shock (for example, fiscal, monetary or financial sector shocks) or a severe external shock (for example, a regional or global crisis). It may be this factor or shock that affects sentiment and expectations rather than volatility itself.

Finally, there is also a danger in over-interpreting the results from what is only a small sample of five countries and, in some cases, relatively small sample periods.

Given these cautions, it is still possible to make some observations about the results.

First, firms seem to be more sensitive to exchange rate volatility than consumers are. The coefficient on volatility is negative in all the business sentiment equations but in only one of the consumer sentiment equations (for Malaysia). The coefficient is more often statistically significant in the business sentiment equations. This outcome fits with the well-documented stylised fact that consumption is more persistent than income and investment.¹⁴

Second, exchange rate volatility seems to matter more to sentiment in times of an exchange rate crisis. As shown in the plots of the recursive coefficient, exchange rate volatility does not significantly hurt business confidence in Australia, Korea and Singapore except during periods of extreme uncertainty and instability such as occurred during the East Asian financial crisis. The damage of exchange rate volatility on sentiment only seems to arise in extreme events. Exchange rate crises are costly, more than exchange rate volatility itself. The implication here is that selection of the exchange rate regime to minimise the risk of crisis is important.

Third, the experience of countries with longstanding flexible currency regimes suggests that people may learn how to live with exchange rate volatility, such that volatility generates less uncertainty over time and is less damaging to confidence. In the Singaporean manufacturing (but not finance) business sentiment equation, for example, the coefficient on exchange rate volatility is not statistically significant –

except for the crisis period – and it diminishes over time. In the Australian and, particularly, the Japanese consumer sentiment equations, the coefficient on exchange rate volatility shifts from being negative to positive over time. An interpretation consistent with this is that people have learned over time that exchange rates can move up and down by relatively large amounts without causing palpable distress to the economy. Consequently, the effects on sentiment have dissipated over time.

Fourth, the results for Malaysia are the clearest statement that exchange rate variability can matter, even outside crisis periods. Oddly, this is most evident for consumer sentiment than for business sentiment. Not surprisingly, in both cases, the shift to fixing the ringgit to the US dollar in September 1998 eliminated the effect of volatility on sentiment.

Conclusion

This paper has assessed the empirical relationship between exchange rate volatility and survey measures of household and business confidence in Australia, Japan, Korea, Malaysia, and Singapore.

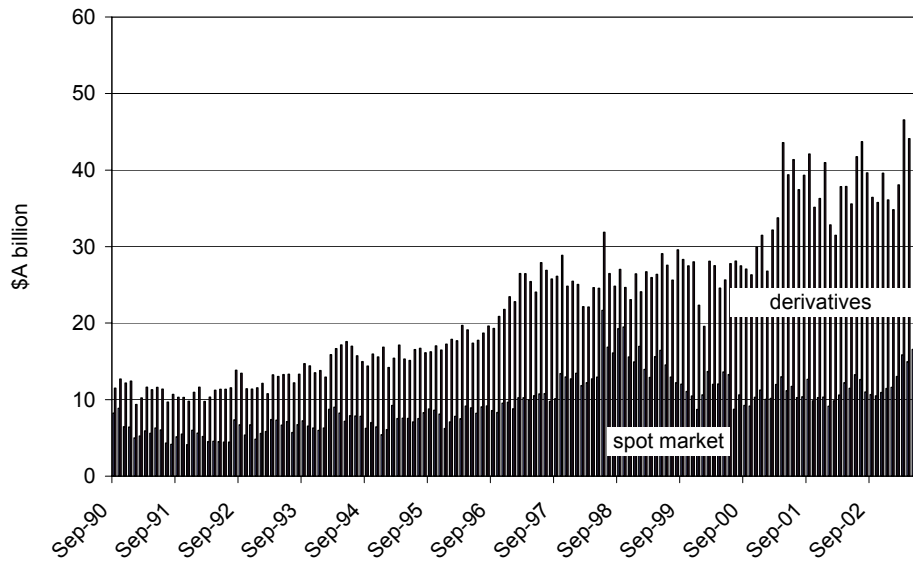
Caution needs to be used in interpreting this relationship, because the number of countries and observations is relatively small and because volatility may be a proxy for the effects of other factors and shocks on sentiment. But some tentative conclusions can be drawn. Business sentiment is more sensitive than consumer sentiment to exchange rate volatility. Exchange rate volatility matters much more when there is a currency crisis than in ‘normal’ times: it seems that currency crises are much more damaging to confidence than is exchange rate volatility itself. Finally, there is some evidence that consumers and firms learn to live with exchange rate uncertainty in flexible rate regimes.

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Figure 9.1 Spot and derivatives turnover in the onshore Australian dollar market



Source: Reserve Bank of Australia Bulletin Table F.9

**Table 9.1 Over-the-counter total foreign exchange derivatives:
average daily turnover, April 2001**

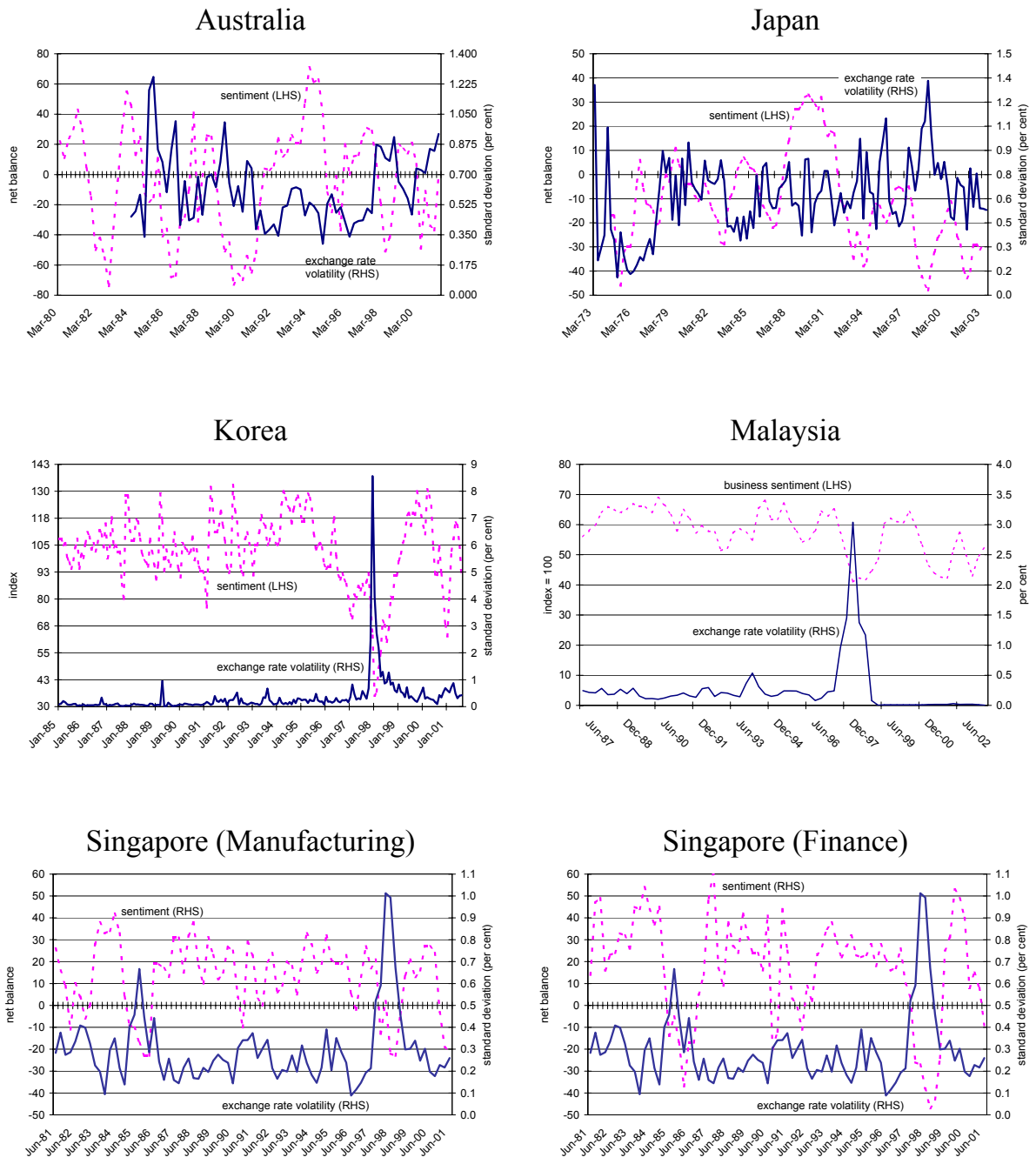
	US\$ million ^a
Australia	40,852
Hong Kong SAR	49,388
Indonesia	534
Japan	115,946
Korea	3,950
Malaysia	895
New Zealand	3,056
Philippines	605
Singapore	69,258
Taiwan	1,669
Thailand	1,315

Notes:

^a net of local inter-dealer double-counting.

Source: BIS (2002: 94).

Figure 9.2 Business sentiment and exchange rate volatility



Source: CEIC database

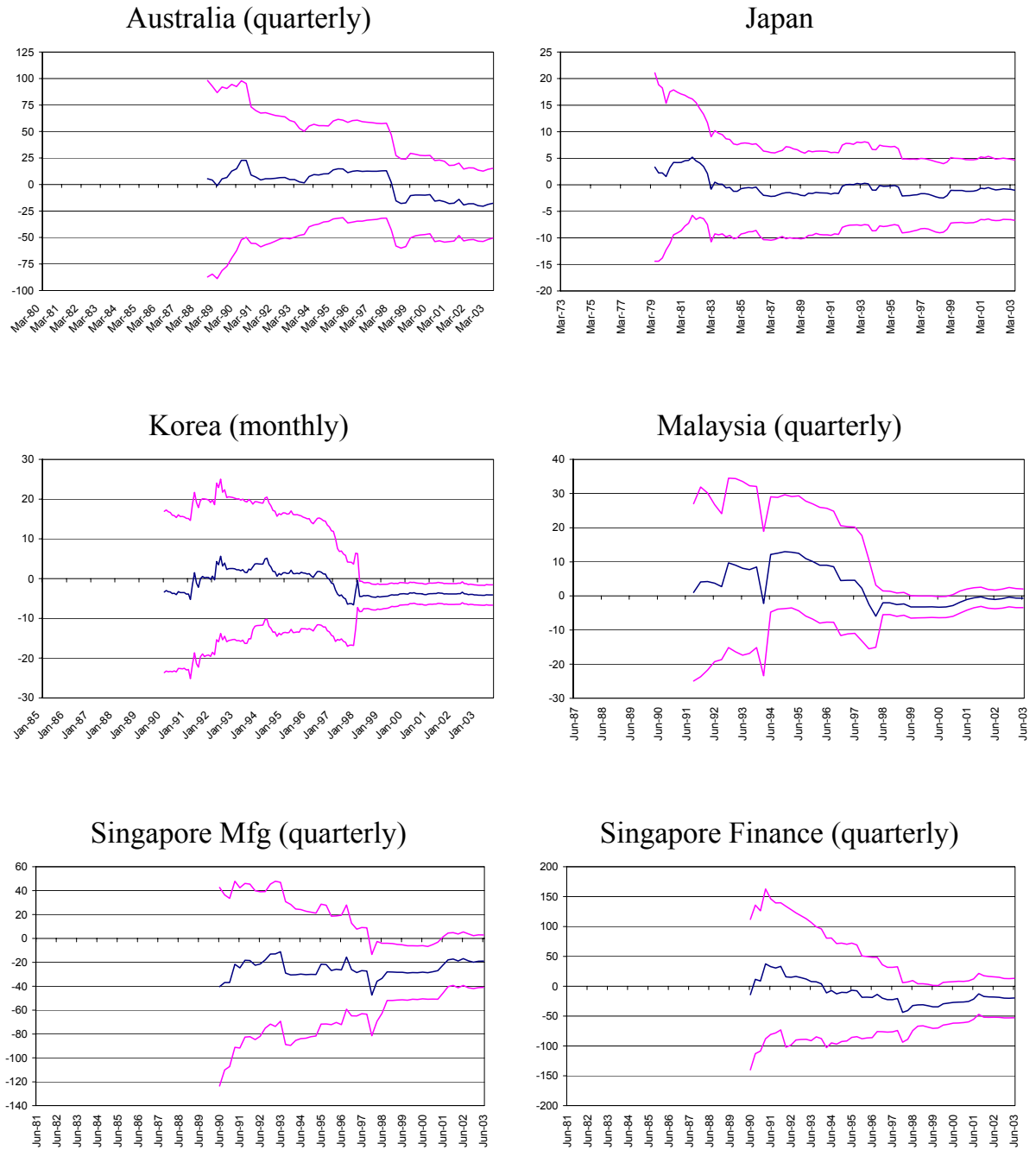
Table 9.2 Modelling survey measures of business sentiment

	Australia	Japan*	Korea*	Malaysia*	Singapore	Singapore
Sector	Manufacturing	General	General	General	Manufacturing	Finance
Periodicity	Quarterly	Quarterly	Monthly	Quarterly	Quarterly	Quarterly
Sample period	1990 Mar qtr 2003 Jun qtr	1974 Sep qtr 2003 Jun qtr	1985 Mar 2003 August	1987 Dec qtr 2003 Jun qtr	1985 Sep qtr 2003 Jun qtr	1985 Sep qtr 2003 Jun qtr
Constant	26.28 [0.20]	-2.07 [0.46]	29.74 [0.00]	11.16 [0.03]	42.65 [0.57]	15.71 [0.02]
Business sentiment (t-1)	0.47 [0.00]	0.88 [0.00]	0.90 [0.00]	0.81 [0.00]	0.29 [0.03]	0.34 [0.02]
Business sentiment (t-1)			-0.17 [0.02]		-0.42 [0.00]	-0.09 [0.57]
% Δ growth (t-1)	6.05 [0.18]	2.14 [0.00]	-0.36 [0.04]		3.86 [0.00]	2.72 [0.04]
% Δ growth (t-2)		1.43 [0.06]	-0.30 [0.01]		2.70 [0.01]	2.76 [0.04]
Exchange rate volatility (t-1)	-30.53 [0.17]	-1.02 [0.73]	-4.11 [0.00]	-0.69 [0.59]	-19.02 [0.08]	-19.79 [0.24]
% Δ exchange rate (t-1)	-0.13 [0.83]	-0.05 [0.63]	-0.10 [0.52]	-0.27 [0.00]		
% Δ exchange rate (t-2)					-1.19 [0.02]	-1.77 [0.02]
Interest rate (t-1)	-2.09 [0.14]	-0.32 [0.04]	-0.16 [0.28]		1.20 [0.21]	-2.76 [0.04]
Δ interest rate (t-1)				-1.08 [0.14]		
Δ stock price (t-1)	1.33 [0.00]	0.29 [0.00]	0.18 [0.01]		0.10 [0.39]	0.11 [0.57]
R-bar-squared	0.64	0.90	0.71	0.70	0.56	0.58
Standard error	19.91	6.00	9.29	4.27	11.48	16.24
Normality	1.10 [0.58]	0.62 [0.73]	77.20 [0.00]	0.53 [0.77]	0.85 [0.65]	0.79 [0.67]

Notes: marginal significance in parentheses; growth is real GDP apart for Korea where it is industrial production; normality test is the Jarque–Bera test statistic; bold indicates significance at the 10 per cent level; * indicates Newey–West adjusted standard errors.

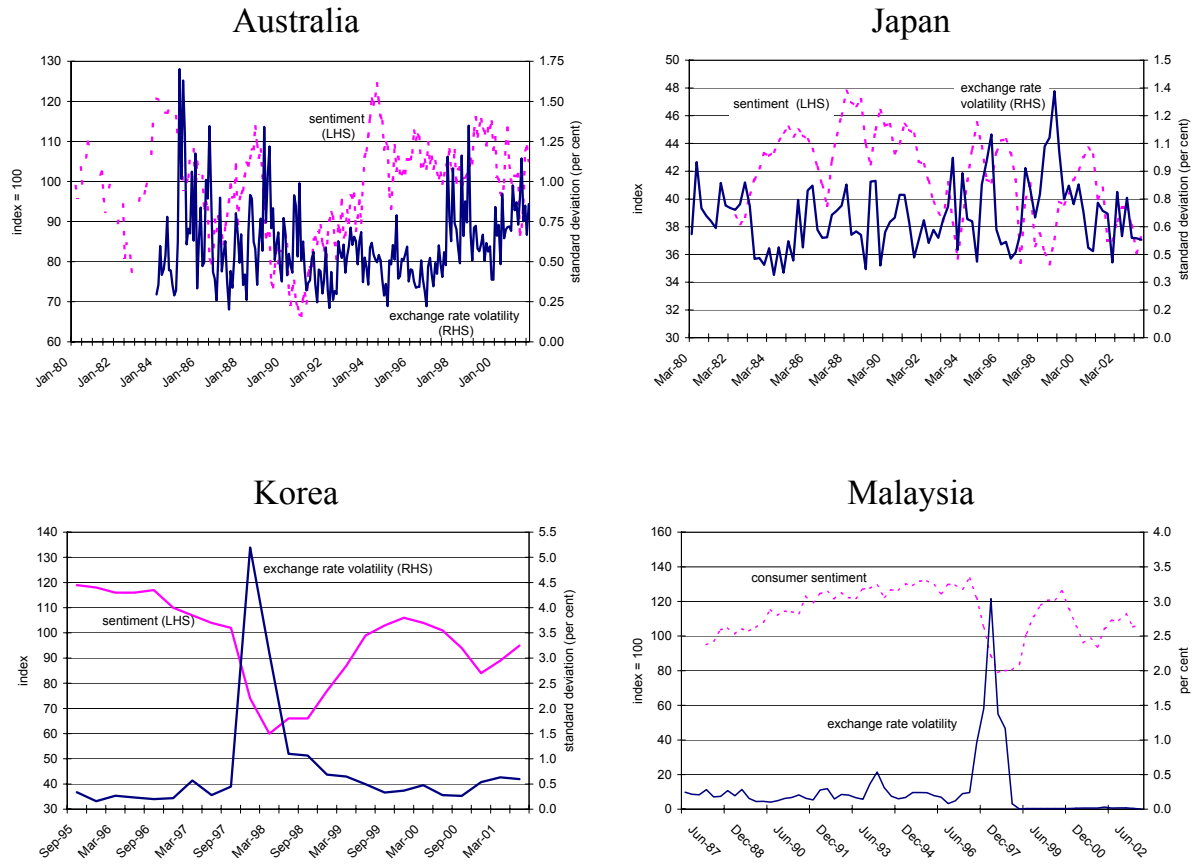
Source: author's calculations.

Figure 9.3 Recursive estimates: effect of exchange rate volatility on business sentiment



Source: author's calculations.

Figure 9.4 Consumer sentiment and exchange rate volatility



Source: CEIC database.

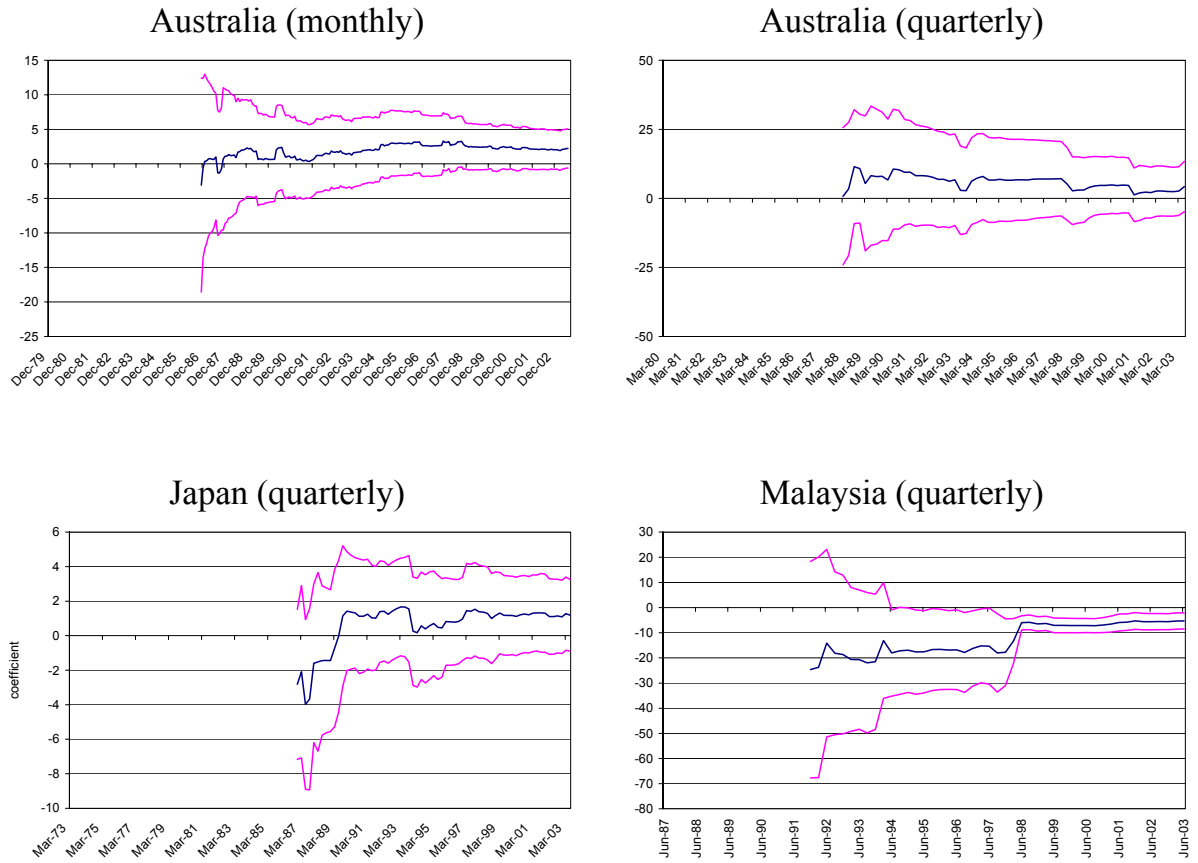
Table 9.3 Modelling survey measures of consumer sentiment

	Australia	Australia	Japan	Korea	Malaysia*
Periodicity	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
Sample period	1984 Jul 2003 Jul	1984 Jun qtr - 2003 Jun qtr	1982 Sep qtr - 2003 Jun qtr	1995 Dec qtr 2003 Jun qtr	1988 Jun qtr 2003 Jun qtr
Constant	17.12 [0.00]	29.5 [0.00]	7.62 [0.01]	22.82 [0.10]	17.36 [0.00]
Consumer sentiment (t-1)	0.84 [0.00]	0.71 [0.00]	0.78 [0.00]	0.76 [0.00]	0.87 [0.00]
Growth (t-1)	0.02 [0.95]	2.05 [0.10]	0.43 [0.00]	0.85 [0.35]	-0.17 [0.18]
Growth (t-2)	0.50 [0.00]		0.50 [0.00]		
Exchange rate volatility (t-1)	2.21 [0.11]	4.28 [0.35]	1.32 [0.22]	1.40 [0.71]	-5.43 [0.00]
% Δ exchange rate (t-1)	-0.60 [0.00]	0.07 [0.69]	-0.01 [0.66]	-0.23 [0.16]	-0.38 [0.00]
Interest rate (t-1)	-0.37 [0.00]	-0.55 [0.00]	0.05 [0.55]	-0.19 [0.59]	
Δ interest rate (t-1)					-1.10 [0.34]
% Δ stock price (t-1)	0.12 [0.06]		0.03 [0.06]		
R-bar-squared	0.87	0.70	0.73	0.77	0.87
Standard error	4.40	6.88	1.62	7.33	5.52
Normality	1.52 [0.47]	0.13 [0.93]	8.77 [0.01]	36.59 [0.00]	2.24 [0.33]

Notes: marginal significance in parentheses; growth is nominal retail spending for Australia monthly, real GDP for Australia quarterly but real private consumption expenditure for all other countries; normality test is the Jarque–Bera test statistic; bold indicates significance at the 10 per cent level; * indicates Newey–West adjusted standard errors.

Source: author's calculations.

Figure 9.5 Recursive estimates: effect of exchange rate volatility on consumer sentiment



Source: author's calculations.

Appendix 9.1 Descriptions and sources of data

Exchange rates	End-period bilateral US dollar rates, sourced from the IMF's International Financial Statistics (IFS).	
Exchange rate volatility	Defined as the standard deviation of daily percentage changes in the dollar bilateral exchange rate. Daily exchange rate data were obtained from Bloomberg.	
Sentiment series	Obtained from the CEIC database for all countries except Australia, which were obtained from the Reserve Bank of Australia. The sentiment series are defined as:	
Australia	Consumer sentiment	Melbourne Institute survey of consumer expectations.
	Business sentiment	Australian Chamber of Commerce and Industry (ACCI) survey of business conditions over the next 12 months.
Japan	Consumer sentiment	Economic Planning Agency Consumer Confidence Index, seasonally adjusted. CEIC code: JHMA.
	Business sentiment	Bank of Japan, Tankan Survey of All Enterprises over the next quarter. CEIC code: JONB.
Korea	Consumer sentiment	Consumer Spending Plan survey of expected household income over the next 12 months. CEIC Code: KHGH.
	Business sentiment	Federation of Korean Industries, Business Survey Index of future composite business condition. CEIC code: KOFAA.
Malaysia	Consumer sentiment	Malaysian Institute of Economic Research consumer sentiment index. CEIC code: MOUAD.
	Business sentiment	Malaysian Institute of Economic Research business conditions index, forecast. CEIC code: MOUAA.
Singapore	Business sentiment:	Survey of overall business conditions over the next six months for manufacturing and for finance. CEIC code: SOIAD and SOIAC respectively.

Notes

- * I am grateful for comments from Prema-Chandra Athukorala, Mardi Dungey, and Warwick McKibbin.
- ¹ The paper by Masahiro Kawai in this volume is a clear expression of this.
- ² See Rose (2000) for a new tilt.
- ³ BIS (2002) data indicate that onshore trade only accounts for about 40 per cent of total Australian dollar trade.
- ⁴ See Grimes, Holmes and Bowden (2000) for a detailed and persuasive case study in New Zealand.
- ⁵ See Muth (1961), Lucas (1972) and Sargent (1973).
- ⁶ The literature on the impact of 'news' in financial markets is very large; see, for example, Engle, Ito and Lin (1990) and Campbell, Lo and MacKinlay (1997).
- ⁷ See, for example, Evans and Honkapohja (2001).
- ⁸ They are imperfect because respondents participate selectively in surveys and they might not be telling the truth (Froot and Frankel 1989; Brischetto and de Brouwer 1999).
- ⁹ This is a standard way of measuring exchange rate volatility (Frenkel and Mussa 1980 and the paper by Menzie Chinn in this volume). Exchange rate volatility can also be measured in terms of real exchange rates or deviations from an equilibrium value which may be time varying. The general assessment in the literature is that these measures tend to be highly correlated with each other, implying that the proper focus for debate is not the measure so much as the nature of its relationship with other economic variables.
- ¹⁰ The inference from adjusted Dickey Fuller tests is that sentiment in all cases is stationary.

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- ¹¹ Contemporaneous values could be included and then tested for exogeneity but the concern here is finding sufficiently good instruments which are correlated with exchange rate volatility but not with shocks to sentiment. As it turns out, contemporaneous values of volatility are only significant in the regressions on Korean and Malaysian business sentiment. There may also be concern that exchange rate changes and exchange rate volatility are correlated, which would give rise to multicollinearity. As it turns out, these variables are largely orthogonal to each other with the statistical significance of either variable not changing substantially when the other variable is excluded from the equation. Estimation is in EViews 4.1.
- ¹² A number of alternative measures of business sentiment from Japan's Tankan survey were also assessed, such as manufacturing firms and big and small firms. The results for the general Tankan measure are replicated for alternative sub-samples. For example, business sentiment of small manufacturing firms is not adversely affected by exchange rate volatility.
- ¹³ When the stock price variable is excluded from the regression, the coefficient on exchange rate variability becomes negative and statistically significant.
- ¹⁴ See Blanchard and Fischer (1996).