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The asymmetric impact of consumer sentiment announcements on Australian foreign exchange rates

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Abstract
We examine the effect of consumer sentiment announcements on changes in 13 of the more common foreign exchange rates against the Australian dollar using a consumer sentiment index (CSI). Generally, we find that the CSI possesses information that influences the foreign exchange market. However, we observe an asymmetric effect – when a lower than previous month CSI is announced, the Australian dollar experiences a significant depreciation on the announcement day, but there is no matching appreciation when positive CSI news occurs. This supports the negativity effect documented in the psychology literature and in the Australian stock market. There is no evidence that the effect is non-linear.

Keywords
asymmetry, foreign exchange markets, investor sentiment

1. Introduction

The issue of whether sentiment affects stock prices is enduring and has taken on renewed significance in the context of dramatic rises and falls observed in the stock market over the past decade. Prior research have explored the impact of US sentiment measures on various securities, such as American depository receipts (ADRs) (Grossmann et al., 2007), closed-end country funds (Bodurtha et al., 1995), and individual stocks (Baker and Wurgler, 2006). Few studies have

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considered the information content or market reaction to consumer sentiment announcements (see Akhtar et al., 2011). We extend this area of research by exploring the foreign exchange (FX) market reaction (with respect to the Australian dollar) to periodic announcements of consumer sentiment from the Westpac-Melbourne Institute of Applied Economic and Social Research. This sentiment index is released monthly, and generally only a few days after the surveys underlying the index are conducted. This makes the announcement of consumer sentiment timely. Whether and to what extent such sentiment announcements affect the FX market is unknown.[1]

FX markets have been characterized by substantial short-term volatility, large medium-term swings, and long-term trends (IMF, 2000). These characteristics affect the decisions of firms, investors, and policy makers in a similar manner. Evans and Lyons (2005) find that the arrival of macroeconomic news induces changes in the trading behavior of various FX market participants and that the effect remains significant for days as market participants adjust their positions vis-à-vis prior expectations. The process by which the Australian FX market sets the price of currency, and how quickly and effectively prices incorporate consumer sentiment information, remains opaque. This suggests that there is a gap in our knowledge of the decision-making process of corporate managers, investors, and policy makers in relation to FX risk management in the event of positive or negative consumer sentiment information and its impact on the Australian FX market.

Gulley and Sultan (1998) document evidence that announcements of consumer sentiment signal information to the US FX market. Loundes and Scutella (2000) argue 'that there is a pervasive belief among economic analysts that consumer opinion and expectations can influence- or provide a forecast of changes in- economic growth' (p.1). If consumer sentiment provides information about future economic activity, then it should also provide information about future trade balances. In turn, information on future trade balances yields information about the future (and therefore, current) FX value of the dollar (Gulley and Sultan, 1998).

Therefore, we investigate whether major currencies react to Australian consumer sentiment announcements and, further, whether positive and negative sentiment announcements impact FX rates equally. Two core observations stand out from our analysis. Firstly, not all currencies are influenced similarly – some exchange rates are sensitive to sentiment announcements and others are not. The interesting question is whether any patterns emerge that distinguishes these two groups. We posit that the distinguishing characteristic is 'salience' – the currencies that are more salient or prominent in the FX market are more likely to be those affected by sentiment events. Secondly, of those exchange rates that are impacted by consumer sentiment news, we find that the impact is asymmetric between good and bad news events. We address this issue by considering whether sentiment announcements reflect the psychological bias of 'negativity.' The negativity effect gives value to negative information, but not to similarly intense positive information. The effect embraces a wide range of empirical phenomena as well as theoretical concepts advanced in order to explain them (Peeters and Czapiński, 1990).

The finance literature extensively explores asymmetric security market reactions to various types of news announcements; a partial list consists of Jain (1988), McQueen et al. (1996), Conrad et al. (2002), Busse and Green (2002), Chan (2003), Chen et al. (2003), Marcucci and Quagliariello (2009), Chuliá et al. (2010), Kurov (2010), Li (2010), May (2010), and Akhtar et al. (2011). Similarly, several studies investigate the effect of news announcements and exchange rate changes in the literature; for instance, on the Euro–dollar market (Bauwens et al., 2005a), the Yen–dollar market (Andersen et al., 2003; DeGennarro and Shrieves, 1997; Melvin and Yin, 2000); the deutschemark–dollar market (Andersen and Bollerslev, 1998; Danielsson and Payne, 2002), and the Norwegian Krone (Bauwens et al., 2005b). A general finding of these studies is that scheduled news announcements and time-of-the-day effects are found to be important variables in predicting

exchange rate changes. However, to our knowledge, ours is the first paper to explore a consumer sentiment-related negativity effect in FX rates.

Our work is important for a number of reasons. Firstly, at a general level the literature on asymmetry mostly considers the impact of fundamental information on asset prices. Consumer sentiment is not fundamental information. How markets respond to fundamental and non-fundamental information is important for gaining a better understanding of market behavior. In particular, establishing the dynamics of Australian exchange rate returns is important for the purposes of risk management, asset pricing and asset allocation, economic and exchange rate management, and international trade. Having limited or no knowledge about the linkage between sentiment announcements and FX markets is likely to lead to suboptimal financial decision making.

Secondly, although much of the work documents an asymmetry in the effect of the various announcements on market prices, there is often no control for 'intensity' effects. That is to say, although considerable research documents asymmetry in market responses to announcements, the asymmetry may simply be due to the 'bad' news on average being considerably worse than the 'good' news. Any such asymmetry could therefore be driven by the magnitude of the effect. In contrast, if the intensity of the good news is on average equal to the intensity of the bad news, then any observed asymmetry favoring a negative reaction to bad news is actually a negativity effect.

At a general level, predicting a negativity effect in FX markets can be justified by the argument of Kroner and Ng (1998), who suggest that FX returns are more responsive to bad news than good news because bad news shocks increase the flow of information, which affects the covariance between returns. Following this, in our case, the transmission of consumer sentiment news, and its processing and interpretation, is important because it conditions the expectations of market participants, such as local and international investors, corporate managers, hedgers, speculators, and arbitragers. We control for intensity and document that the asymmetry is actually a negativity effect in consumer sentiment announcements on foreign currency exchange rates. This is supported by the considerable psychological literature on negativity effects (Baumeister et al., 2001) and provides a better understanding of how markets behave to the release of non-fundamental information.

The remainder of the paper is structured as follows. The next section reviews the background literature and develops testable hypotheses. Section 3 overviews the data collection process and the characteristics of that data. Section 4 documents the method and results of the tests. Section 5 concludes.

2. Literature review and empirical prediction

Finance research has generally dichotomized investors in financial markets as either uninformed or informed traders. Uninformed traders (Kyle, 1985) can be 'irrational' or 'sentiment' traders (Shleifer and Vishny, 1990), 'noise' traders (Black, 1986), and/or 'liquidity' traders (Treynor, 1971). Conversely, informed traders have been characterized into various types, such as 'arbitrageurs' or 'smart money' traders or 'rational speculators' (Shleifer and Summers, 1990). Informed traders, while advantaged, still face risk and uncertainty. For example, such investors who have inside knowledge or arbitrageurs who can lock in their returns might have lower risks, but generally even trading by fully rational investors is risky and arbitrage is limited (Shleifer and Summers, 1990).

If one accepts the possibility that the relation between prices and fundamental values is decoupled, the issue of what determines market prices is largely an empirical question.[2] More specifically, in which direction (positive or negative) do prices move when sentiment changes and are

these changes symmetric? That is, if investor sentiment rises or falls by a given magnitude, will the magnitude of the effect on the FX market be the same? The main goal of our study is to examine whether and to what extent the negativity effect provides an answer to this question.

As outlined in the introduction, asymmetric behavior is a concept generally characterized by a greater impact of negative *versus* positive stimuli on a subject (Peeters and Czapiński, 1990). Generally, negative phenomena have been found to attract more attention (Fiske, 1980), stimulate more attributional questions (Wong and Weiner, 1981), more often trigger counterfactual thought (Gleicher et al., 1990), and more frequently stimulate the curiosity of scientists (Czapiński, 1985).[3] Generally, the psychological literature provides evidence that, other things being equal, negative events appear to elicit more physiological, affective, cognitive, and behavioral activity and prompt more cognitive analysis than neutral or positive events (Taylor, 1991).

The actual cognitive basis as to why a negativity effect occurs is unclear. Cannon (1932) has been credited with being the first to describe the potential basis for negativity effects (Taylor, 1991). Cannon (1932) proposed that when a threat is perceived, the body is rapidly aroused and mobilized by the sympathetic nervous system and the endocrine system. This response is marked by the secretion of catecholamines, leading to an increase in the heart rate, blood pressure, blood sugar, and respiration (Taylor, 1991). This is the classic fight-or-flight response. This suggests that the attraction of negative information is created by a genetic predisposition – an evolutionary theory. Since all our genes are likely to be coded more or less similarly in this regard, then we are all more inclined to attend to negative stimuli over positive stimuli. The negativity effect in psychology can also be understood from a 'fight-or-flight' basis. Namely, if one does not attend to 'bad' information then one's life may be jeopardized, whereas failure to attend to 'good' information is unlikely to jeopardize one's life.

From a finance perspective, there are two manifestations of the effect: (1) potential costs are more heavily weighted than potential gains in making decisions under risk; and (2) negative information is weighted more heavily than positive information in the formation of overall evaluations. The first manifestation gave rise to prospect theory.[4] It is the second manifestation that is of interest here. The asymmetric effect suggests that investors will react more to negative information than to positive information. However, how extreme or asymmetric the reaction will be is unclear. Does this negativity effect extend to information such as sentiment?

If a negative sentiment shock occurs in the market, investors perceive this as 'bad' news. The previous expected return is now less certain. Investors rebalance their portfolios by selling the now relatively riskier asset and buying a relatively less risky asset to maintain their preferred risk profile. The selling of the riskier asset drives down the price. If a positive sentiment shock occurs then, due to the psychological negativity effect, investors do not attend to the positive sentiment news and therefore no selling pressure (or buying pressure) occurs and the asset price remains constant. This has been documented in the Australian stock market by Akhtar et al. (2011).

Following the research by Peeters (1971, 1988) and that reported by Lewicka et al. (1992), as well as the extensive support in the psychological literature for negativity effects (see Baumeister et al., 2001; Rozin and Royzman, 2001), our *a priori* expectation is that the release of consumer sentiment news will induce a negativity effect on the value of the Australian dollar against other currencies. FX traders will sell off Australian dollars. As positive sentiment news is not attended to, then the release of similar magnitude positive sentiment announcements will have little or no effect on exchange rates. The currencies that are expected to be most affected by the negative sentiment news are the more heavily traded currencies, although cross-rate or triangular arbitrage is likely to be influential in establishing links between currencies.

In the finance literature asymmetric effects have been given at least two explanations. A strand of literature beginning with Barberis et al. (1998) shows that a series of positive earnings leads investors to expect additional positive earnings. In such a situation, bad news generates a large negative response because it is a surprise, whereas good news generates little response because it is anticipated (Andersen et al., 2003). The resulting asymmetry is driven by asymmetry in expectations rather than asymmetry in the use of the information. Furthermore, if the expectation regarding the quantum of positive news is equal to the quantum of negative news then the psychological literature would suggest a negativity effect.

One could expect that if the quantum of the 'surprise' or news is asymmetric for good versus bad news, then asymmetry in the effect would be observed. For example, if there was overwhelming good news then prices would be expected to increase and, similarly, if there was overwhelming bad news then prices would be expected to fall. The negativity effect implies that average good news does not impact asset prices, while average bad news does. That is, controlling for the quantum of news involved, the negative news response is material while the positive news response is negligible.

Another strand of the literature models investor behavior as a function of the state of the economy. In expansionary periods (good times) the release of bad news is expected to have an unusually large impact. The reasoning uses a rational-expectations equilibrium approach and is explained well in Andersen et al. (2003). We test whether consumer sentiment announcements have a different impact depending upon the state of the economy.

In the prior finance literature related to sentiment, several findings, until now, have not been regarded as the outcome of a normal adaptive function. For example, Baker and Wurgler (2006) find that when sentiment is low, small stocks earn particularly high subsequent returns, but when sentiment is high, there is no effect at all. Schmeling (2009) confirms these findings in an international context. Edmans et al. (2007) use international sporting results as a proxy for investor sentiment. When a country loses a game unexpectedly in an international sporting event, especially in a popular sport such as soccer, the losing country's stock market falls significantly the following day. However, there is not a corresponding increase in the winning country's stock market. The studies that consider the relation between sentiment and stock returns do not explicitly cast them in the context of a negativity effect, but their results are consistent with this psychological phenomenon.

A distinction should be drawn between those studies that consider announcement effects and those that consider longer term relations. For example, market sentiment is extremely difficult to measure. There have been many studies that consider the correlation between various proxies of market sentiment in an attempt to identify some relation between sentiment and stock prices: see, for example, Baker and Wurgler (2007). Unfortunately these studies have not considered negativity as a possible explanation for any asymmetries.

Another explanation for the negativity effect is that while generally people are optimistic, when information is released that indicates other people are pessimistic, then this triggers a behavioral response by market participants. Essentially, it is indicating that the individual had an incorrect view relative to others. Information that indicates that other people are optimistic is simply confirmatory evidence of one's own perspective and does not trigger any response.

Studies that consider the announcement effects are sparse, particularly in FX markets. Gulley and Sultan (1998) document asymmetry in the effect on US exchange rates on announcements of US consumer sentiment. Similarly, Andersen et al. (2003), using US dollar spot exchange rates, find that negative macro surprises often have a greater impact than positive surprises. Unfortunately, it is not possible from the reported analysis in either of these papers to identify if their results are actually due to an intensity effect or not.

Motivated by the forgoing discussion, we formally present the negativity effect applied to sentiment news in FX markets, in terms of the following empirical prediction:

> The announcement of negative (positive) consumer sentiment news will induce a depreciation (zero effect) of the Australian dollar.

3. Data

The consumer sentiment index (CSI) produced by the Westpac-Melbourne Institute of Applied Economic and Social Research is similar to that produced in the US by the University of Michigan, and is regarded as the main index of consumer sentiment in Australia.[5] The CSI is an average of five components that reflect consumers' evaluations of their household financial situation over the past year and the coming year, anticipated economic conditions over the coming year and the next five years, and buying conditions for major household items. The CSI is constructed based on surveys of consumers undertaken approximately one week before the CSI is publicly released. It would be difficult to replicate the CSI using existing market data, such as the current short-term interest rate or stock market behavior. In this sense, the CSI provides a timely indicator of attitudes to the business climate, personal finance, and spending.

Announcements of the CSI occur and are available on a monthly basis from June 1992. Our ending month is December 2009. What makes the use of these data unique is that Australia is one of the few places where the announcement of a CSI has been undertaken over a sufficiently lengthy period to allow meaningful analysis to be performed. Further, in other countries, including the US, the release of consumer sentiment is often a two-stage process.[6] This process involves a preliminary release of results early in the month followed by a second release later in the month. This staggered release of information is likely to dilute considerably any effect in financial markets. In Australia, the CSI is held under embargo until the second Wednesday of the month. It is announced to the market around 11 a.m. on the release day.[7]

Given the announcement is made at 11 a.m., the FX market has access to the CSI data for most of its trading hours on the announcement day. If the CSI contains valuable information and the FX market is efficient, then the information is expected to be incorporated into FX prices by the end of the announcement day. We obtain daily FX rates for 13 foreign currencies against the Australian dollar available from the Reserve Bank of Australia (RBA):[8] US Dollar, UK Pound, Euro, Chinese Renminbi, Swiss Franc, Canada Dollar, Indonesian Rupiah, Japanese Yen, Korean Won, Malaysian Ringgit, New Zealand Dollar, Singapore Dollar, and Taiwan New Dollar.[9]

4. Method and results

4.1. Descriptive statistics

The daily changes in each FX rate are calculated as

$$FX_{i,t} = \text{Log}\left(\frac{F_{i,t}}{F_{i,t-1}}\right) \tag{1}$$

where $FX_{i,t}$ is FX rate, i on day t for each of the 13 different currencies available from the RBA. FX rates are used in indirect quote form for ease of interpretation. That is, a negative (positive) change

reflects depreciation (appreciation) of the Australian dollar. The change in the CSI from month to month is calculated as:

$$\Delta CSI_m = \frac{CSI_m}{CSI_{m-1}} \tag{2}$$

where CSI_m is the CSI for month m. When ΔCSI_m is greater (less) than unity, it represents a positive (negative) change in consumer sentiment.

Figure 1 illustrates the movement of the CSI over the sample period and Table 1 reports some basic descriptive statistics for ΔCSI_m over our sample period. We see that the average monthly value is 1.003. Based on a *t*-test, this is insignificantly different from unity. A Jarque–Bera test for normality cannot reject the null hypothesis that the distribution is normal (Jarque–Bera statistic = 0.495; prob = 0.780).[10] As such, the results reported in Table 1 justify the assumption of 'equal intensity' between positive and negative stimuli (Peeters and Czapiński, 1990).[11] There are 211 CSI announcements over the sample period and these are divided almost equally between months when the change in the CSI is positive (i.e. value > 1: 103 announcements) and when it is negative (i.e. value < 1: 108 announcements).

Table 2 presents the sample correlations between changes in the FX rates. It can be seen from the table that correlations range from a high of 0.961 between China and the US to a low of 0.117 between New Zealand and Korea.

Table 3 provides information about the changes in FX rates partitioned between positive CSI announcement days and negative CSI announcement days over the sample period. When the sentiment announcement is positive there is no significant difference between changes in the value of the Australian Dollar relative to other days across any of the 13 currencies examined.

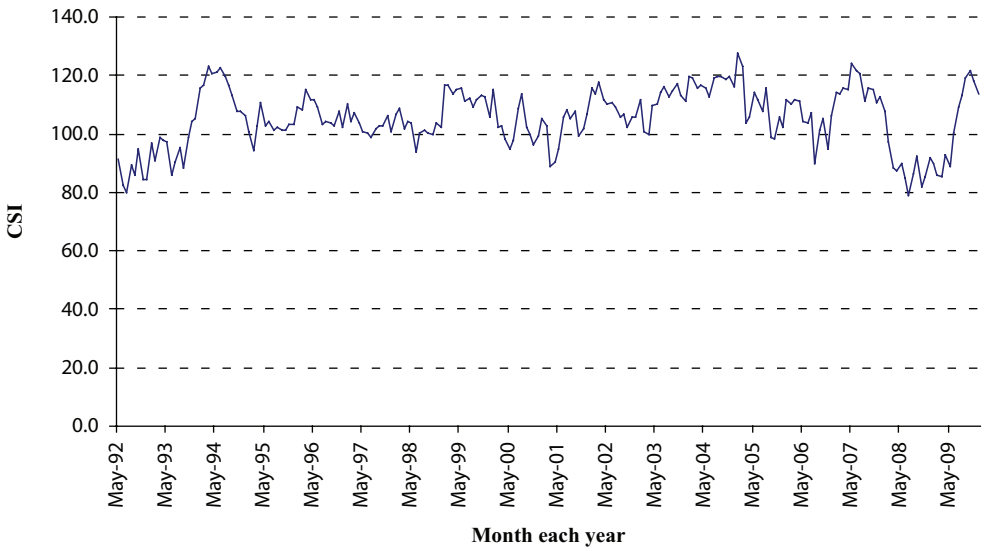

Figure 1. Westpac-Melbourne Institute of Applied Economic and Social Research monthly consumer sentiment index (CSI). May 1992–December 2009.

Table 1. Descriptive statistics on changes in the consumer sentiment index (CSI). This table reports the descriptive statistics for the monthly changes in the CSI from May 1992 until December 2009. Changes in the CSI were calculated as:

$$\Delta CSI_m = \frac{CSI_m}{CSI_{m-1}} \tag{2}$$

where CSI_m is the CSI for month m.

Statistic	Value
Average	1.003
Std dev	0.057
Maximum	1.150
Minimum	0.838
t-test	0.678
Prob-value	0.498

When the sentiment announcement is negative, all 13 FX rates are negative. This negative exchange rate change represents a depreciation of the Australian dollar relative to the other currencies. In particular, returns on nine currencies are significant and negative on negative CSI announcement days (at the 10% level or better). These cases are the US Dollar, UK Pound, Chinese Renminbi, Swiss Franc, Indonesian Rupiah, Japanese Yen, Korean Won, Singapore Dollar, and the Taiwan New Dollar. The Euro, Canada Dollar, Malaysian Ringgit, and the New Zealand Dollar are not significant.

The fact that there is a difference across currencies is not all that surprising – the question is, does any pattern emerge regarding which cases come in significant and which do not? At first glance it does appear that currency prominence may be a major factor, since major currencies such as the US Dollar, UK Pound, Japanese Yen, and the Chinese Renminbi are significant. The weak result for the Euro may be due to the reduced number of observations, since data are only available from January 1999. Overall these results provide the first piece of evidence of negativity effects in the various FX rates changes.

4.2. Regression analysis

4.2.1. Baseline regression. We test for negativity in the context of Equation (3):

$$FX_{i,t} = \beta_{i,0} + \beta_{i,1} Neg_t + \beta_{i,2} Pos_t + \beta_{i,3} IR_{A,t} + \beta_{i,4} IR_{i,t} + \varepsilon_{i,t} \tag{3}$$

for $i = 1, 2,..., 13$, and where Neg_t (Pos_t) is a dichotomous variable taking a value of unity for the day of an announcement when the monthly change in sentiment is negative (positive) news; $FX_{i,t}$ is the natural logarithm of the daily change in the Australian Dollar with respect to the currency of country i; $IR_{A,t}$ is the natural logarithm of the daily change in the Australian interest rate; and $IR_{i,t}$ is the natural logarithm of the daily change in the interest rate of country i.[12] We perform the regression analysis using a systems version of the Generalized Method of Moments (GMM).[13] That is, we estimate Equation (3) jointly across all FX cases.

The results from estimating Equation (3) are shown in Panel A of Table 4. In the left-hand side of the panel we see there are seven currencies that are significant on the negative CSI coefficient (at the 10% level or better). These are UK, China, Indonesia, Japan, Korea, New Zealand, and Taiwan

Table 2. Correlations between currency returns. This table reports the correlation between changes in foreign exchange rates.

	US Dollar	UK Pound	Euro	Chinese Renminbi	Swiss Franc	Canada Dollar	Indonesian Rupiah	Japanese Yen	Korean Won	Malaysian Ringgit	New Zealand Dollar	Singapore Dollar
UK Pound	0.703	1.000										
Euro	0.623	0.712	1.000									
Chinese Renminbi	0.961	0.686	0.608	1.000								
Swiss Franc	0.640	0.695	0.931	0.625	1.000							
Canada Dollar	0.729	0.586	0.529	0.698	0.516	1.000						
Indonesian Rupiah	0.551	0.376	0.311	0.529	0.311	0.446	1.000					
Japanese Yen	0.784	0.625	0.627	0.760	0.697	0.568	0.449	1.000				
Korean Won	0.663	0.489	0.432	0.638	0.428	0.561	0.437	0.544	1.000			
Malaysian Ringgit	0.965	0.691	0.620	0.933	0.629	0.732	0.554	0.748	0.689	1.000		
New Zealand Dollar	0.181	0.219	0.218	0.168	0.207	0.140	0.119	0.173	0.117	0.201	1.000	
Singapore Dollar	0.937	0.713	0.670	0.907	0.684	0.720	0.580	0.814	0.715	0.938	0.210	1.000
New Taiwan Dollar	0.953	0.698	0.631	0.919	0.646	0.718	0.554	0.788	0.721	0.940	0.197	0.936

Table 3. Average change in foreign exchange rates on positive and negative consumer sentiment index (CSI) days versus all other days in the sample period. This table reports the average change in foreign exchange across 13 currencies with the Australian dollar on positive and negative CSI announcement days. A *t*-test is reported to test the difference in mean between the different exchange rates assuming unequal variances.

Currency	US Dollar	UK Pound	Euro	Chinese Renminbi	Swiss Franc	Canada Dollar	Indonesian Rupiah	Japanese Yen	Korean Won	Malaysian Ringgit	New Zealand Dollar	Singapore Dollar	Taiwan New Dollar
Positive CSI days versus all other days													
***t*-stat**	0.635	0.918	−0.604	0.506	0.005	1.456	−0.039	0.365	0.095	0.281	0.008	0.984	1.477
***p*-value**	0.526	0.360	0.547	0.613	0.995	0.148	0.968	0.715	0.924	0.779	0.993	0.327	0.142
Negative CSI days versus all other days													
***t*-stat**	**−1.682**	**−2.380**	−0.816	**−2.311**	**−1.876**	−1.433	**−2.860**	**−2.990**	**−2.328**	−1.210	−0.061	**−3.295**	**−2.265**
***p*-value**	**0.095**	**0.019**	0.417	**0.022**	**0.063**	0.154	**0.004**	**0.003**	**0.021**	0.228	0.950	**0.001**	**0.025**

currencies. These results are similar to the *t*-test of Table 3. Controlling for interest rate changes produces some slight variations in results: the United States, Singapore, and Switzerland are now not significant, while New Zealand has become significant. The right-hand side of Panel A documents the results of estimating the positive CSI coefficient. Similar to the individual *t*-tests, none of the coefficients show significance. These results reinforce the evidence of negativity in the FX market.

Table 4. The effect of positive and negative changes in sentiment on various foreign currency returns. This table reports the outcome of Generalized Method of Moments (GMM) estimation for the following regressions. In Panel A:

$$FX_{i,t} = \beta_{i,0} + \beta_{i,1} Neg_t + \beta_{i,2} Pos_t + \beta_{i,3}\, IR_{A,t} + \beta_{i,4}\, IR_{i,t} + \varepsilon_{i,t} \quad (3)$$

and in Panel B:

$$FX_{i,t} = \lambda_{i,0} + \lambda_1 Neg_t + \lambda_2 Pos_t + \lambda_{i,3}\, IR_{A,t} + \lambda_{i,4}\, IR_{i,t} + \varepsilon_{i,t} \quad (4)$$

for $i = 1, 2, ..., 13$, and where $FX_{i,t}$ is the natural logarithm of the daily change in the Australian Dollar with respect to the currency of country i; Neg_t (Pos_t) is a dichotomous variable taking a value of unity for the day of an announcement when the change in sentiment relative to the previous month is deemed negative (positive) news; $IR_{A,t}$ is the natural logarithm of the daily change in the Australian interest rate; and $IR_{i,t}$ is the natural logarithm of the daily change in the interest rate of country i. The currencies examined are: US Dollar, UK Pound, Euro, Chinese Renminbi, Swiss Franc, Canada Dollar, Indonesian Rupiah, Japanese Yen, Korean Won, New Zealand Dollar, Singapore Dollar, Malaysian Ringgit, and New Taiwan Dollar. The estimation uses Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors and covariance. The table suppresses reporting the intercept terms to conserve space. Reported regression coefficient estimates are multiplied by 1000 to improve readability.

Panel A: unrestricted differential estimates across the alternative currency returns

Estimated coefficients on negative CSI dummy				Estimated coefficients on positive CSI dummy			
	Coefficient	*t*-Statistic	Prob.		Coefficient	*t*-Statistic	Prob.
$\beta_{US,1}$	−1.055	−1.592	0.111	$\beta_{US,2}$	0.465	0.767	0.443
$\beta_{UK,1}$	**−1.483**	**−2.305**	**0.021**	$\beta_{UK,2}$	0.582	1.101	0.271
$\beta_{Euro,1}$	−0.126	−0.151	0.880	$\beta_{Euro,2}$	−0.297	−0.432	0.666
$\beta_{China,1}$	**−1.331**	**−1.948**	**0.051**	$\beta_{China,2}$	0.059	0.077	0.939
$\beta_{Swiss,1}$	−0.681	−1.356	0.175	$\beta_{Swiss,2}$	0.898	1.440	0.150
$\beta_{Canada,1}$	−4.562	−1.280	0.201	$\beta_{Canada,2}$	5.957	0.575	0.566
$\beta_{Indonesia,1}$	**−1.492**	**−2.479**	**0.013**	$\beta_{Indonesia,2}$	0.449	0.720	0.472
$\beta_{Japan,1}$	**−1.799**	**−3.403**	**0.001**	$\beta_{Japan,2}$	0.247	0.438	0.662
$\beta_{Korea,1}$	**−2.346**	**−3.063**	**0.002**	$\beta_{Korea,2}$	0.260	0.326	0.744
$\beta_{NZ,1}$	**−1.758**	**−2.238**	**0.025**	$\beta_{NZ,2}$	0.224	0.267	0.790
$\beta_{Singapore,1}$	−0.066	−0.199	0.842	$\beta_{Singapore,2}$	−0.040	−0.116	0.908
$\beta_{Malaysia,1}$	−0.578	−0.953	0.341	$\beta_{Malaysia,2}$	0.358	0.520	0.603
$\beta_{Taiwan,1}$	**−1.261**	**−2.140**	**0.032**	$\beta_{Taiwan,2}$	1.145	1.905	0.057

Panel B: restricted fixed estimates across the alternative currency returns

λ_1	−1.748	−3.112	**0.002**	λ_2	0.108	0.204	0.838

CSI: consumer sentiment index

To provide a further overall test of negativity, a GMM model is estimated with the restriction that the negative CSI coefficient and the positive CSI coefficient are each held constant across exchange rates. In effect, the data across all the alternative exchange rates are pooled into a single regression. This is given by Equation (4):

$$FX_{i,t} = \lambda_{i,0} + \lambda_1 Neg_t + \lambda_2 Pos_t + \lambda_{i,3}\, IR_{A,t} + \lambda_{i,4}\, IR_{i,t} + \varepsilon_{i,t} \quad (4)$$

for $i = 1, 2,..., 13$, and the variables are as previously described.

The results of estimating Equation (4) are shown in Panel B of Table 4. As seen in the left-hand side of the panel, the estimated negative CSI coefficient is significant (at the 1% level), indicating that on average a 'bad news' CSI announcement is associated with a depreciation of the Australian dollar of approximately 0.17%. In contrast, the right-hand side of Panel B reveals that the estimated positive CSI coefficient is not significant. In combination, these results add further support to negativity effects in FX rates against the Australian dollar.

Recent research by Akhtar et al. (2011) has shown that the Australian stock market also suffers from negativity effects. To control for potential negativity spillover effects from the Australian stock market we model the FX negativity controlling for returns on the Australian stock market and world stock markets, as shown in Equations (5) and (6):

$$FX_{i,t} = \beta_{i,0} + \beta_{i,1} Neg_t + \beta_{i,2} Pos_t + \beta_{i,3}\, IR_{A,t} + \beta_{i,4}\, IR_{i,t} + \beta_{i,5} R_{A,t} + \beta_{i,6} R_{wt-1} + \varepsilon_t \quad (5)$$

$$FX_{i,t} = \lambda_{i,0} + \lambda_1 Neg_t + \lambda_2 Pos_t + \lambda_{i,3}\, IR_{A,t} + \lambda_{i,4}\, IR_{i,t} + \lambda_{i,5} R_{A,t} + \lambda_{i,6} R_{wt-1} + \varepsilon_t \quad (6)$$

for $i = 1, 2,..., 13$, and where $R_{A,t}$ is the logarithmic change on the Australian All Ordinaries Index on day t, and R_{wt-1} is the logarithmic change on the Morgan Stanley Capital International (MSCI) World Index on day $t - 1$ (both series of data are provided by Datastream).[14] The other variables are as previously defined.

As with the previous analyses, we use the GMM framework in estimating Equations (5) and (6). The results for estimating Equation (5) (Equation (6)) are shown in Panel A (Panel B) of Table 5. The left-hand side of Panel A shows that the negative CSI coefficients for the US, UK, Euro, Indonesia, and Korea are statistically significant (at the 10% level or better), while all coefficients except three cases (China, Singapore, and Taiwan) are negative – a seemingly low-chance joint event (under a null hypothesis of randomness). Only one of the estimated coefficients (Taiwan) on the positive sentiment variable shows significance, but then only at the 10% level (right-hand side of the panel). In relation to Equation (6), these results are shown in Panel B of Table 5. Here we find that the estimated negative CSI coefficient enters the model negatively but with high significance (p-value = 0.006), while the estimated positive CSI coefficient remains insignificant (right-hand side of the same panel). On the announcement of a negative CSI, the Australian dollar depreciates by 0.143% on average, after controlling for movements in the Australian and global stock markets. These results continue to support negativity effects in the Australian FX market, and they do not seem to be tempered by spillover effects, either from or to local and international stock markets.

We further analyse FX rates in the days surrounding the CSI announcements. Generally, on the day before a negative CSI announcement there is a similar result as to that reported for the announcement day. This is expected, as there is likely to be some 'leakage' of the sentiment information. A significant negative depreciation of the Australian Dollar also occurs on the day after a negative CSI announcement, suggesting there is some delay, but by the second day after the

Table 5. The effect of positive and negative changes in sentiment on various foreign currency returns controlling for stock market returns. This table reports the outcome of Generalized Method of Moments (GMM) estimation for the following regressions. In Panel A:

$$FX_{i,t} = \beta_{i,0} + \beta_{i,1}Neg_t + \beta_{i,2}Pos_t + \beta_{i,3}IR_{A,t} + \beta_{i,4}IR_{i,t} + \beta_{i,5}R_{A,t} + \beta_{i,6}R_{wt-1} + \varepsilon_t \quad (5)$$

and in Panel B:

$$FX_{i,t} = \lambda_{i,0} + \lambda_1 Neg_t + \lambda_2 Pos_t + \lambda_{i,3}IR_{A,t} + \lambda_{i,4}IR_{i,t} + \lambda_{i,5}R_{A,t} + \lambda_{i,6}R_{wt-1} + \varepsilon_t \quad (6)$$

for $i = 1, 2, ..., 13$, and where $FX_{i,t}$ is the natural logarithm of the daily change in the Australian Dollar with respect to the currency of country i; Neg_t (Pos_t) is a dichotomous variable taking a value of unity for the day of an announcement when the change in sentiment relative to the previous month is deemed negative (positive) news; $IR_{A,t}$ is the natural logarithm of the daily change in the Australian interest rate; $IR_{i,t}$ is the natural logarithm of the daily change in the interest rate of country i; R_{At} is the logarithmic change on the Australian All Ordinaries Index on day, t, and R_{wt-1} is the logarithmic change on the MSCI World Index on day $t - 1$. The currencies examined are: US Dollar, UK Pound, Euro, Chinese Renminbi, Swiss Franc, Canada Dollar, Indonesian Rupiah, Japanese Yen, Korean Won, New Zealand Dollar, Singapore Dollar, Malaysian Ringgit, and New Taiwan Dollar. The estimation uses Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors and covariance. The table suppresses reporting the intercept terms and the betas on domestic and world returns to conserve space. Reported regression coefficient estimates are multiplied by 1000 to improve readability.

Panel A: unrestricted differential estimates across the alternative currency returns

Estimated coefficients on negative CSI dummy				Estimated coefficients on positive CSI dummy			
	Coefficient	*t*-Statistic	Prob.		Coefficient	*t*-Statistic	Prob.
$\beta_{US,1}$	**–3.245**	**–2.826**	**0.005**	$\beta_{US,2}$	–1.118	–1.083	0.279
$\beta_{UK,1}$	**–1.715**	**–2.375**	**0.018**	$\beta_{UK,2}$	0.364	0.564	0.573
$\beta_{Euro,1}$	**–6.537**	**–2.021**	**0.043**	$\beta_{Euro,2}$	0.318	0.193	0.847
$\beta_{China,1}$	1.053	0.302	0.762	$\beta_{China,2}$	–3.484	–1.125	0.261
$\beta_{Swiss,1}$	–2.640	–0.223	0.823	$\beta_{Swiss,2}$	–1.504	–0.122	0.903
$\beta_{Canada,1}$	–2.329	–0.376	0.707	$\beta_{Canada,2}$	9.081	0.462	0.644
$\beta_{Indonesia,1}$	**–1.059**	**–1.815**	**0.070**	$\beta_{Indonesia,2}$	0.448	0.695	0.487
$\beta_{Japan,1}$	–0.278	–0.382	0.703	$\beta_{Japan,2}$	1.002	1.373	0.170
$\beta_{Korea,1}$	**–2.018**	**–2.084**	**0.037**	$\beta_{Korea,2}$	0.129	0.128	0.898
$\beta_{NZ,1}$	–1.920	–0.281	0.779	$\beta_{NZ,2}$	–0.997	–0.192	0.848
$\beta_{Singapore,1}$	1.315	0.311	0.756	$\beta_{Singapore,2}$	0.612	0.177	0.859
$\beta_{Malaysia,1}$	–0.225	–0.359	0.720	$\beta_{Malaysia,2}$	0.523	0.743	0.458
$\beta_{Taiwan,1}$	0.040	0.042	0.966	$\beta_{Taiwan,2}$	**6.242**	**1.696**	**0.090**
Panel B: restricted fixed estimates across the alternative currency returns							
λ_1	**–1.429**	**–2.738**	**0.006**	λ_2	0.107	0.203	0.840

CSI: consumer sentiment index

announcement the effect is insignificant. When we consider the second day before there is no evidence of negativity effects.[15,16]

To contextualize our results to the strand of literature that considers bad announcements in good times, such as Conrad et al. (2002), we obtain data from the Melbourne Institute of Applied

Economic and Social Research reports on phases of the business cycle.[17] We use these data to create a dichotomous variable to reflect when the economy is in a period of expansion (Exp_t). We then augment Equation (3) with a term that interacts the negative CSI dummy with Exp_t, that is, $\lambda_7 Neg_t * Bus_t$. If a given quantum of bad news is deemed to be worse in good times, then $\lambda 7$ is expected to be significantly negative. The results (unreported) do not show any significance on the interaction coefficient. Therefore, negative CSI announcements do not have a stronger relation with changes in FX in expansion periods relative to contraction periods.[18]

Ludvigson (2004: 29) asks: 'Do consumer confidence surveys contain meaningful independent information about the economy, or do they simply repackage information already captured in other economic indicators?' Given that there are numerous economic variables that may influence consumer sentiment, or be influenced by consumer sentiment, we control for economic variables by taking the individual components that are used to develop the Australian economic risk rating (ERR).[19] The results of estimating this augmented equation are consistent with the negativity effect documented for the baseline regression.

5. Conclusion

This research analyses the effect of consumer sentiment announcements on FX rates against the Australian dollar using the CSI issued by the Melbourne Institute of Applied Economics and Social Research. Firstly, the results indicate that the CSI has valuable information content in the FX market. Secondly, when a lower than previous month CSI is announced, the Australian dollar suffers a significant negative depreciation on the announcement day. Notably, there is no counterpart positive appreciation of the Australian dollar on positive CSI announcement days. This supports the negativity effect documented in the psychology literature and in the Australian stock market by Akhtar et al. (2011). Controlling for stock market movements does not alter these findings. This suggests that there is a common negativity effect across the stock and FX markets in Australia.

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Notes

1 A distinction should be drawn between the relation of sentiment and FX in the longer term, such as Menkhoff and Rebitzky (2008), and the relation of sentiment announcements and FX. The later is a short-term relation.

2 Some influential empirical studies have suggested that, for FX, prices and fundamentals are largely disconnected (Meese and Rogoff, 1983).

3 Baumeister et al. (2001) among others, consider the negativity effect as an adaptive response to physical and social environments. The negativity effect has been documented in everyday events, major life events, such as trauma, close relationship outcomes, social network patterns, interpersonal interactions, and learning processes.

4 Veronesi (1999) presents a dynamic, rational-expectations equilibrium model of asset prices in which investors overreact (underreact) to bad (good) news in good (bad) times. However, Veronesi's model requires 'good time' and 'bad time' economic states to accommodate the asymmetric reaction. While prospect theory does not require such states (Kahneman and Tversky, 1979), there is asymmetry in the utility attaching to gains and losses. However, prospect theory does not directly provide us with any prediction of what investors are expected to do upon the arrival of positive or negative information (e.g. that market sentiment has risen or fallen).

5 The CSI has been included in the RBA statistical tables since 1974.
6 A good review of the two main CSIs in the US is in Bram and Ludvigson (1998). The Melbourne Institute CSI is reviewed in Loundes and Scutella (2000). For a cross-country comparison of CSIs, see Golinelli and Parigi (2003).
7 We checked announcement releases for a range of other 'sentiment' and 'economic' indices that were available at various times across the sample period and failed to identify any potential confounding events that would affect our CSI variable.
8 In addition to the RBA data, a similar series of exchange rates were obtained from Datastream and all the tests replicated with substantially similar results to those reported.
9 We ameliorate the impact of outliers by applying a 1% winsorization to the sample (i.e. 0.5% to both tails).
10 Calculating the change in the CSI as the natural logarithm of the relative change in index provided substantively similar results.
11 This assumes that a unit increase in sentiment is equal in effect to a unit decrease in sentiment.
12 To control for changes in interest rates in Australia we use the three-year Commonwealth Treasury bond rate. For interest rates in other countries we used a variety of interest rates obtained from Datastream, aiming to maintain the rates as consistent in risk and term to maturity as possible.
13 To support the use of the GMM, from ordinary least-squares (OLS) regressions a Jarque–Bera test for normality indicates that the distribution of residuals in all cases is non-normal at higher than 1% significance.
14 Both indices are dividend adjusted.
15 Cheung and Chinn (2001) report that traders believe that exchange rates adjust almost instantaneously following news announcements, so these results are not surprising.
16 A regression was also conducted on changes in the trade-weighted index. The results, available from the authors upon request, confirm the negativity effect.
17 http://www.melbourneinstitute.com/research/macro/bcchronology.html
18 Since there are only 57 negative CSI announcements in expansionary periods, we cannot draw too much from this result.
19 The individual components of the ERR are obtained from the PRS group (https://www.prsgroup.com/). The approach taken is as follows. Firstly, as the ERR components are only available on a monthly basis, a log change in the monthly component is calculated. Secondly, the monthly log change in the individual component is allocated to each day in the particular month to which it relates. This gives a series of daily log changes in individual components for each month. Our baseline equation is augmented by components relating to: GDP; real GDP growth; annual inflation; budget balance as a percentage of GDP; and current account as a percentage of GDP.

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