

Why Limited opportunities exist for exchange rate Leverage in Australian stocks

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Abstract:

Returns on JSE listed companies have proved very sensitive to the movements in the rand exchange rates. Companies can be categorised accordingly as rand leverage or rand hedge stocks- those whose rand value consistently appreciates(declines) when the rand weakens (strengthens) or as rand plays, companies that have consistently benefited from rand strength when the simultaneous influence of the market is excluded. (See Barr and Kantor (2005)) In this study we compare the reactions to exchange rate movements on the Johannesburg Stock Exchange with exchange rate (Australian dollar) effects on companies listed on the Australian Stock Exchange (ASX). We note that the Australian literature has, in general, found limited opportunity to hedge currency risks in the stock market.

The procedure adopted is to regress monthly share market returns of the top companies in each exchange onto a variable for the change in the exchange rate and a variable for the orthogonalised change in the market. The exchange rate and market betas are then reported with close attention paid to the statistical significance and consistency over time of the respective exchange rate and market betas (co-efficients of the model)

We find that, unlike the results for SA where almost all resource companies are rand hedges, their Australian counterparts reveal themselves (surprisingly given the SA example) as Australian dollar neutral, or even plays, rather than hedges or leverages. We find the reason for these very different results in the very different responses of the real Australian dollar and real rand exchange rates to commodity prices expressed in USD. We show that when commodity prices rise to improve the returns on Australian resource companies, the exchange rate also improves in a consistent way. We show that the reaction of the rand to commodity prices has not consistently been in the same direction. That the real rand has often weakened as commodity prices improves and vice versa explains the rand leverage effects so favourable or unfavourable to the returns realised by shareholders in SA resource companies when measured in rands or USD. These real rand effects we argue provides the opportunities for hedging rand risks on the JSE that are not readily available on the ASX.

1. Measuring exchange rate exposure

Barr, Kantor Holdsworth (2007) examined the exposure of South African companies to fluctuations in the ZAR/USD exchange rate. We have reapplied this method to a more recent data set and compared the results to the exposure of large Australian companies to the exchange rate.

Following from Bar et al. we describe stocks that have benefited from rand weakness and are harmed by rand strength as either rand leverages or pure rand hedges. Stocks that are harmed by rand weakness and benefit from rand strength we describe as rand plays or SA economy plays. We also identify a few companies as rand neutrals in that the rand should not be expected to have a consistent impact on their returns because they operate, with roughly equal importance, in and out of South Africa. Thus any rand exchange rate influences on their operating profits onshore would be expected to be off set by the conversion back into rands of profits or losses made offshore.

The categorisation as leverages, hedges, plays or neutrals is based on the results of a linear regression model of stock market returns of the following kind, similar to that employed by Jorion (1990).

$$\%ALSI_{i,t} = \alpha + \beta_1 \%R/\$_t + \beta_2 \%Top40_t + e_{it} \quad (1)$$

Where

$\%ALSI_{i,t}$ is the continuously compounded change of the i^{th} component of the ALSI at time t

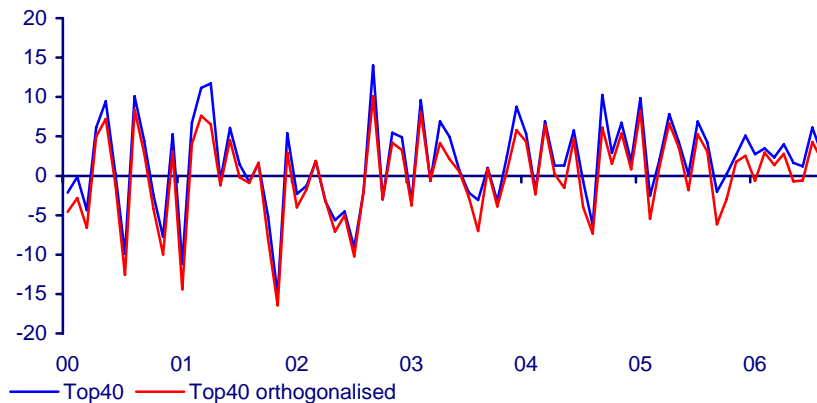
$\%R/\$_t$ is the continuously compounded change of the ZAR/USD at time t

$\%Top40_t$ is the continuously compounded change of the Top40 index at time t .

By including the market effect in this model, we are able to isolate the impact of the exchange rate on share market returns. Forces other than the exchange rate that might influence the returns of an individual share, for example economic growth, inflation and interest rates or changing expectations of them will presumably be captured by the market as a whole and so by the market beta included in the model. The part of returns not explained by either the exchange rate or the market may then be regarded as specific to the firm. For the purpose of drawing conclusions from this analysis a meaningful proportion of the monthly returns of an individual share should be explained by the exchange rate and market betas. Reference therefore is made to the statistical significance of the respective betas and to the R squared of the equation to reveal the goodness of fit of the model or how well the model does in explaining the variation in monthly returns.

The rand, and all that may follow from a stronger or weaker rand for the economy, including more or less inflation and higher or lower interest rates, will also affect the share market. Therefore we have eliminated the influence of the rand on the market through a process of orthogonalising the market returns for movements in the

exchange rate. This helps to give us a pure market beta.¹ We show ALSI market returns before and after orthogonalising the market returns for movements in the ZAR below. As may be seen removing the exchange rate influence on the market does not have a material influence on the direction or magnitude of market returns.



We are moreover well aware that the respective market and rand betas are not necessarily stable and so adopt a rolling 36-month window in which we calculate the respective moving betas. The results of the regression model for the latest 36-month period are shown below² as well as the results for the regression model over the extended period 2000- 2007. Negative betas (typically belonging to rand plays that benefit from rand strength) are shown in red, positive betas typically belonging to rand leverages and hedges that benefit from rand weakness and whose rand values tend to decline when the rand strengthens are indicated in blue and statistically significant betas are shown in bold. We also identify acceptable models, those with an R square above 0.25 by showing this goodness of fit also in bold in the final column

South African Top 50 betas 2004.05-2007.04 (negative betas are red, positive are blue and significant betas are bold. R²s above 25% are bold)

	ZAR	t-stat	p-value	TOP40	t-stat	p-value	R ²
ABL	-1.183	-6.165	0.000	0.969	4.370	0.000	0.634
AFX	-0.012	-0.050	0.960	0.360	1.312	0.199	0.050
AGL	0.622	5.718	0.000	1.261	10.034	0.000	0.802
AMS	0.837	3.592	0.001	1.054	3.916	0.000	0.461
ANG	0.162	0.730	0.470	1.657	6.468	0.000	0.562
APN	-0.204	-0.806	0.426	0.620	2.124	0.041	0.135
ARI	0.309	1.048	0.302	1.584	4.654	0.000	0.408
ASA	-0.659	-4.221	0.000	0.496	2.745	0.010	0.434
BAW	-0.554	-2.709	0.011	1.042	4.407	0.000	0.448
BIL	0.218	1.309	0.200	1.301	6.752	0.000	0.589
BVT	-0.373	-2.347	0.025	0.621	3.378	0.002	0.339
DSY	-0.244	-1.082	0.287	0.225	0.863	0.394	0.055
ECO	-0.803	-3.008	0.005	0.891	2.888	0.007	0.345
FOS	-1.024	-5.218	0.000	0.683	3.013	0.005	0.524
FSR	-0.501	-3.684	0.001	0.993	6.321	0.000	0.619

¹ For a full explanation see the accompanying Appendix

² For a Full list of Names of each of the shares examined with their associated ticker, please see the attached Appendix.

South African Top 50 betas 2004.05-2007.04 (negative betas are red, positive are blue and significant betas are bold. R²s above 25% are bold)

GFI	0.409	1.407	0.169	1.815	5.406	0.000	0.486
HAR	0.644	1.711	0.096	2.727	6.265	0.000	0.561
IMP	0.304	1.627	0.113	0.776	3.592	0.001	0.320
INL	-0.327	-1.799	0.081	0.553	2.635	0.013	0.236
INP	-0.273	-1.445	0.158	0.504	2.313	0.027	0.184
IPL	-0.789	-4.512	0.000	0.972	4.811	0.000	0.569
JDG	-0.992	-4.905	0.000	0.467	1.997	0.054	0.459
LBT	0.486	3.426	0.002	0.321	1.958	0.059	0.321
LGL	-0.430	-2.590	0.014	0.535	2.788	0.009	0.305
MLA	-0.446	-1.574	0.125	1.647	5.030	0.000	0.457
MSM	-0.796	-3.275	0.002	0.649	2.309	0.027	0.327
MTN	-0.429	-2.181	0.036	0.993	4.371	0.000	0.420
NED	-0.735	-4.357	0.000	0.537	2.752	0.010	0.446
NPK	-0.336	-2.737	0.010	0.182	1.280	0.210	0.217
NPN	-0.613	-3.261	0.003	0.932	4.289	0.000	0.468
NTC	0.111	0.540	0.593	0.647	2.732	0.010	0.190
OML	-0.134	-0.762	0.452	0.672	3.295	0.002	0.257
PIK	-0.280	-1.982	0.056	0.690	4.221	0.000	0.397
PPC	-0.896	-3.721	0.001	0.340	1.222	0.231	0.317
RCH	0.327	2.571	0.015	0.706	4.807	0.000	0.474
REM	0.202	1.369	0.180	0.381	2.236	0.032	0.172
RLO	-0.550	-2.585	0.014	0.456	1.856	0.072	0.235
RMH	-0.561	-3.865	0.000	0.810	4.829	0.000	0.537
SAB	0.011	0.070	0.945	0.654	3.753	0.001	0.299
SAP	-0.161	-0.544	0.590	0.971	2.841	0.008	0.202
SBK	-0.550	-4.447	0.000	0.690	4.832	0.000	0.566
SHF	-0.395	-1.715	0.096	0.992	3.728	0.001	0.338
SHP	-0.469	-2.684	0.011	0.596	2.953	0.006	0.325
SLM	-0.546	-2.598	0.014	0.501	2.062	0.047	0.250
SOL	0.085	0.424	0.674	1.375	5.919	0.000	0.516
SUI	-0.272	-1.179	0.247	0.539	2.020	0.052	0.142
TBS	-0.412	-2.531	0.016	1.081	5.745	0.000	0.544
TKG	-0.247	-1.096	0.281	0.042	0.160	0.874	0.036
TRU	-0.943	-4.838	0.000	0.836	3.711	0.001	0.530
WHL	-0.538	-2.967	0.006	0.840	4.006	0.000	0.430

Source: Investec Securities Research and I-net

South African Top 50 betas 1997.05-2007.04 of monthly data

	ZAR	t-stat	p-value	TOP40	t-stat	p-value	R ²
ABL	-0.717	-2.755	0.007	0.977	5.455	0.000	0.250
AFX	-0.315	-2.101	0.038	0.588	5.735	0.000	0.242
AGL	0.256	2.417	0.017	1.282	17.679	0.000	0.731
AMS	0.648	3.837	0.000	1.067	9.236	0.000	0.461
ANG	-0.263	-1.369	0.174	0.800	6.073	0.000	0.249
APN	0.423	1.288	0.200	0.061	0.271	0.787	0.015
ARI	0.252	1.360	0.178	0.827	4.814	0.000	0.243
ASA	-0.586	-3.582	0.000	0.995	8.883	0.000	0.439
BAW	-0.460	-3.386	0.001	0.946	10.184	0.000	0.496
BIL	0.140	1.060	0.291	1.142	12.573	0.000	0.583
BVT	-0.384	-3.458	0.001	0.660	8.693	0.000	0.428
DSY	-0.264	-1.679	0.097	0.402	2.903	0.005	0.114
ECO	-1.086	-4.302	0.000	0.766	4.436	0.000	0.246
FOS	-0.983	-5.562	0.000	0.854	7.066	0.000	0.409
FSR	-0.551	-3.865	0.000	0.886	9.070	0.000	0.454
GFI	0.050	0.233	0.816	0.766	5.245	0.000	0.191
HAR	0.373	1.351	0.179	1.089	5.766	0.000	0.231

South African Top 50 betas 1997.05-2007.04 of monthly data

IMP	0.425	2.305	0.023	1.088	8.611	0.000	0.404
INL	-0.537	-3.566	0.001	0.860	8.352	0.000	0.413
INP	-0.488	-3.225	0.002	0.877	8.476	0.000	0.413
IPL	-0.701	-5.488	0.000	0.814	9.313	0.000	0.500
JDG	-1.252	-6.144	0.000	0.908	6.510	0.000	0.406
LBT	0.643	6.927	0.000	0.417	5.105	0.000	0.449
LGL	-0.214	-1.623	0.108	0.535	4.593	0.000	0.212
MLA	0.385	1.589	0.117	1.249	4.725	0.000	0.286
MSM	-0.521	-2.789	0.007	0.443	2.553	0.013	0.155
MTN	-0.789	-3.763	0.000	1.114	7.763	0.000	0.389
NED	-0.596	-4.418	0.000	0.652	7.055	0.000	0.372
NPK	-0.505	-3.108	0.002	0.659	5.929	0.000	0.277
NPN	-0.682	-2.713	0.008	1.050	6.102	0.000	0.276
NTC	-0.194	-0.827	0.410	0.885	5.502	0.000	0.209
OML	-0.027	-0.240	0.811	0.731	7.422	0.000	0.380
PIK	-0.447	-2.490	0.014	0.649	5.278	0.000	0.225
PPC	-0.626	-3.673	0.000	0.410	3.513	0.001	0.181
RCH	0.244	2.120	0.036	0.801	10.161	0.000	0.479
REM	0.162	1.594	0.115	0.466	4.858	0.000	0.256
RLO	-0.607	-3.786	0.000	0.835	7.608	0.000	0.382
RMH	-0.579	-3.563	0.001	0.940	8.453	0.000	0.418
SAB	-0.108	-1.004	0.317	0.823	11.164	0.000	0.518
SAP	-0.056	-0.311	0.757	1.165	9.402	0.000	0.431
SBK	-0.428	-3.251	0.002	0.866	9.615	0.000	0.468
SHF	0.242	1.526	0.130	0.670	5.227	0.000	0.229
SHP	-0.699	-4.317	0.000	0.484	4.368	0.000	0.244
SLM	-0.356	-2.565	0.012	0.637	5.570	0.000	0.277
SOL	0.278	1.795	0.075	1.105	10.440	0.000	0.490
SUI	-0.202	-1.180	0.240	0.615	5.244	0.000	0.198
TBS	-0.544	-4.460	0.000	0.610	7.312	0.000	0.385
TKG	-0.377	-1.837	0.073	0.107	0.435	0.666	0.072
TRU	-1.066	-4.703	0.000	0.929	5.711	0.000	0.345
WHL	-0.704	-3.722	0.000	0.613	4.663	0.000	0.243

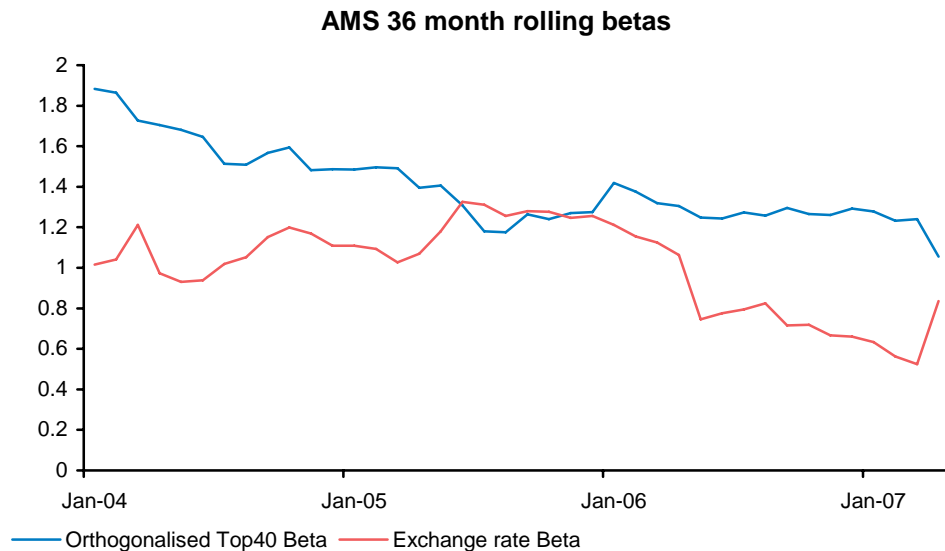
Source: Investec Securities Research and Bloomberg

1.2 A commentary on the SA results

As may be seen almost all of the market betas are statistically significant of plausible magnitude with the SA economy plays generating betas below one and the Resource company market betas above one, indicating above average market risk. Most of the models explain more than 25% of the variation in monthly returns. We have calculated 36 month moving market and rand betas for all of the stocks and we highlight some of the trends in the different betas over time below.

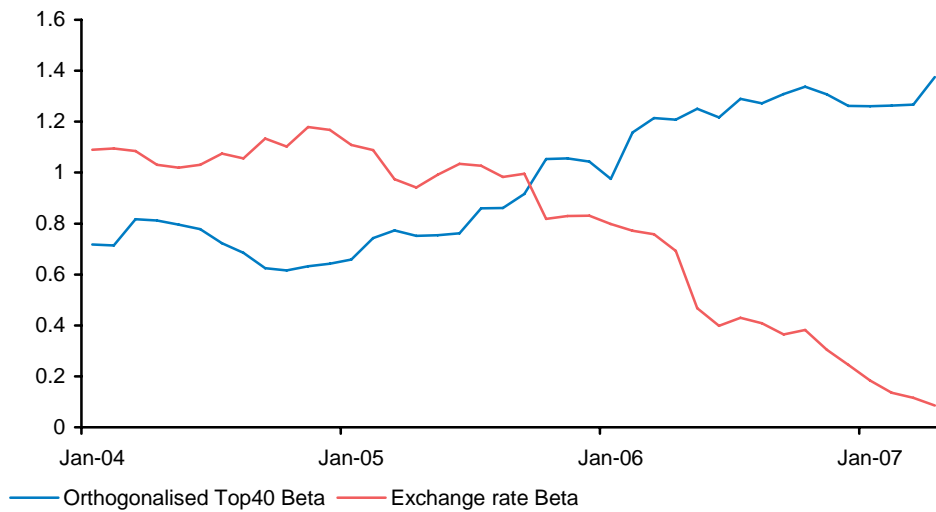
Monthly returns on fourteen of the top 50 shares have had a positive linear relationship with the ZAR/USD exchange rate over the past 36 months indicating their capability for currency hedging. The mining houses fall into this category, though the exchange rate influence on Anglo-American (AGL) is larger and more statistically significant than that on BHP-Billiton (BIL). This is consistent with the fact that only a very small proportion of the operations of BIL take place in SA, providing less leverage to the weaker rand.

The platinum mines Anglo American Platinum (AMS) and Implats (IMP) are also rand hedges in a consistent way with large rand betas. The gold mines Anglo-Gold (ANG) Gold Fields(GFI) and Harmony(HAR) are not obviously useful currency hedges as may also be seen. Clearly gold and gold price hedging specifics have been more important than currency and market effects as may be confirmed by the low R squares for the gold company models. Angloplats's rolling beta provides a good example of a rand leverage share. In this case the exchange rate beta has remained consistently high over time, highlighting the leverage opportunities present in the company. It may also be seen that the market beta has declined over the past year.



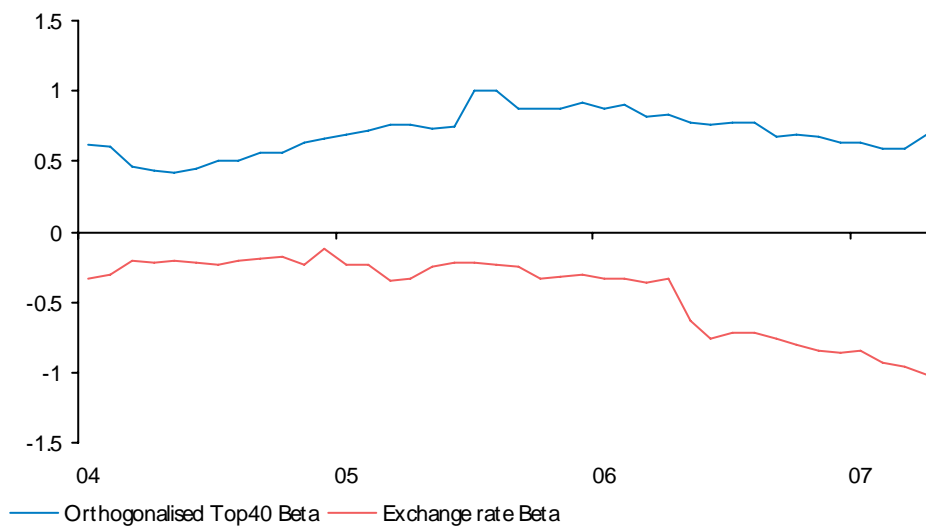
Of the resource companies Sasol (SOL) reveals a rand beta close to zero over the past 36 months that is also statistically insignificant with the implication that it would not have served usefully as a rand hedge over the past three years. However over the past ten years the rand beta for SOL is positive and significant but only at the 10% level. This is a somewhat surprising result since SOL has distinct rand leverage potential as the company converts coal into oil and chemicals in South Africa that are priced in USD at world market equivalent prices. Oil price and firm specifics, perhaps offshore expansion plans as well as a concern over taxing so called windfall profits may have played a part in overriding exchange rate and markets influences on SOL's share price. SOL's rolling exchange rate beta has recently headed towards zero as seen in the following graph while the market beta has headed higher indicating that it has become a more risky counter in recent months.

SOL 36 month Rolling betas

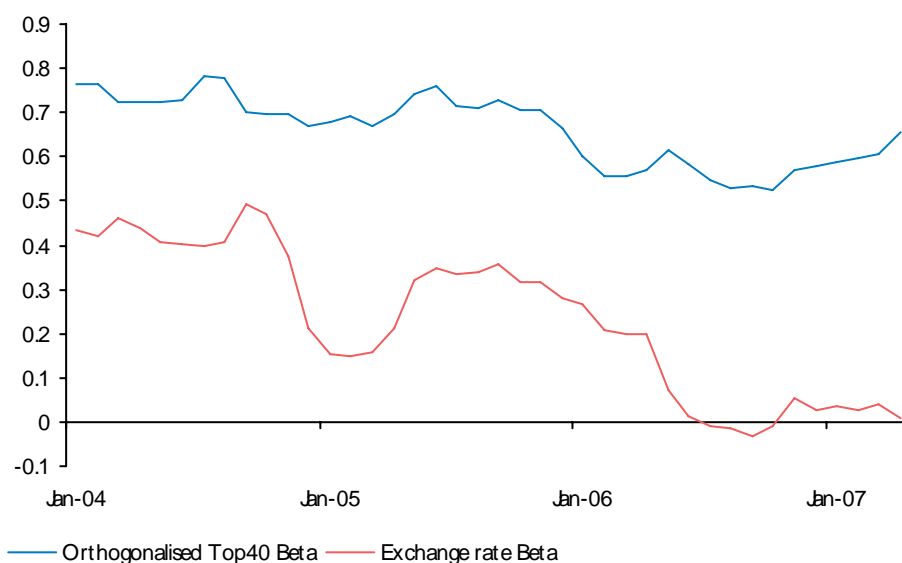


The pure rand hedges LBT and RCH have had significantly positive rand betas over the past 36 months with LBT the most consistent of the rand hedges, a fact that explains part of its strong hold on its SA shareholders. SAB-Miller (SAB), which might on *a priori* grounds be regarded as a rand hedge because much of its assets and liabilities and operations are located outside of SA, has a statistically insignificant rand beta close to zero. This could be attributed to firm specific events that have dominated currency effects on SAB or to the continued importance of its SA operations to its bottom line. It should also be recognised that a disproportionately high share of its profits come from its SA operations. Disproportionate that is to the share of the firm's capital invested in SA.

LBT 36 month Rolling betas

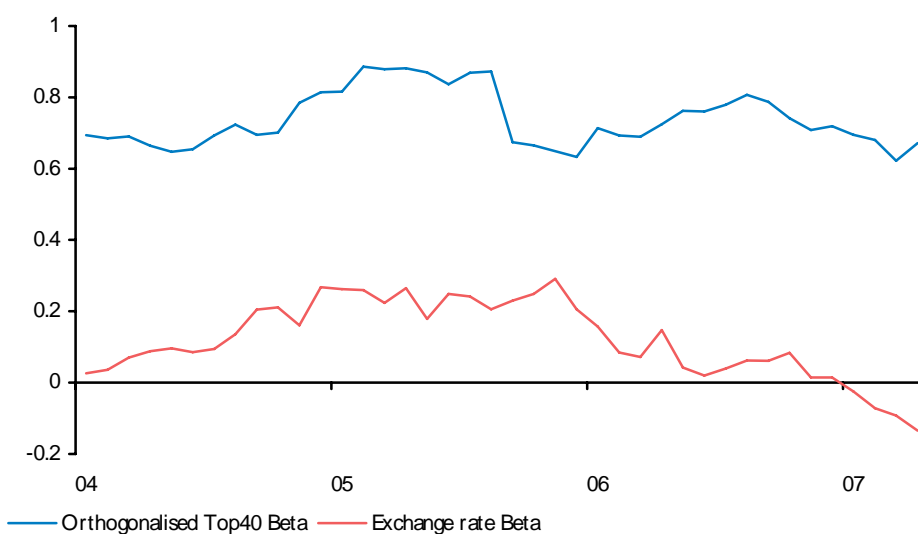


SAB 36 month Rolling betas

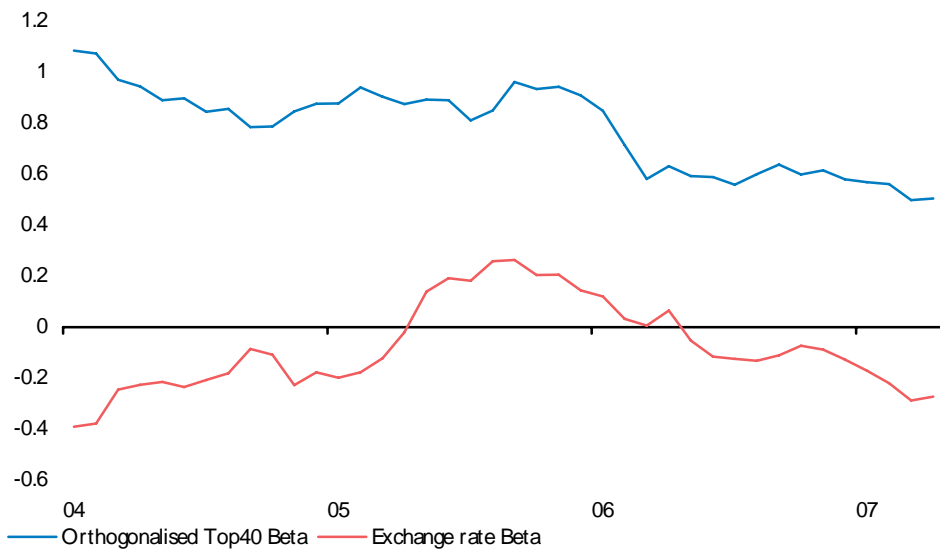


Companies that on a priori grounds, given the mix of their assets and activities onshore and off shore, might be expected to be rand neutral, Investec (INL) (INP) Old Mutual (OML) all still have negative rand betas but these betas are statistically insignificant and therefore they may well be rand neutral. Remgro (REM) has a statistically insignificant positive rand beta. The R^2 s of the model for these shares ranges from 0.127 (REM) to 0.257 (OML) indicating that the models explains a small part of the variance of these shares. The models for these potentially rand neutral companies all have statistically significant market betas, indicating that their returns move with the market but not with the rand.

OML 36 month Rolling betas

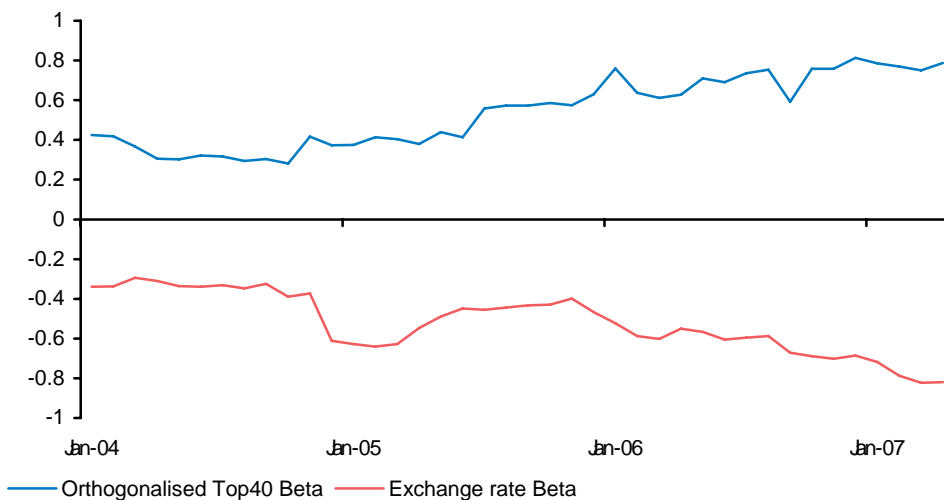


INP 36 month Rolling betas

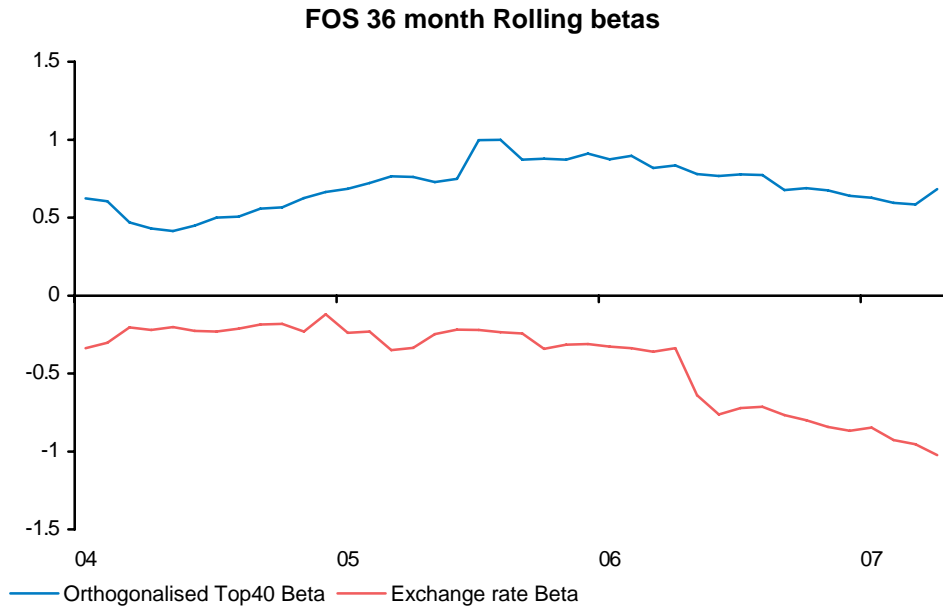


The remainder of the top 50 shares analysed have a negative relationship with the exchange rate, implying that they benefit from exchange rate appreciation. Twenty-seven of these shares have significant relationships with the rand exchange rate and these shares are classified as rand plays. It may be seen that the SA banks and retailers have particularly significantly negative rand betas. The example of Nedcor (NED) shown below is a typical one. Recently Nedbank's exposure to the rand has become even stronger, implying heightened response to rand movements presumably because doubts about the recovery potential of the bank have dissipated.

NED 36 month Rolling betas



FOS's exposure, as a retailer, to the Rand should be negative and the graph below confirms this. The graph shows how recently FOS has become even more sensitive to the share price and benefited more from a strengthening ZAR.



1.3 The Australian case

We extended this analysis to the Australian Stock Exchange. The Australian economy, exchange rates, interest rates also have a dependence on commodity prices and mining companies are also well represented on its Stock Exchange. We therefore investigated whether AUS/USD exchange rate effects influenced returns on the ASX as the ZAR/USD affects returns on the JSE. We examined the market and exchange rate exposure of the top 50 Australian shares³ (the constituents of the ASX 50) and included 14 large shares listed on the ASX but domiciled elsewhere and therefore not included as part of the Australian market. We excluded shares that had less than 20 months of history to ensure. The following table gives the betas for the past 36 months.

ASX constituents and foreign domiciled companies' betas 2004.05-2007.04 (negative betas are red, positive are blue and significant betas are bold. R²s above 25% are bold)

	AUD/\$	t-stat	p-value	ASX50	t-stat	p-value	R ²
AIA	-0.2838	-0.7457	0.4611	0.8990	2.3698	0.0238	0.1576
ALL	0.3368	0.6014	0.5517	1.0308	1.8465	0.0738	0.1026
AMC	0.5997	1.6970	0.0991	0.4895	1.3897	0.1739	0.1272
AMP	0.0605	0.2323	0.8178	0.7296	2.8090	0.0083	0.1940
ANZ	-0.4726	-2.2138	0.0339	0.6989	3.2849	0.0024	0.3223
AVM	-1.3409	-1.4596	0.1545	0.9924	1.1149	0.2734	0.0981
AWC	-0.1160	-0.3730	0.7115	1.3100	4.2266	0.0002	0.3530
AXA	-0.1706	-0.4385	0.6639	0.4381	1.1300	0.2666	0.0426
BHP	-0.6049	-1.6272	0.1132	1.8198	4.9111	0.0000	0.4479
BLD	-0.1038	-0.2365	0.8145	1.0175	2.3253	0.0264	0.1420
BSL	-1.0137	-1.6597	0.1064	1.6692	2.7420	0.0098	0.2374
CBA	-0.3106	-1.4487	0.1569	0.7390	3.4582	0.0015	0.2987
CGJ	0.1480	0.3975	0.6936	0.6297	1.6967	0.0992	0.0843
CNP	-0.0571	-0.1411	0.8887	0.0545	0.1352	0.8933	0.0012

³ For the names associated with each ticker in the table, please see the attached appendix.

ASX constituents and foreign domiciled companies' betas 2004.05-2007.04 (negative betas are red, positive are blue and significant betas are bold. R²s above 25% are bold)

CSL	-0.2794	-0.5704	0.5723	0.8500	1.7412	0.0910	0.0923
EQN	-2.4112	-1.7396	0.0919	2.9910	2.2272	0.0333	0.2049
FBU	-0.3446	-0.8176	0.4195	1.0940	2.6039	0.0137	0.1841
FGL	-0.3442	-0.9087	0.3701	0.5855	1.5508	0.1305	0.0892
FPA	-0.0525	-0.0997	0.9212	1.1319	2.1580	0.0383	0.1239
FPH	0.3032	0.8858	0.3821	0.2235	0.6551	0.5170	0.0355
FXJ	-0.4609	-1.1738	0.2489	0.9920	2.5347	0.0162	0.1912
GPG	0.1622	0.5485	0.5871	0.7603	2.5803	0.0145	0.1741
GPT	0.0675	0.2136	0.8321	0.1619	0.5142	0.6105	0.0093
HGI	-0.2059	-0.4045	0.6885	1.3579	2.6767	0.0115	0.1817
IAG	-0.4692	-1.6269	0.1133	1.1846	4.1209	0.0002	0.3730
LLC	-0.2611	-0.8359	0.4092	1.0404	3.3424	0.0021	0.2645
MAP	-0.2649	-0.7048	0.4859	0.6376	1.7022	0.0981	0.0933
MBL	-0.7189	-2.2193	0.0335	2.3576	7.3025	0.0000	0.6384
MGQ	0.0075	0.0215	0.9830	0.1448	0.4474	0.6588	0.0086
MGR	-0.3136	-0.7583	0.4536	0.3429	0.8318	0.4115	0.0370
MIG	0.4405	1.1555	0.2562	1.3775	3.6251	0.0010	0.3049
NAB	-0.0322	-0.1264	0.9002	0.5562	2.1893	0.0358	0.1272
NCM	-0.6624	-0.9502	0.3489	2.5232	3.6315	0.0009	0.2992
NWS	0.7924	2.1358	0.0402	1.0307	2.7874	0.0087	0.2720
NWSLV	0.7911	2.0934	0.0441	0.9389	2.4927	0.0179	0.2430
ORG	-0.0899	-0.2430	0.8095	0.7155	1.9410	0.0608	0.1039
ORI	-1.1158	-2.9985	0.0051	1.5993	4.3121	0.0001	0.4553
PBL	-0.3179	-0.9883	0.3302	0.6720	2.0962	0.0438	0.1400
PMN	-0.5246	-1.6336	0.1125	0.5144	1.6551	0.1080	0.1485
QAN	-0.4322	-0.9701	0.3391	0.9206	2.0731	0.0461	0.1370
QBE	-0.0651	-0.2242	0.8240	0.8431	2.9135	0.0064	0.2056
RIN	-0.4961	-1.0033	0.3230	2.3075	4.6818	0.0000	0.4099
RIO	-0.2286	-0.6417	0.5255	1.7368	4.8909	0.0000	0.4244
RMD	0.6138	1.2662	0.2143	0.4582	0.9483	0.3499	0.0705
SGB	-0.1570	-0.9391	0.3545	0.8386	5.0316	0.0000	0.4426
SGP	-0.0987	-0.4493	0.6561	0.1667	0.7616	0.4517	0.0231
SGT	0.3928	1.0325	0.3093	0.8959	2.3626	0.0242	0.1677
SKC	0.3358	0.9722	0.3380	0.7927	2.3022	0.0278	0.1591
STO	-0.6216	-1.3129	0.1983	1.0765	2.2810	0.0291	0.1735
SUN	-0.2840	-0.8748	0.3880	0.4675	1.4448	0.1579	0.0796
TAH	-0.1689	-0.5780	0.5672	0.7990	2.7425	0.0098	0.1923
TCL	-0.1455	-0.3021	0.7645	0.0851	0.1774	0.8603	0.0037
TEL	-0.2051	-0.4945	0.6242	1.2216	2.9548	0.0057	0.2138
TLS	-0.4305	-1.1401	0.2625	0.2790	0.7411	0.4639	0.0531
TOL	0.6387	1.1766	0.2478	0.5778	1.0678	0.2933	0.0711
TWR	1.2220	1.4852	0.1470	0.1598	0.1948	0.8467	0.0637
WBC	-0.3894	-1.9303	0.0622	0.9420	4.6847	0.0000	0.4376
WDC	0.1784	0.6269	0.5354	0.3075	1.0969	0.2814	0.0505
WES	-0.6860	-2.4620	0.0192	1.0590	3.8135	0.0006	0.3844
WOW	-0.2149	-0.6561	0.5163	0.5857	1.7940	0.0820	0.0996
WPL	-0.2610	-0.5952	0.5558	1.5680	3.5874	0.0011	0.2861
ZFX	-1.0227	-1.3915	0.1734	0.8697	1.1871	0.2436	0.0920

Source: Investec Securities Research and Bloomberg

The lack of significant currency hedging and leverage opportunities in the Australian market is noticeable when comparing the exposure of the Australian shares to that of the South African shares. This result is similar to that found in the literature (see for example Doidge, Griffin and Williamson (2006)) While there are several stocks with

positive exchange rate betas, the only significant hedges to AUD depreciation are News Corp (NWS and NWSLV) and Amcor Ltd (AMC), an international packaging company. It is also noticeable how poorly the models do in explaining monthly returns of many of the Australian counters as indicated by very low R squares. It may be seen that the model that combines exchange rate and market influences on the returns of the individual shares explains surprisingly, to us, very little of what drives these shares up and down This relative lack of explanatory power is seen by the lower values for the R²s of the models. Very few of the models have R²s above 0.25. The market betas in most cases appear as statistically significant with plausible values around one.

As in our analysis of the South African shares we extended the study back to examine the betas over the last ten years. Similarly to the South African case there was a large degree of correlation between the betas for the last 36 months and those for the last 10 years with a similar failure of the model to explain the monthly returns of the individual stocks

Australia betas 1997.05-2007.04

	AUD/\$	t-stat	p-value	ASX50	t-stat	p-value	R ²
AIA	-0.3248	-1.6566	0.1009	0.0459	0.2378	0.8125	0.0286
ALL	0.3752	0.8361	0.4048	1.4033	3.4031	0.0009	0.0950
AMC	-0.3966	-2.3495	0.0205	0.7806	5.0318	0.0000	0.2086
AMP	0.1477	0.5029	0.6161	1.4846	5.0704	0.0000	0.2013
ANZ	-0.3939	-3.0372	0.0029	1.0665	8.9496	0.0000	0.4329
AVM	-1.3409	-1.4596	0.1545	0.9924	1.1149	0.2734	0.0981
AWC	-0.8427	-3.8708	0.0002	1.2058	6.0273	0.0000	0.3049
AXA	-0.2887	-1.4400	0.1525	0.8921	4.8415	0.0000	0.1790
BHP	-0.7428	-4.1501	0.0001	1.1437	6.9532	0.0000	0.3592
BLD	-0.5863	-2.6964	0.0085	0.5410	2.4292	0.0173	0.1370
BSL	-0.8926	-2.2541	0.0283	1.3805	3.6432	0.0006	0.2537
CBA	-0.2928	-2.1852	0.0309	0.9125	7.4110	0.0000	0.3379
CGJ	-0.0857	-0.4847	0.6288	0.5411	3.3300	0.0012	0.0882
CNP	-0.1822	-1.1920	0.2358	0.1656	1.1453	0.2545	0.0236
CSL	0.2089	0.7201	0.4729	1.0439	3.9159	0.0002	0.1193
EQN	-2.4112	-1.7396	0.0919	2.9910	2.2272	0.0333	0.2049
FBU	-0.1918	-0.8172	0.4166	0.5294	2.4816	0.0155	0.0889
FGL	0.0581	0.3966	0.6924	0.4895	3.6378	0.0004	0.1027
FPA	-0.1962	-0.5805	0.5637	0.8602	2.7099	0.0087	0.1102
FPH	-0.0658	-0.1797	0.8579	0.5270	1.5334	0.1303	0.0370
FXJ	-0.5924	-3.2721	0.0014	0.9214	5.5388	0.0000	0.2613
GPG	0.2996	1.4261	0.1602	0.7651	3.5618	0.0008	0.2310
GPT	-0.1376	-1.1063	0.2709	0.4772	4.1742	0.0001	0.1375
HGI	-0.3120	-0.6468	0.5218	1.2233	2.3530	0.0240	0.1386
IAG	-0.3723	-1.7853	0.0782	0.5806	2.7476	0.0075	0.1224
LLC	-0.0491	-0.2531	0.8006	1.1309	6.3377	0.0000	0.2559
MAP	-0.3894	-0.9222	0.3606	0.6209	1.5359	0.1305	0.0571
MBL	-0.6546	-3.6872	0.0003	1.2872	7.8910	0.0000	0.3934
MGQ	0.0075	0.0215	0.9830	0.1448	0.4474	0.6588	0.0086
MGR	-0.2949	-1.9973	0.0488	0.0710	0.4726	0.6377	0.0442
MIG	-0.1618	-0.7325	0.4653	0.4598	2.2650	0.0254	0.0462
NAB	-0.3185	-2.1642	0.0325	1.0313	7.6248	0.0000	0.3494
NCM	-1.9365	-5.0982	0.0000	1.1309	3.2399	0.0016	0.2377
NWS	-0.1254	-0.4863	0.6276	1.6922	7.1438	0.0000	0.3047
NWSLV	-0.0415	-0.1636	0.8703	1.5504	6.6513	0.0000	0.2745
ORG	-0.6900	-2.6722	0.0086	0.4891	2.0612	0.0415	0.0887

Australia betas 1997.05-2007.04

ORI	-0.8319	-3.8378	0.0002	0.8849	4.4427	0.0000	0.2276
PBL	-0.7374	-4.0339	0.0001	0.8960	5.3336	0.0000	0.2765
PMN	-0.3600	-1.2623	0.2138	0.6217	2.0095	0.0509	0.1182
QAN	-0.2441	-0.9190	0.3600	0.6521	2.6714	0.0086	0.0639
QBE	-0.7344	-3.3268	0.0012	1.2747	6.2838	0.0000	0.3017
RIN	-0.3363	-0.9264	0.3590	2.1290	5.2700	0.0000	0.3836
RIO	-0.7501	-4.0246	0.0001	1.1835	6.9107	0.0000	0.3534
RMD	0.3507	0.9037	0.3687	0.9837	2.4434	0.0166	0.0731
SGB	-0.2508	-2.0146	0.0462	0.4762	4.1630	0.0001	0.1546
SGP	-0.1726	-1.5872	0.1152	0.3496	3.4991	0.0007	0.1120
SGT	0.4433	1.7553	0.0840	0.7345	3.1611	0.0024	0.1696
SKC	-0.1714	-0.8977	0.3717	0.0774	0.3983	0.6913	0.0104
STO	-0.4308	-2.3140	0.0224	0.7695	4.4980	0.0000	0.1794
SUN	-0.0781	-0.5545	0.5803	0.8265	6.3892	0.0000	0.2601
TAH	-0.2641	-1.6793	0.0958	0.5910	4.0889	0.0001	0.1431
TCL	-0.2655	-1.1390	0.2570	0.4046	1.8888	0.0614	0.0399
TEL	-0.2037	-1.0042	0.3173	0.8607	4.6185	0.0000	0.1603
TLS	-0.0129	-0.0690	0.9451	0.4111	2.1799	0.0314	0.0414
TOL	-0.1172	-0.4643	0.6433	0.8676	3.7409	0.0003	0.1083
TWR	0.6058	1.3629	0.1764	0.0753	0.1647	0.8696	0.0210
WBC	-0.2465	-2.1702	0.0320	0.8965	8.5889	0.0000	0.4015
WDC	0.1784	0.6269	0.5354	0.3075	1.0969	0.2814	0.0505
WES	-0.3396	-1.9248	0.0567	0.6778	4.1814	0.0001	0.1533
WOW	0.0774	0.4734	0.6368	0.2070	1.3774	0.1710	0.0178
WPL	-0.2116	-0.9918	0.3234	0.9265	4.7248	0.0000	0.1661
ZFX	-1.0227	-1.3915	0.1734	0.8697	1.1871	0.2436	0.0920

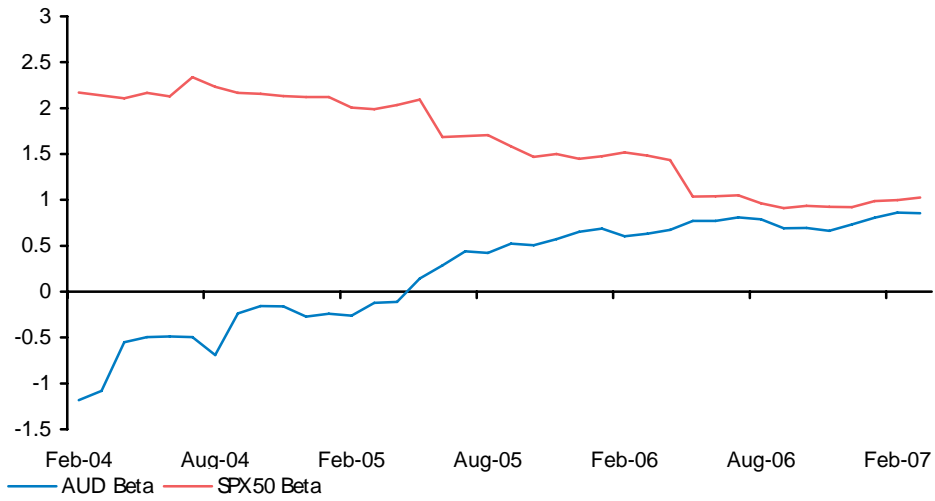
Source: Investec Securities Research and Bloomberg

It appears that the only significant currency hedge in Australia over the last ten years has been Singapore telecommunications (SGT), a large telecom company with operations and partnerships in more than 20 countries and more than 120 million customers. News Corp more recently has also demonstrated currency hedge potential. The following graph displays the 36-month rolling exchange rate and market betas of News Corp. The influence of listing in the U.S. at the end of 2004 and the increasing foreign involvement of News Corp can clearly be seen as the AUD price of News Corp has become more of a hedge against AUD depreciation. NewsCorp, the media company controlled by Rupert Murdoch, once an Australian, now conducts almost all of its activities off shore though retains its listing on the ASX, as a Richemont or Liberty International have retained their listings on the JSE in the interest of its large block of SA shareholders.

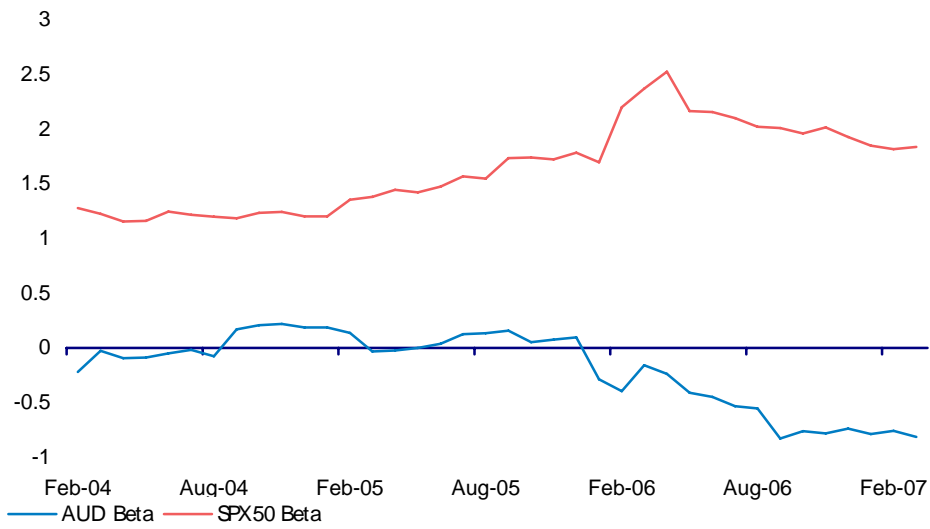
The mining companies in Australia do not act as currency hedges as they do in SA. It may be seen that BHP acts as a play in Australia, as does Rio Tinto (RIO). We were somewhat surprised at first to discover that there are very few Australian dollar hedges available on the ASX and that the Australian mining companies RIO and BHP were Australian dollar plays rather than leverages, as is clearly the case with Anglo American in SA. In other words their returns increased with Australian dollar strength when market effects were held constant. We found that almost all the major Australian companies were Australian dollar plays with the important exception of NewsCorp that does act as an Australian dollar hedge. The fact that the shares of mining companies in Australia turn out to be Australian dollar plays rather than hedges or leverages implies that something very different is going on in Australia.

with regard to the valuation of mining companies. The absence of currency hedges on the ASX is also noticeable by comparison with the JSE.

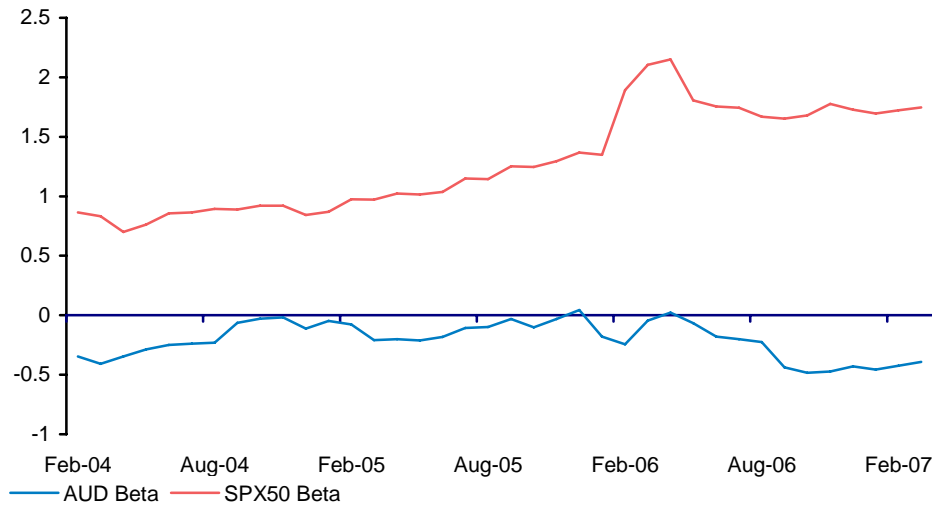
NewsCorp rolling beta



BHP Rolling betas



Rio rolling betas



2. The source of the differing exposure between Australia and South Africa

As a preliminary attempt to explain the different reactions on the JSE and the ASX to exchange rate movements, let us briefly consider why exchange rates movements might be expected to have an influence on the value of a company. If a movement in the exchange rate simply reflected differences in the rate of inflation between the home country and its trading partners, or in other words purchasing power parity (PPP) exchange rates were the constant order of the day, then exchange rate movements would have only nominal and not real effects on company profits and their valuations. What would be gained (lost) by companies operating in the weaker (stronger) currency zone in the form of higher revenues would be simultaneously lost (gained) in the form of rising (falling) domestic costs of production. Nominal profits might be rising in line with inflation but when converted into real terms or when converted into a stronger currency it would become apparent that nothing real had been gained or lost through the exchange rate. Under strict conditions of PPP exchange rates the prices of all goods and services and of all shares would simply be rising faster in the high inflation country and slower in the lower inflation currency. The exchange rate could not have real effects in these circumstances

It is clear that while PPP exchange rates may be considered as a long run equilibrium exchange rate, actual exchange rates mostly diverge and some times significantly from their PPP equivalents and for long periods of time. For this reason economists refer to real exchange rates as the percentage deviation of an observed nominal exchange rate from its PPP equivalent. Real exchange rates are calculated as equivalent to 100 in a base year (ideally the base year is one when the exchange approximated its long term PPP value) with movements above 100 indicating real exchange rate strength and movements below 100 real exchange rate weakness. A value above 100 would indicate a less competitive or overvalued (relative to PPP and vice versa when the real exchange rate takes a value below 100.

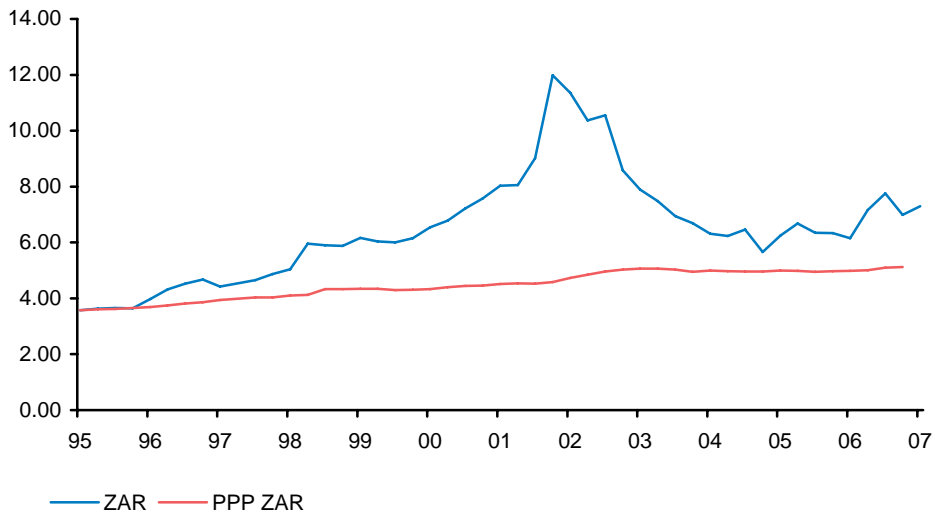
Furthermore it is mostly the case that nominal exchange rates lead rather than follow differences in inflation rates changes in both directions. We show below that in South Africa and even more so in Australia, real exchange rate movements occur in response to movements in nominal exchange rates and not to any lagged response of nominal exchange rates to widening differences in the inflation rates between trading partners.

When the inflation rates lag behind exchange rate movements the impact on the operating margins of exporters and importers will be very different. In the case of a currency depreciating faster than inflation differences, the revenues of exporters will tend to rise faster than their domestic costs, so adding to the operating profit margins of companies that focus on exports, for example mining companies. Vice versa for the case of real exchange rate appreciation- when the exchange rate is strengthening ahead of inflation differences – their costs will be rising faster than revenues and their operating margins will come under pressure. The opposite will be true of importers or those companies focused on the local market, that have costs of production that include imported components. Their operating margins will improve as the real exchange appreciates and deteriorate as the real exchange rate weakens.

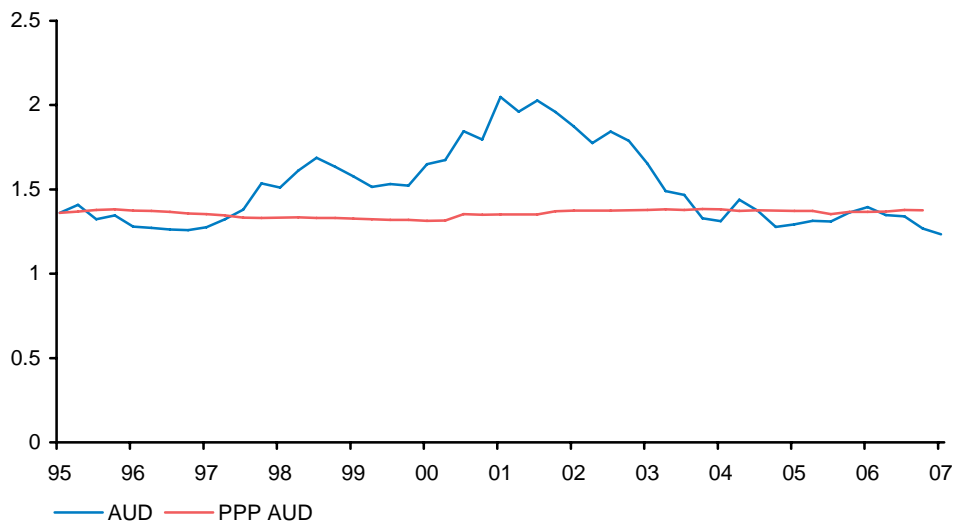
It is for these real exchange rate influences on operating margins that it may be presumed that the real exchange rate would have a consistent influence on the stock market returns of different companies, depending on their primary focus on domestic or offshore sales and on domestic or foreign costs of production.

Let us first therefore look at the behaviour of the rand and the Australian dollar exchange rates relative to its PPP equivalent. It can be seen in the next two graphs that both the ZAR and the AUD suffered large deviations from their PPP values in 2001. It may also be seen that since then the AUD has recovered fully and is now very close to its PPP value of 1995 while the ZAR still remains undervalued relative to its PPP value at 1995.

ZAR compared to its PPP level



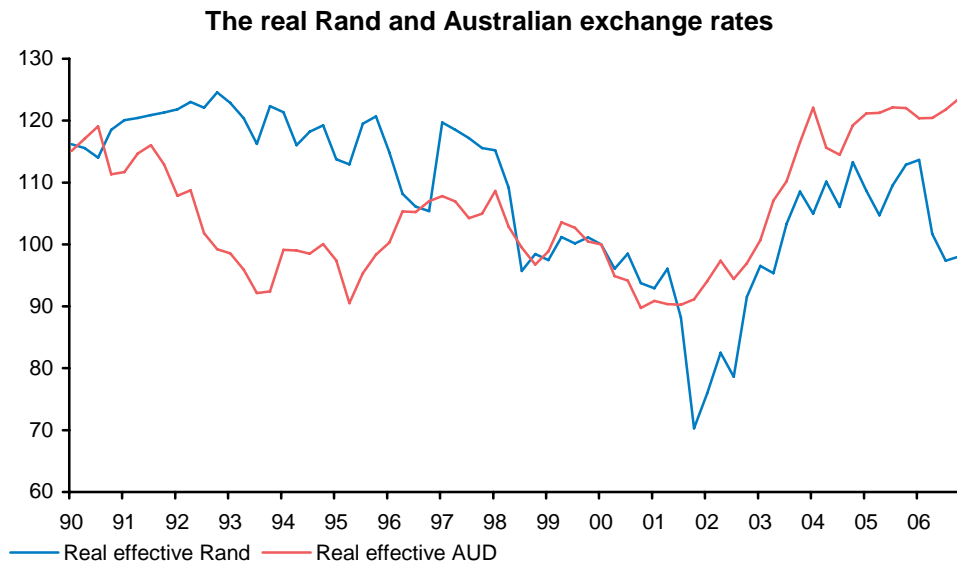
AUD compared to its PPP level



The comparison of Nominal currency values to their PPP levels is dependant upon the selection of the base year. Below we examined the PPP levels to the Nominal values going back to 1971, that is before the movement towards flexible exchange rates took place around the world. It can be seen that the ZAR was at its PPP level in 1995 compared to its PPP value in 1971, while the AUD PPP level in 1995 was stronger compared to 1971. Since 1995 the AUD has returned to its previous position of relative strength, while the ZAR has remained weak though of course not nearly as undervalued as it became in 2001.

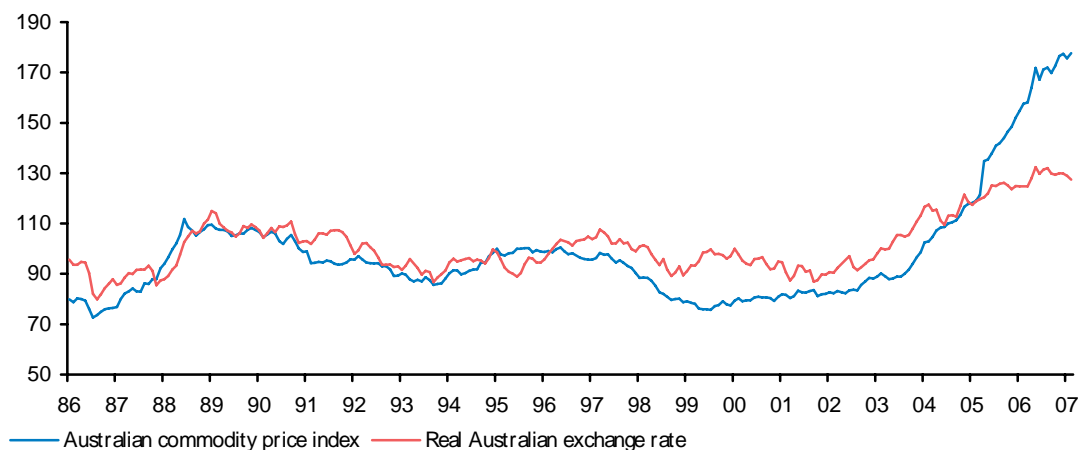
We compare the real rand and real AUD trade weighted exchange rates in the figure below. It may be seen that the respective real exchange rates do not always move in the same direction despite the dependence of the foreign trade of both countries on exports of metals and commodities. In the early nineties the real Australian dollar was

much weaker than the real rand. In 2001 the real rand was very weak while the real Australian dollar strengthened. Between 1999 and 2000 and between 2002 and 2004 the two real exchange rates moved in the same direction while since 2005 the real Australian dollar has been much stronger than the real rand. The simple correlation between the two real exchange rates is but 0.2 over the period.



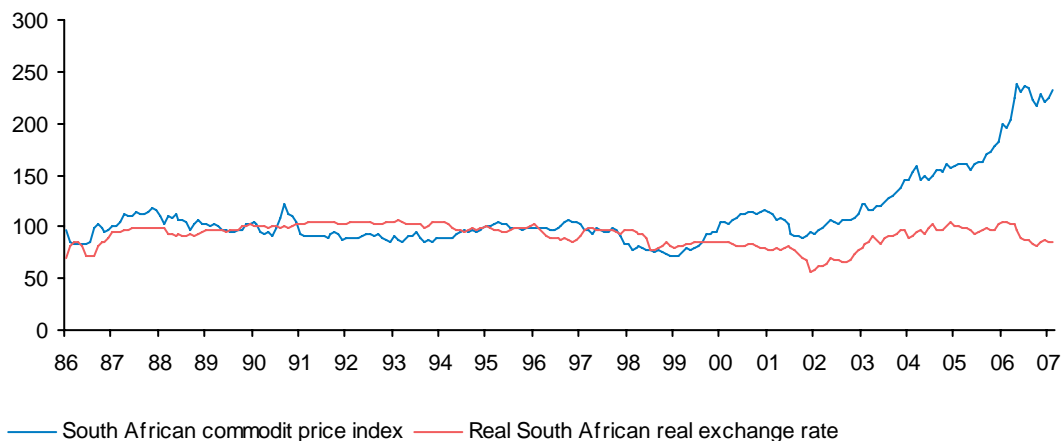
In the figure below we demonstrate close relationship that the real AUD has had with commodity prices expressed in USD. The commodity prices in this figure are represented by the Commodity Price Index of the Australian Reserve Bank. The striking feature is the strong comovement to be found between the real AUD and the Australian commodity price index. Apart from the recent outstanding commodity boom the real AUD seems to have followed the movement of the commodity price index very closely in the past.

Australian commodity price index and the real Australian exchange rate



The link between commodity prices and the real ZAR is not at all so apparent as shown by Cashin, Cespedes and Sahay (2003). This is especially true in 2001 and again recently when despite commodity strength, the Real ZAR actually weakened as we show below

South African commodity index and the real South African exchange rate



We examined the relationship between the log changes in each of the real exchange rates to the log changes in the USD price of the respective commodity price index by application of a linear regression model. We found that the real AUD has a much stronger relationship with commodity prices than the real ZAR. We used quarterly data from 1986 to 2007 due to the un-availability of monthly data on Australian consumer prices and therefore the real Australian exchange rate. Consumer prices in Australia are only updated quarterly rather than monthly, as is the practice in SA and in all other developed economies.

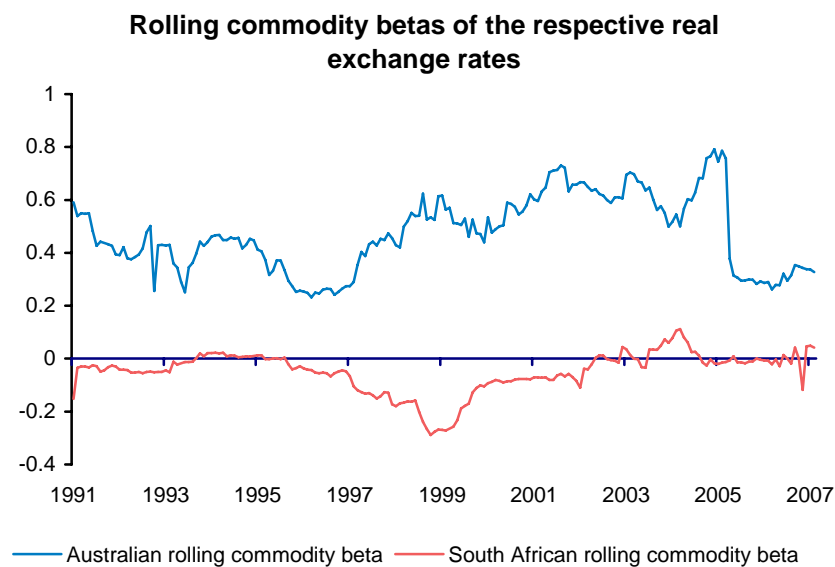
Commodity price regression coefficients

	Commodity price coefficient	t-stat	Prob
Real Australian Dollar	0.4621	3.8896	0.0002
Real South African Rand	0.0886	0.9257	0.3573

The regression coefficients from the above table confirm the relatively strong link between commodity prices and the exchange rate in Australia. The link between the real ZAR and the exchange rate is much weaker, and the coefficient is not significant at even the 10% level. We examined the relationship between the rand and the economist metal index, the economist commodity index, the gold price and the platinum price. The link between the ZAR and the gold price was the only significant linear relationship we could find to explain the ZAR, although the gold price beta was only 0.23.

The strong link between commodity prices and the real AUD implies that Australian mining companies are not able to benefit from AUD depreciation as it largely coincides with lower commodity prices. Similarly higher commodity prices are associated with a more valuable AUD. Conversely the weakness of the relationship between the ZAR and commodity prices allows mining companies and other exporters to benefit from ZAR depreciation even as commodity prices have risen.

The difference in relationship between the real ZAR and Real AUD with commodity prices has been relatively constant over time. In the following graph we display the 60-month rolling betas of the regression models that explain real exchange rate movements with the respective commodity price indexes.



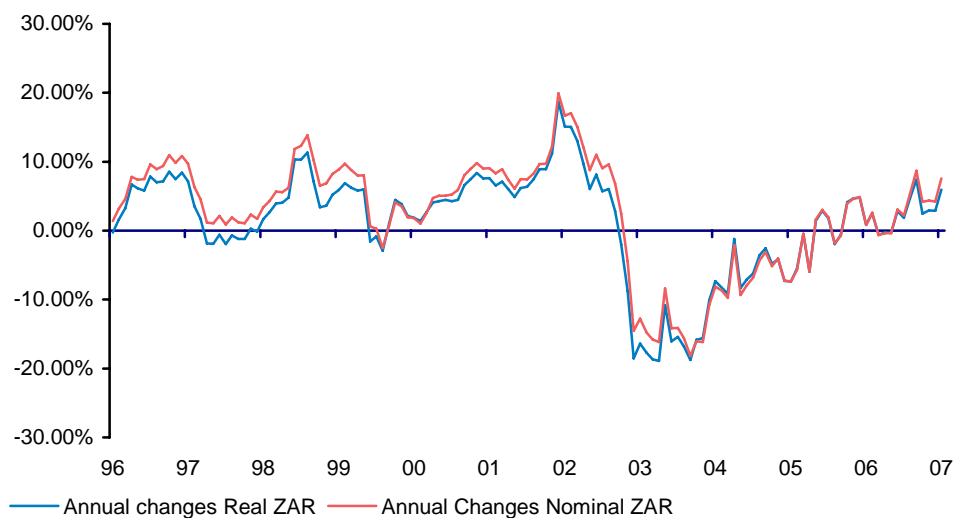
The reason for the very different responses of the share prices of mining companies to exchange rate movements in SA and Australia is the very different responses of the two real exchange rates to commodity price trends when calculated in USD. We have shown that commodity price trends of relevance to Australia have had a much more significant and consistent impact on the real Australian dollar than has been the influence of commodity prices on the real ZAR. It appears therefore that the Australian dollar has proved much more of a commodity currency in recent years than the ZAR.

In Australia what commodity prices have added to or subtracted from the value of mining companies the exchange rate has taken something away or given something back. Mining companies in SA by contrast have at times benefited from a very helpful, to them, combination of rising commodity prices in USD and a simultaneously weaker rand. At other times the recovery of the rand to a degree has had very little to do with commodity prices providing mining companies with no defence against the stronger currency.

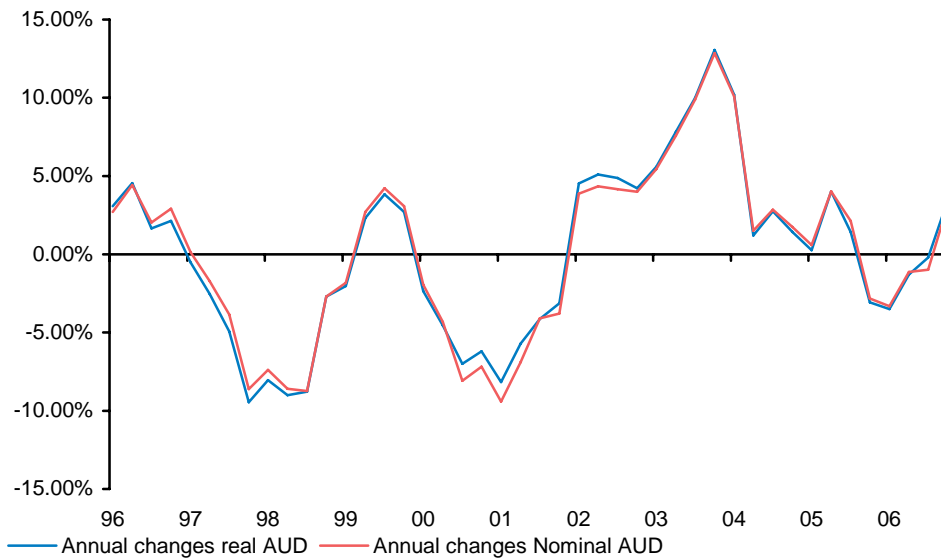
It is clear that factors other than commodity prices have had a large impact on the behaviour of the nominal and the real rand. The influence of commodity prices on the nominal and real Australian dollar has been more consistent and influential than has been the case for the ZAR. However for both currencies the predominant driver of real exchange rate movements have been movements in the nominal exchange rate rather than differences in inflation rates as we show below. In Australia's case commodity prices to an important extent have been driving the nominal and the real Australian dollar. In the case of SA, forces other than commodity prices have shocked the nominal and the real rand in different directions over recent years. Changing degrees of uncertainties about the political dispensation in SA and its influence on economic policy setting have been a cause of exchange rate shocks in both directions

In the graphs below we demonstrate the almost perfect correlation of changes in nominal and real exchange rate changes in Australia and South Africa. Clearly while economic theory indicates why it is only real exchange rates that have real effects on operating profits, changes in nominal exchange rates are a very good proxy for changes in real exchange rates. This is presumably why exchange rate movements command the attention they do from market participants, especially in South Africa

Changes in real and nominal South African exchange rates



Changes in real and nominal Australian exchange rates

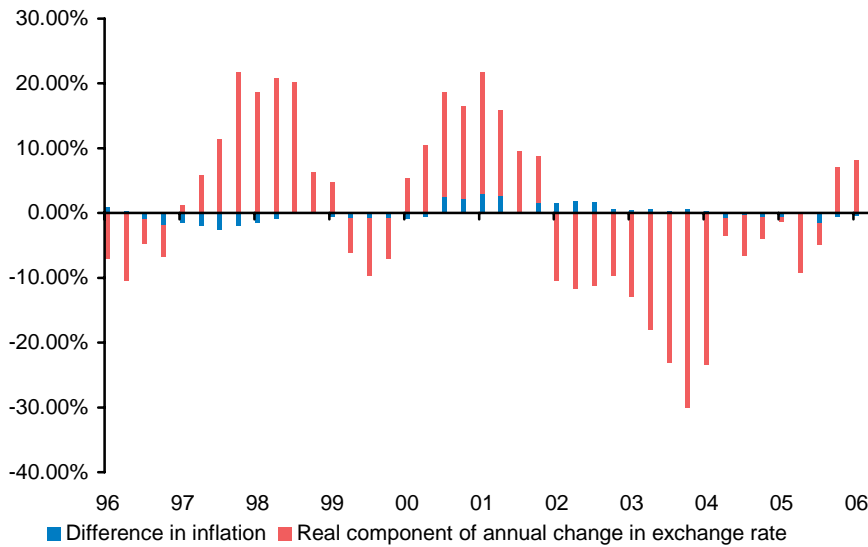


The reason why nominal and real exchange rates are so highly correlated is because in practice nominal exchange rate changes lead inflation up and down rather than the other way round. It is the inflation rate lagging behind the exchange rate that gives rise to real exchange rate effects rather than the exchange rate having to catch up with differences in inflation rates. In the following graphs we decompose the annual changes in the ZAR/USD and AUD/USD exchange rate into an inflation component and a real component.

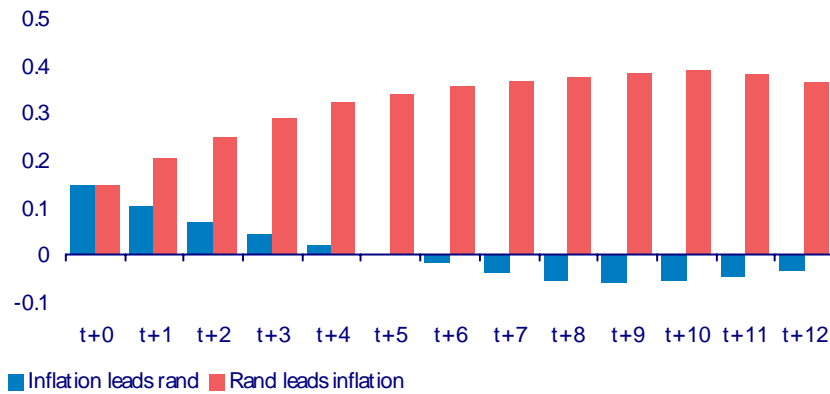
The breakdown of the ZAR shows that over certain periods the difference in inflation between the USA and South Africa plays a minimal part in determining the change in the bilateral nominal exchange rate. This is particularly clear when examining the period between September 1999 and April 2002, when the Rand consistently depreciated by more than the difference in SA and US CPI inflation. Following this period of weakness up until April 2005 the Rand consistently appreciated by more than would have been expected by the difference in inflation until April 2005. The ZAR weakened significantly again in May 2006 and the depreciation of the exchange rate measured as a year on year percentage change in the ZAR between May 2006 and 2007 again far exceeded differences in inflation. This suggests that, in general, the short-term changes in the ZAR/USD are largely driven by real shocks rather than the difference in inflation.

The relatively small impact of inflation differences on the bilateral ZAR/USD can be seen in the following graph, which displays the annual change in the ZAR/USD rate and the annual change in the real ZAR/USD rate. It should therefore be appreciated that the moves in the nominal ZAR/USD has been is equivalent for practical purposes, as for example for purposes of share market valuations, to a movement in the real exchange rate.

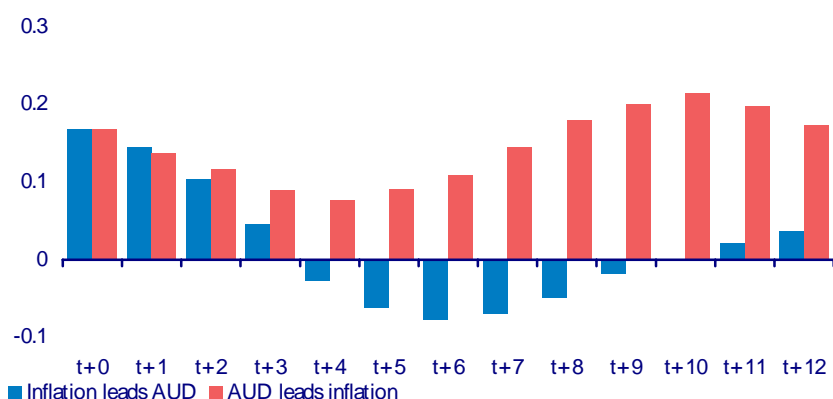
Components of annual changes in nominal ZAR/USD



In the graph below we show the correlations between annual exchange rate moves and the inflation rate at different lags up to twelve months. It shows that inflation consistently follows exchange rate moves with the peak effect on inflation occurring about 10 months after the exchange rate has changed after which the exchange rate effect on inflation tails off gradually. It may also be seen that the inflation effect on the exchange rate is very much weaker and indeed becomes a negative influence on the exchange rate after 5 months.



In the case of the AUD it appears that the difference in inflation plays an even smaller part in determining the change in the nominal exchange rate. Over the past 11 years inflation in Australia has been very similar to that experienced in the US. In spite of this, the currency has been prone to periods of volatility that must be attributable to other factors. The cross correlations between inflation and exchange rates in Australia show that the exchange rate effect on inflation is a strong one though the correlations at the different lags are not as high as they are in SA but that the exchange rate effect on measured inflation peaks at 10 months before tailing off. The impact of inflation on the exchange rate in Australia is much weaker and also turns negative after five months as may be seen below



4. Why exchange rates that lead inflation add risks for investors, particularly foreign ones

The uncertainty that faces particularly foreign investors in a particular market subject to exchange rate shocks, for example the JSE, is how soon or how long it will take for inflation and so for inflated operating profits to make up for the exchange rate weakness. Until higher inflation makes up for the weaker currency, operating profits earned and measured in the local currency will be depressed when converted back into the stronger currency in which the initial investment has to be made. These presumably temporarily depressed earnings may then act as a drag on the foreign exchange value of the company affected by an exchange rate shock.

There is a further danger faced by the foreign investor of further exchange rate shocks, which may delay the recovery of profits when expressed in the inflating local currency. Exchange rate shocks may come in waves before the currency stabilises at some lower level or recovers from initial weakness. It takes some mixture of currency stability and or absolute recovery of the exchange rate, plus higher inflation subsequent inflation to overcome any initial exchange rate shock on the foreign currency earnings of the domestic company. The timing of this recovery is very uncertain which makes foreign investors particularly wary of shocks that may weaken a currency.

We identified at the opening of this report those companies that by the nature of their operations would be particularly vulnerable to a negative exchange rate shock and those who would benefit from it. Companies with revenues derived in the domestic market and with input costs incurred in foreign markets will be the worst affected by a negative currency shock. Companies with revenues earned in foreign currencies and with costs incurred domestically will be most favoured and vice versa for positive exchange rate shocks. We identify these companies in SA as either rand plays or rand leverages or something in between. We found strong confirmation of these risks in the reactions of the SA share market but much less so in the case of Australia.

These exchange rate risks will be ameliorated to a greater or lesser degree by exchange rate or commodity price hedging that companies may undertake. The composition of company debt as local or foreign currency debt will also affect

earnings outcomes and valuations. A company may also hedge its exchange rate exposure by operating both onshore and offshore which explains our categorisation of some SA companies as rand neutral. It may be that the typical Australian listed company is more hedged in these diverse ways than their SA counterparts, so minimising exchange rate effects on operating profits and valuations.

The companies that will be fully exposed to foreign exchange movements are what we have described as the pure or almost pure currency hedges. These are companies that for historical reasons are listed on the JSE or the ASX but operate almost entirely outside of the country. News Corp is the prominent Australian example and Richemont, Liberty International and SAB are the important pure rand hedges on the JSE. Exchange controls that limit domestic investors from investing directly offshore, an obvious form of currency hedging, may make the pure hedges particularly attractive to local currency investors and help to explain why they retain their important constituency of local investors.

Foreign investors based in strong currency economies will naturally attach much less importance to companies that offer a foreign currency hedge than domestic investors, especially those subject to exchange control limitations of their portfolio diversification. The foreign investors are presumably investing outside their own currencies for the purpose of extra growth as well as for the diversification benefits investing through a foreign currency may offer. Naturally they would not appreciate investing in a currency that depreciated unexpectedly. But they would also not wish to miss the benefits of unexpected currency appreciation or unexpected domestic growth that may be the result of hedging operations. Other things equal, it will be the pure domestic companies that will command the attention of foreign investors for whom a particular foreign investment is but a part of a well diversified portfolio.

It is a mixture of good earnings growth generated by operations in the domestic economy, coupled to currency stability that constitutes the ideal investment opportunity. Furthermore currency stability has much to contribute to economic growth in the form of predictable low inflation and predictably stable costs of capital and finance. The volatility of the rand has taken away from the case for investing in South Africa and in particular for investing in the SA economy or what we call the rand plays. Rand volatility has possibly added to the case for investing in SA mining companies rather than their Australian counterparts

Any greater sense of currency stability will add to the case for SA economy plays by reducing the currency risk premium implicit in current valuations. Currency stability if expected would also reduce the relative attraction of the pure rand hedges. The Australian absence of exchange rate leverages indicates that it is inappropriate to rely on mining or resource companies to provide protection against currency weakness. If the ZAR were to behave much more like the AUD, and would respond consistently to commodity price strength or weakness SA mining companies would become rand plays rather than leverages.

Our view is that the rand is likely to behave much more like a commodity currency in the future than it has since 2001. Our view is also that the rand is likely to be less shock prone and more likely to reflect the conservative fiscal policy settings of the SA treasury that we believe are well entrenched. If so such outcomes will be good for the growth outlook and the SA economy plays. If so this suggests to us that the case for investing in Resource companies as rand hedges or investing in pure rand hedges is less powerful than recent experience and past performance might indicate

Appendix

We apply the following model to estimate the returns of the top 50 shares:

$$\%ALSI_{i,t} = \alpha + \beta_1 \%R/\$ + \beta_2 \%Top40_t + e_{it}$$

We regress the Top40 onto the exchange rate to give::

$$\%Top40_t = \gamma_0 + \gamma_1 \%R/\$ + \varepsilon_t$$

Replacing the Top40 term in the first equation with the Top40 as explained by the exchange rate gives:

$$\%ALSI_i = \alpha + \beta_1 \%R/\$ + \beta_2(\gamma_0 + \gamma_1 \%R/\$ + \varepsilon_t) + e_{it}$$

Rearranging the terms gives:

$$\%ALSI_i = \alpha + \beta_2\gamma_0 + \beta_1 \%R/\$ + \beta_2\gamma_1 \%R/\$ + \beta_2\varepsilon_t + e_{it}$$

$$\%ALSI_i = (\alpha + \beta_2\gamma_0) + (\beta_1 + \beta_2\gamma_1)\%R/\$ + \beta_2\varepsilon_t + e_{it}$$

Thus replacing $\%ALSI_{40}$ with ε_t , the residual after regressing $\%ALSI_{40}$ onto the exchange rate, does not change the size of β_2 while the exchange rate coefficient increases by $\beta_2\gamma_1$. Thus the exchange rate beta of a share will only increase by a large amount after orthogonalisation if the Top40 beta of that share is large and the exchange rate beta of the Top40 is large.

For the rolling betas the orthogonalisation takes place over each 36-month period. This allows for a changing beta between the Market and the Exchange rate.

Names of Shares examined:

Table Of South African shares examined

Ticker	Full Name
ABL	African Bank Investments Ltd
AFX	African Oxygen Ltd
AGL	Anglo American PLC
AMS	Anglo Platinum Ltd
ANG	AngloGold Ashanti Ltd
APN	Aspen Pharmacare Holdings Ltd
ARI	African Rainbow Minerals Ltd
ASA	ABSA Group Ltd
BAW	Barloworld Ltd
BIL	BHP Billiton PLC
BVT	Bidvest Group Ltd
DSY	Discovery Holding Ltd
ECO	Edgars Consolodated Stores
FOS	Foshini Ltd
FSR	FirstRand Ltd
GFI	Gold Fields Ltd
HAR	Harmony Gold Mining Co Ltd
IMP	Impala Platinum Holdings Ltd
INL	Investec Ltd
INP	Investec PLC
IPL	Imperial Holdings Ltd
JDG	JD Group Ltd
LBT	Liberty International PLC
LGL	Liberty Group Ltd
MLA	Mittal Steel South Africa Ltd
MSM	Massmart Holdings Ltd
MTN	MTN Group Ltd
NED	Nedbank Group Ltd
NPK	Nampak Ltd
NPN	Naspers Ltd
NTC	Network Healthcare Holdings Ltd
OML	Old Mutual PLC
PIK	Pick'n Pay Stores Ltd
PPC	Pretoria Portland Cement Co Ltd
RCH	Compagnie Financiere Richemont SA
REM	Remgro Ltd
RLO	Reunert Lt
RMH	RMB Holdings Ltd
SAB	SABMiller PLC
SAP	Sappi Ltd
SBK	Standard Bank Group Ltd
SHF	Steinhoff International Holdings Ltd
SHP	Shoprite Holdings Ltd
SLM	Sanlam Ltd
SOL	Sasol Ltd
SUI	Sun International Ltd
TBS	Tiger Brands Ltd
TKG	Telkom SA Ltd
TRU	Truworths International Ltd
WHL	Woolworths Holdings Ltd

Source: Bloomberg

Table of names of Australian shares examined

Table of names of Australian shares examined

Ticker	Full name
AIA	Auckland International Airport Ltd
ALL	Aristocrat Leisure Ltd
AMC	Ancor Ltd
AMP	AMP Ltd
ANZ	Australia & New Zealand Banking Group Lt
AVM	Anvil Mining Ltd
AWC	Alumina Ltd
AXA	AXA Asia Pacific Holdings Ltd
BHP	BHP Billiton Ltd
BLD	Boral Ltd
BSL	BlueScope Steel Ltd
CBA	Commonwealth Bank of Australia
CGJ	Coles Group Ltd
CNP	Centro Properties Group
CSL	CSL Ltd/Australia
EQN	Equinox Minerals Ltd
FBU	Fletcher Buildings Limited
FGL	Foster's Group Ltd
FPA	Fisher & Paykel Appliances Holdings
FPH	Fisher & Paykel Healthcare
FXJ	Fairfax Media Ltd
GPG	Guinness Peat Group Ltd
GPT	GPT Group
HGI	Henderson Group Plc
IAG	Insurance Australia Group Ltd
LLC	Lend Lease Corp Ltd
MAP	Macquarie Airports
MBL	Macquarie Bank Ltd
MGQ	Macquarie Goodman Group
MGR	Mirvac Group
MIG	Macquarie Infrastructure Group
NAB	National Australia Bank Ltd
NCM	Newcrest Mining Ltd
NWS	News Corporation
NWSLV	News Corporation
ORG	Origin Energy Ltd
ORI	Orica Ltd
PBL	Publishing & Broadcasting Ltd
PMN	Promina Group Ltd
QAN	Qantas Airways Ltd
QBE	QBE Insurance Group Ltd
RIN	Rinker Group Ltd
RIO	Rio Tinto Ltd
RMD	Resmed Inc
SGB	St George Bank Ltd
SGP	Stockland
SGT	Singapore Telecommunications
SKC	Sky City Entertainment
STO	Santos Ltd
SUN	Suncorp-Metway Ltd
TAH	TABCORP Holdings Ltd
TCL	Transurban Group
TEL	Telecom Corp of New Zealand Ltd
TLS	Telstra Corp Ltd
TOL	Telstra Corp Ltd
TWR	Toll Holdings Ltd
WBC	Westpac Banking Corp
WDC	Westfield Group

Table of names of Australian shares examined

WES	Wesfarmers Ltd
WOW	Woolworths Ltd
WPL	Woodside Petroleum Ltd
ZFX	Zinifex Ltd

Source: Bloomberg

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