

# NEW ZEALAND'S INTERNATIONAL EDUCATION SECTOR

## TRACKING THE INFLUENCE OF CURRENCY VALUES

A research paper for sector discussion

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## Introduction

1. This note compares and correlates the value of the New Zealand dollar (\$NZ) against key foreign currencies (i.e. the \$US, the ¥en, the Won, and the €uro) and the interest from international students in coming to New Zealand, as shown by trends in *total* and *first-time* approved student visas and permits.
2. This note is intended to 'test' the received wisdom that a rise in the value of New Zealand's currency will have resulted in falling numbers of student visas & permits, and vice-versa (i.e. an inverse relationship). The assumption that there is such a link may be based on a view that international education is similar to international tourism. However, a key difference between the two sectors is that tourism is a *leisure activity*, whereas education is normally viewed as an *investment*. This implies markedly different consumer behaviours, in terms of assessing possible rates of return for skills and qualifications, and perceptions of quality/cost trade-offs.

## Factors affecting overseas study

3. A number of pieces of market research have tried to assess the factors which directly concern prospective tertiary students when making a choice of country locations for study<sup>1</sup>. The various factors affecting students have generally been summarised as follows (*listed in no particular order*):
  - a. Academic reputation (particularly relevant for tertiary institutions).
  - b. Cost of courses.
  - c. Cost of living (including travel).
  - d. Ease of obtaining a student visa, and work rights while studying.
  - e. Ease of finding information on courses and providers.
  - f. 'Liveability' of a foreign country.
  - g. Perceived impact of qualification(s) on career prospects.
  - h. Perceived national safety and pastoral care reputations.
  - i. Presence of family and friends.

## Key findings

4. The enrolment charts set out in this paper indicate, from 2003/04, an expected inverse relationship between enrolments with currency values. However, the statistical tables show there is usually **no** strong inverse correlation between the value of the \$NZ and the *total* level of approved student visas and permits. In some years, and for some source countries (notably China and Korea), there were *alternating* inverse or positive linear correlations from year to year.
5. For *first-time* approved student visas and permits for students from China, there was usually the expected inverse correlation between approval levels and the relative value of the \$NZ, particularly when a one-year lag factor was included. This overall result was generally not apparent for students from South Korea, Japan, and Germany. These varying findings support a view that currency values are **a** key decision factor for students from China, depending on the

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<sup>1</sup> Recent research includes:

Malcolm Abbott and Ershad Ali, "The Impact of Exchange Rate Variations and University Reputation on the Choice of Destinations of International Students", AIS St Helens, August 2005  
StudentPulse by i-graduate, a survey of 6,787 students actively considering international study (2006).  
The IDP/British Council projections of international education (2004).  
Survey of International Students (NZ Ministry of Education, 2004).

sector in which they wish to study, but are not necessarily a *major* decision factor for students from other countries.

### **Methodological limitations**

6. This paper is based on two complete monthly data-sets for approved student visas and permits, and the value of the New Zealand dollar, from 1999 to 2006. The assumption that there is a link between these two variables is based mainly on anecdotal reports from providers (using their own proprietary enrolment forecasting systems), rather than published econometric research. A study confirming the relative importance of currency values for student decision-making, and any consequent enrolments, would need to be based on detailed interview data with significant and representative samples of international students.
7. Charts in this paper do compare enrolment data (shown as single annual data-points) with monthly data on the relative values of the NZ dollar against key foreign currencies. However, these comparisons cannot be used as the basis for correlations with monthly average currency values because the enrolment figures are annual totals – there are no figures available on international enrolments on a month-by-month basis, in total or by specific provider groups.
8. A limitation of the NZ Immigration monthly data on approved student visas and permits is that it does not show the study destinations – or actual enrolments – of the international visitors. This is because there is no data-matching system in place between the Department of Labour and NZ education providers. A comparison with overall enrolment data shows that many English language students from key source countries (notably Japan) arrive in New Zealand on visitor visas. As it is not possible to accurately assess the proportion of visitor visa recipients who enrol with education providers, this paper necessarily excludes this group from the analysis.
9. As well, anecdotal reports from providers are that there is usually a time-lag between a student making a decision to study in a foreign country (e.g. shown by student applications, and/or receiving a student visa) and actually enrolling with a provider. This time-lag may be over a year in duration, depending on the provider. This factor is important as it indicates that students may be relatively insensitive to *changes* in exchange rates, following their initial decision to go to a particular country. It is difficult to model time-lags in the two data-sets used as the basis for this report, given that the immigration data cannot be disaggregated by provider groups. However, alternative statistical correlation tables are stated using an average ‘one-year’ time lag.

### **Further questions**

10. Further studies of the economic factors affecting international students’ decisions to travel to New Zealand to study could investigate the following:
  - a. Does the relative *volatility* of the \$NZ affect decisions by prospective international students to come here?
  - b. How do the relative changes in other countries exchange rates affect the level of international student interest in New Zealand education?
  - c. How does New Zealand’s currency/enrolments experience compare with other ‘main English speaking destination countries’ (i.e. Australia, Canada, the United Kingdom and the USA)? What are the specific and different institutional factors that affect international enrolments?

## Enrolments overall

11. Table 1 shows that the total enrolments of international students across all provider groups in New Zealand rose by 253 percent from 2000 to 2002, from 50,026 to 126,919. From the market peak in 2002, there was an overall 26 percent decline to 94,246 enrolments in 2005. This decline has mainly affected the schools, private tertiary education organisations, and English language schools. In 2005 a reduction in total enrolments within the public tertiary education institutions was also recorded.

| Table 1: Total international enrolments by provider groups | 2000          | 2001          | 2002           | 2003           | 2004           | 2005          |
|--|---------------|---------------|----------------|----------------|----------------|---------------|
| Schools  | 7,191         | 10,555        | 15,259         | 17,448         | 14,477         | 11,984        |
| Public Tertiary Education Institutions                     | 13,326        | 20,405        | 30,714         | 39,009         | 43,047         | 40,706        |
| Private Tertiary Education Organisations                   | 3,306         | 6,345         | 9,443          | 10,475         | 9,876          | 5,807         |
| English Language Schools*                                  | 26,203        | 41,725        | 71,503         | 50,689         | 43,417         | 35,749        |
| <b>Totals</b>  | <b>50,026</b> | <b>79,030</b> | <b>126,919</b> | <b>117,621</b> | <b>110,817</b> | <b>94,246</b> |

**Sources:** Schools data is as at 1 July, 2000 to 2005 (Ministry of Education roll returns).

Tertiary data, for public and private providers, is for full calendar years 2000 to 2005 (Ministry of Education Single Data Returns database).

English language schools data is for the financial years ended 31 March 2001 to 2006 (Statistics New Zealand Survey of English Language Providers).

\* **Note:** As  $\frac{3}{4}$  of the SNZ data period is from the previous calendar years, then in order to aid comparability the respective ELS enrolment figures have been combined with the calendar year data from schools and tertiary single data returns, i.e. the '2005' data includes the SNZ information for the financial year ended 31 March 2006. This convention is used in all tables in this report.

12. Chart 1 (below) sets out a comparison of the monthly average \$NZ/\$US rates (sourced from the Reserve Bank of New Zealand) and total monthly approved student visas and permits (from the NZ Department of Labour) for the seven financial years ended 30 June, from July 1999 to June 2006. The \$US is used as a generic proxy for all other foreign currencies, given the importance and size of the United States economy.
13. It is apparent that the annual level of approved student visas and permits (shown by the '12 month moving average' line) increased significantly over the period from July 2001 to June 2004, at a time when the value of the \$NZ was *rising* against the \$US. From July 2004 a slow decline in the level of approved visas and permits occurred, and over the same period the value of the \$NZ peaked against the \$US. From July 2005 the value of the \$NZ has fallen, and the level of student visas and permits has also reduced.
14. This comparison indicates there is no apparent linear relationship between the value of the \$NZ and the total level of international student visas and permits. This result is substantiated by the very low correlation co-efficients stated in Table 2, for each financial year period (see the Appendix for an explanation of co-efficients). There were two years (1999/2000 and 2005/06) in which a *fall* in the value of the \$NZ occurred at the same time as a *rise* in student numbers, but there was not a strong correlation evident.

Chart 1: Total level of student visas/permits vs the \$NZ/\$US

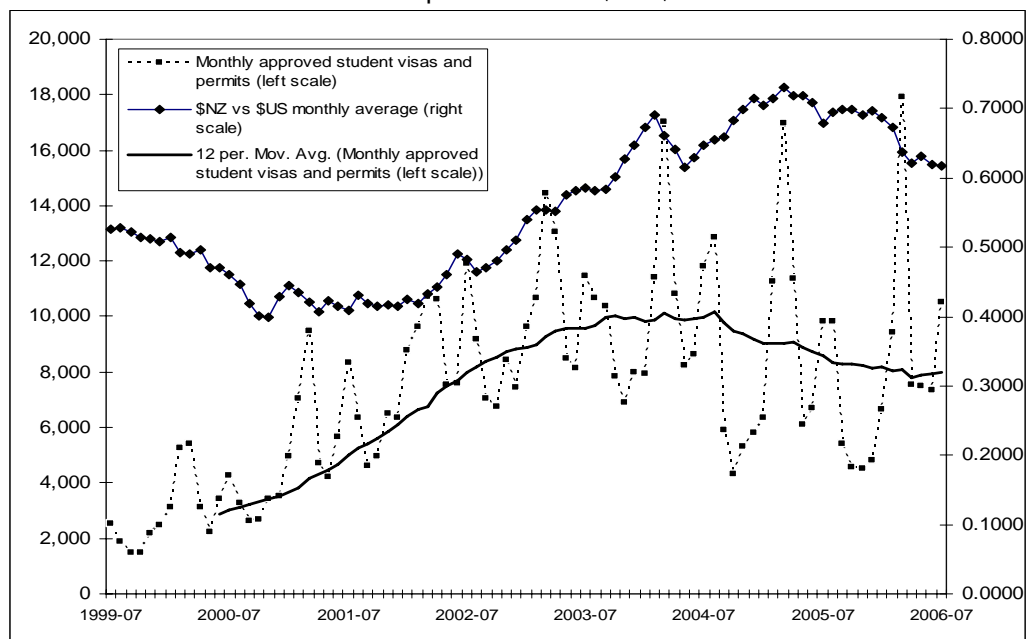


Table 2: Total monthly averages

| Financial Year | Average monthly number of approved student visas and permits (x) | Average of monthly values of \$NZ/\$US (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|--|--------------------------------|-----------|
| 1999/2000      | 2,886  | 0.50                                       | -0.49                          | 0.24      |
| 2000/2001      | 4,653  | 0.42                                       | 0.09                           | 0.01      |
| 2001/2002      | 7,670  | 0.43                                       | 0.19                           | 0.04      |
| 2002/2003      | 9,600  | 0.52                                       | 0.33                           | 0.11      |
| 2003/2004      | 9,939  | 0.63                                       | 0.16                           | 0.03      |
| 2004/2005      | 8,735  | 0.70                                       | 0.05                           | 0.00      |
| 2005/2006      | 7,943  | 0.67                                       | -0.41                          | 0.17      |

15. Chart 2 draws a similar comparison between the value of the \$NZ, and the total monthly numbers of *first-time* approved student visas and permits. This comparison shows the **flow**, rather than the **stock**, of approved student visas and permits, and so tends to be skewed towards students who wish to attend short-term studies in New Zealand (e.g. in English language schools).
16. Both Chart 2 and Table 3 show that there was usually a greater correlation between the value of the \$NZ and the numbers of first-time visas. It is apparent that numbers rose as the \$NZ fell (from 1999/00 to 2001/02), and then declined as the \$NZ rose to a peak (from 2002/03 to 2004/05). There has since been a recovery in first-time approvals as the \$NZ has reduced in value (in 2005/06).

Chart 2: First-time approved student visas/permits, vs the \$US

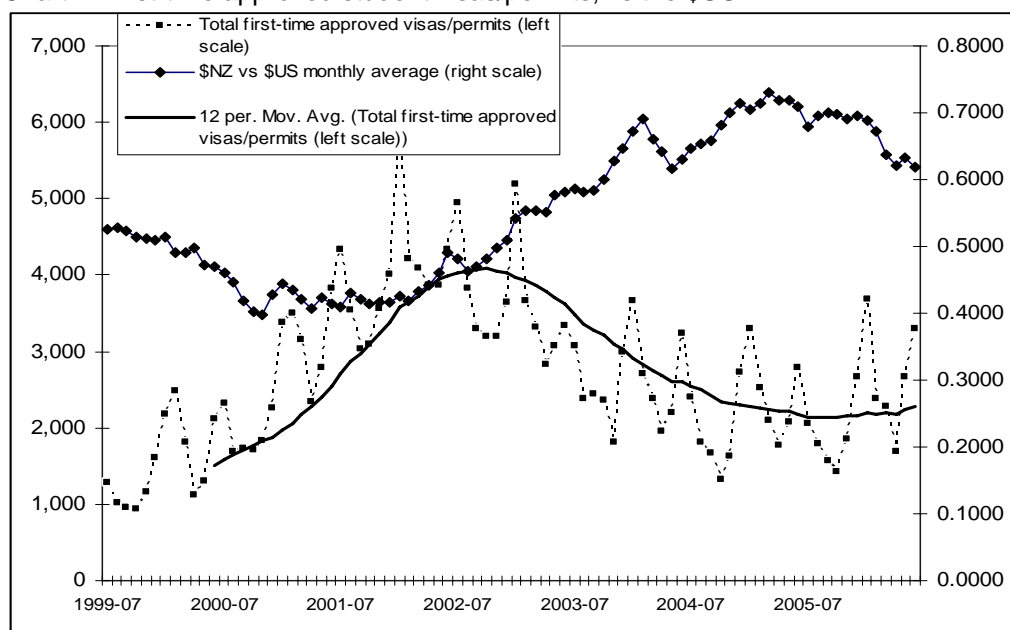


Table 3: First-time monthly averages

| Financial Year | Average monthly first-time approved student visas and permits (x) | Average of monthly values of \$NZ/\$US (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|--|--------------------------------|-----------|
| 1999/2000      | 1,496   | 0.50                                       | -0.49                          | 0.24      |
| 2000/2001      | 2,543   | 0.42                                       | 0.18                           | 0.03      |
| 2001/2002      | 3,982   | 0.43                                       | 0.14                           | 0.02      |
| 2002/2003      | 3,628   | 0.52                                       | -0.20                          | 0.04      |
| 2003/2004      | 2,600   | 0.63                                       | 0.25                           | 0.06      |
| 2004/2005      | 2,176   | 0.70                                       | 0.28                           | 0.08      |
| 2005/2006      | 2,279   | 0.67                                       | -0.29                          | 0.08      |

17. The following sections draw a similar comparison of the respective currency values with the key source countries for international students (China, South Korea, and Japan), and the smaller but growing market of Germany.

## China

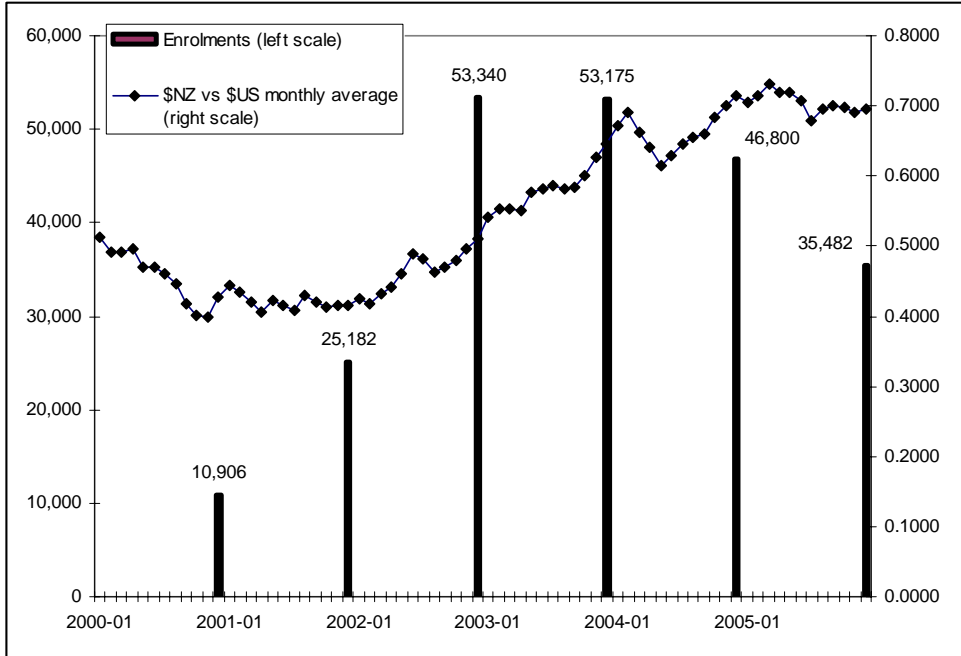
18. Interest from Chinese students has been the key driver behind the increased size of the international education sector. Table 4 presents a breakdown of enrolments of students from China over the past six years. The rapid growth from 2000 to 2002-2003 is apparent, as is the subsequent significant decline to 2005. The spread of Chinese students across provider groups is now concentrated within the public tertiary education institutions.

| Table 4: China student enrolments*       | 2000          | 2001          | 2002          | 2003          | 2004          | 2005          |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| Schools                                  | 1,989         | 3,554         | 5,530         | 5,376         | 3,313         | 1,765         |
| Public Tertiary Education Institutions   | 2,915         | 7,462         | 15,733        | 22,757        | 25,970        | 23,469        |
| Private Tertiary Education Organisations | 946           | 2,449         | 4,479         | 6,425         | 6,005         | 4,553         |
| English Language Schools                 | 5,056         | 11,717        | 27,598        | 18,617        | 11,512        | 5,695         |
| <b>Totals</b>                            | <b>10,906</b> | <b>25,182</b> | <b>53,340</b> | <b>53,175</b> | <b>46,800</b> | <b>35,482</b> |

\* Not including the Hong Kong Special Administrative Region

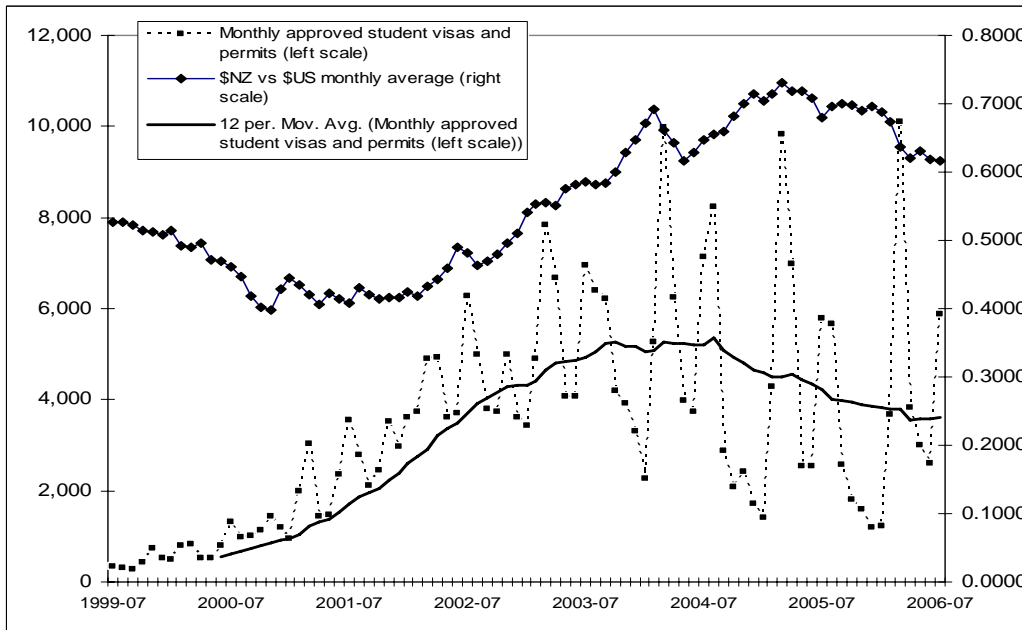
19. The level of enrolments of Chinese students from 2000 to 2005 is shown in Chart 3 (by placing the annualised enrolment totals at the end of each calendar year). It is apparent that the decline in enrolments from 2003 coincided with a continuing rise in the value of the \$NZ vs the \$US.

Chart 3: Enrolments of Chinese students vs the \$NZ/\$US



20. Chart 4 shows the rapid expansion of approved student visas and permits for Chinese citizens from July 1999 to June 2004, and the subsequent decline in the trend of total approved student visas and permits to end June 2006.

Chart 4: Total Chinese student visas/permits vs the \$US<sup>2</sup>



<sup>2</sup> The \$US is used as a proxy for the Chinese yuan, because the Chinese government fixes the value of the yuan against the \$US (although some appreciation has been allowed from 2005/06 due to the expanding Chinese trade balance and consequent accumulation of \$US-denominated financial assets).

21. Table 5 shows that, since at least July 2000, there has been no significant linear correlation in any financial year between the value of the \$NZ vs the \$US, and the *total* level of approved student visas and permits granted to Chinese students. Prior to July 2000 there was a relatively strong *inverse* correlation between the value of the \$NZ and Chinese student visa approvals. It is likely that the subsequent change in New Zealand's immigration policy (i.e. granting more open access to Chinese students) is a primary reason for the rapid increase in visa/permit approvals that then occurred.

Table 5: Monthly averages for Chinese students

| Financial Year | Average monthly number of approved Chinese student visas and permits (x) | Average of monthly values of \$NZ/\$US (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|--|--------------------------------|-----------|
| 1999/2000      | 545  | 0.50                                       | -0.69                          | 0.47      |
| 2000/2001      | 1,521  | 0.42                                       | -0.21                          | 0.04      |
| 2001/2002      | 3,493  | 0.43                                       | 0.33                           | 0.11      |
| 2002/2003      | 4,866  | 0.52                                       | 0.13                           | 0.02      |
| 2003/2004      | 5,202  | 0.63                                       | -0.14                          | 0.02      |
| 2004/2005      | 4,338  | 0.70                                       | -0.12                          | 0.01      |
| 2005/2006      | 3,589  | 0.67                                       | -0.34                          | 0.12      |

22. Chart 5 and Table 6 show the comparative data for **first-time** Chinese approved student visas and permits. While this comparison of the flow of approvals is skewed towards the large numbers of short-term students (i.e. in English language schools), it is apparent that there was usually an inverse correlation between first-time Chinese visa/permit approvals and the value of the \$NZ. Table 6 shows that there was a notably strong inverse correlation from 2002/03 to 2004/05.

Chart 5: First-time Chinese student visas/permits vs the \$US

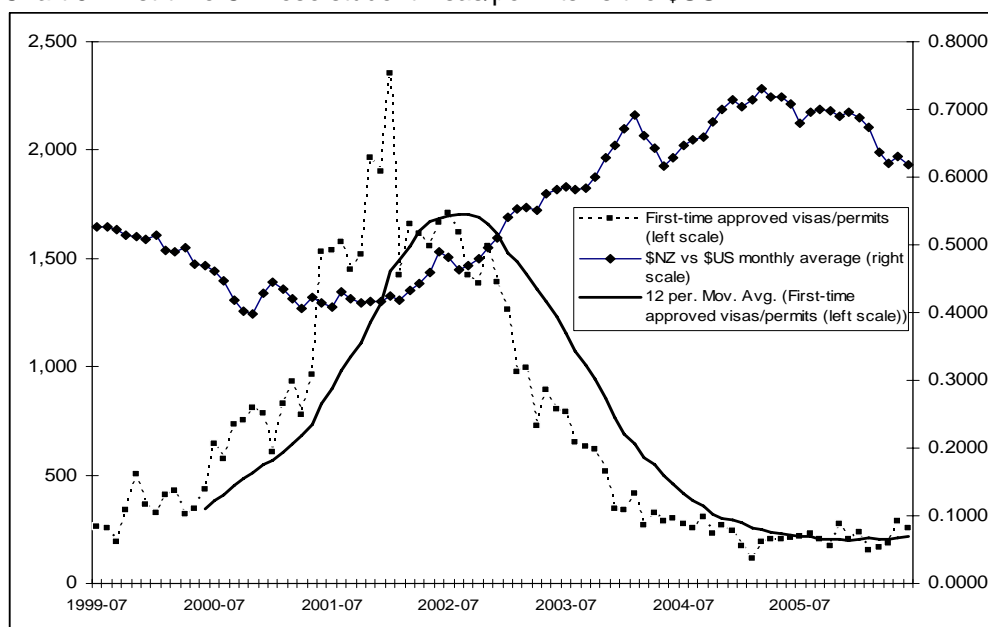


Table 6: Monthly averages for first-time Chinese students

| Financial Year | Average monthly first-time approved Chinese student visas and permits (x) | Average of monthly values of \$NZ/\$US (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|--|--------------------------------|-----------|
| 1999/2000      | 347   | 0.50                                       | -0.54                          | 0.29      |
| 2000/2001      | 827   | 0.42                                       | -0.40                          | 0.16      |
| 2001/2002      | 1,685   | 0.43                                       | -0.08                          | 0.01      |
| 2002/2003      | 1,228   | 0.52                                       | -0.90                          | 0.81      |
| 2003/2004      | 458   | 0.63                                       | -0.73                          | 0.53      |
| 2004/2005      | 223   | 0.70                                       | -0.69                          | 0.48      |
| 2005/2006      | 215   | 0.67                                       | -0.13                          | 0.02      |

23. Table 7 shows a similar correlation of first-time visa/permit approvals with the value of the currency, but incorporates a *one-year time-lag* (i.e. visa/permit approvals in 2000/01 are correlated with the value of the \$NZ/\$US in 1999/00). This approach produces greater inverse correlations for 2000/01, 2003/04 and 2004/05 than are shown in Table 6, indicating that the 'lag effect' for Chinese students was a significant factor.

Table 7: Monthly averages for first-time Chinese students (one-year time-lag)

| Financial Year | Average monthly first-time approved Chinese student visas and permits (x) | Average of monthly values of \$NZ/\$US (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|--|--------------------------------|-----------|
| 1999/2000      |   | 0.50                                       |                                |           |
| 2000/2001      | 827   | 0.42                                       | -0.81                          | 0.66      |
| 2001/2002      | 1,685   | 0.43                                       | 0.07                           | 0.00      |
| 2002/2003      | 1,228   | 0.52                                       | -0.71                          | 0.50      |
| 2003/2004      | 458   | 0.63                                       | -0.88                          | 0.77      |
| 2004/2005      | 223   | 0.70                                       | -0.85                          | 0.73      |
| 2005/2006      | 215   |  | -0.04                          | 0.00      |

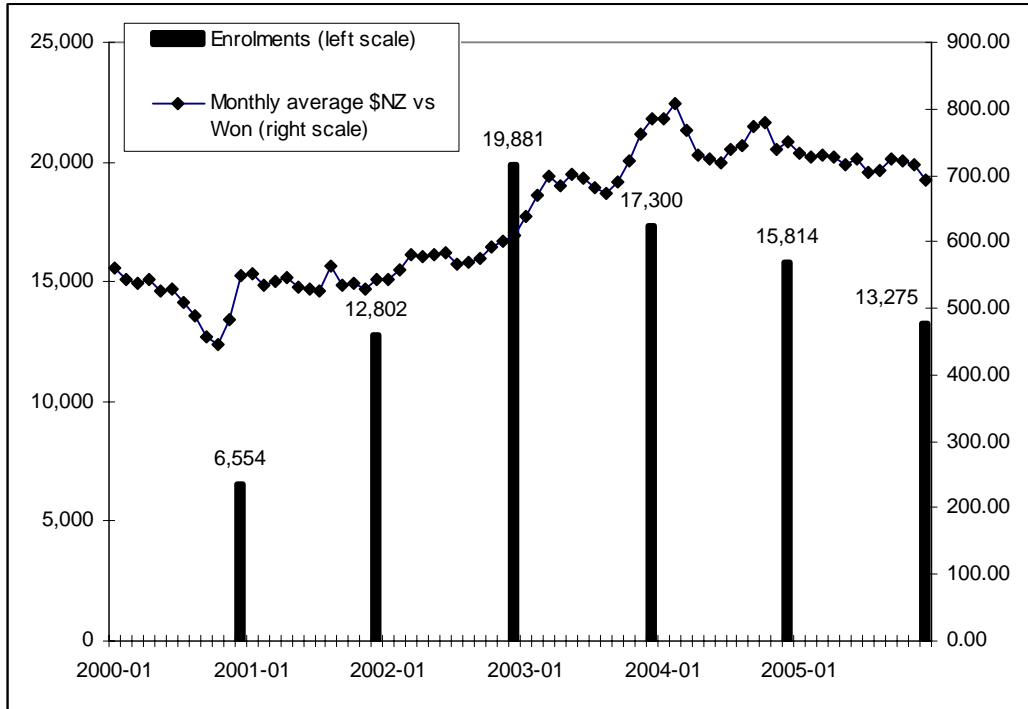
## South Korea

24. South Korea has also become a major source country for international students since 1999, following largely the same trend as that experienced for Chinese students. There was rapid growth in enrolments of South Korean students within the schools and English language providers from 2000 to 2002. Following the downturn since the market peak, South Korean students are still concentrated in schools and English language providers, with relatively few enrolments in tertiary education providers.

| Table 8: South Korean student enrolments | 2000         | 2001          | 2002          | 2003          | 2004          | 2005          |
|--|--------------|---------------|---------------|---------------|---------------|---------------|
| Schools                                  | 1,496        | 2,622         | 5,063         | 7,232         | 6,519         | 5,080         |
| Public Tertiary Education Institutions   | 713          | 1,146         | 1,446         | 1,411         | 1,562         | 1,542         |
| Private Tertiary Education Organisations | 508          | 841           | 1,089         | 812           | 760           | 627           |
| English Language Schools                 | 3,837        | 8,193         | 12,283        | 7,845         | 6,973         | 6,026         |
| <b>Totals</b>                            | <b>6,554</b> | <b>12,802</b> | <b>19,881</b> | <b>17,300</b> | <b>15,814</b> | <b>13,275</b> |

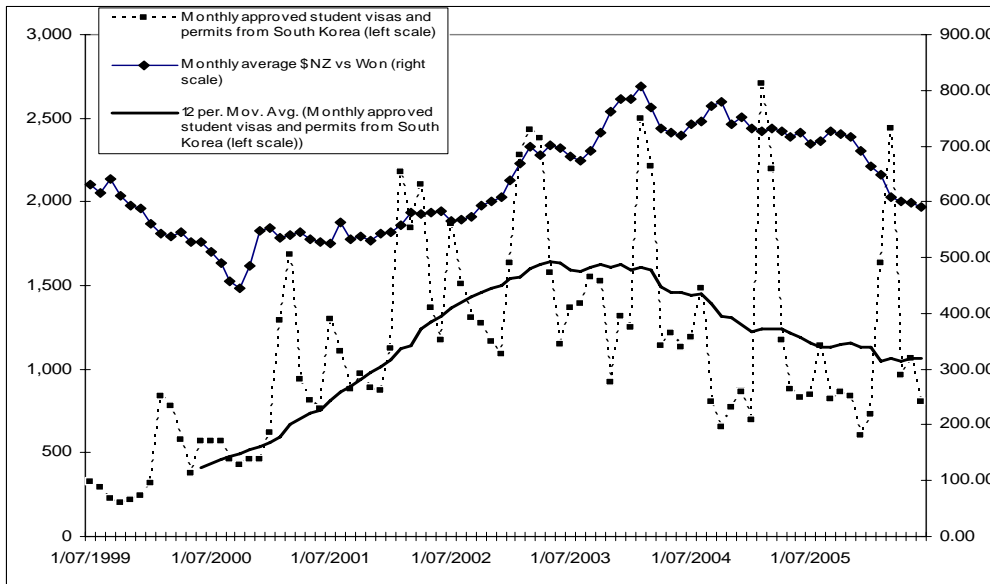
25. The level of enrolments of South Korean students is shown in Chart 6 (by placing the annualised enrolment totals at the end of each calendar year). It is apparent that the decline in enrolments from 2003 initially coincided with a continuing rise in the value of the \$NZ vs the Won, but that enrolments continued to fall as the value of the \$NZ gradually declined.

Chart 6: Enrolments of South Korean students vs the \$NZ/Won



26. Chart 7 shows that the total numbers of South Korean approved visas and permits rose from 2000 to 2003, while the \$NZ was also appreciating against the Won. From July 2003 the trend line of approved visas and permits fell as the value of the \$NZ/Won stabilised and then declined.

Chart 7: Total South Korean student visas/permits vs the Won



27. Table 9 shows there was a significant *negative* correlation in the 1999/2000 year between the value of the \$NZ/Won and the total number of approved South Korean student visas/permits. This correlation then turned *positive* in the 200/01 to 2002/03 years (i.e. the rise in the value of the currency occurred at the same time as a rise in visa/permit numbers). The reason for this change during the period may be that New Zealand was seen as an attractive education provider by Korean parents and students.

Table 9: Monthly averages for South Korean students

| Financial Year | Average monthly number of approved South Korean student visas and permits (x) | Average monthly value of \$NZ/Won* (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|--|--------------------------------|-----------|
| 1999/2000      | 414   | 576.82                                 | -0.71                          | 0.51      |
| 2000/2001      | 755   | 514.04                                 | 0.52                           | 0.27      |
| 2001/2002      | 1,317   | 554.99                                 | 0.56                           | 0.32      |
| 2002/2003      | 1,637   | 633.20                                 | 0.46                           | 0.21      |
| 2003/2004      | 1,460   | 737.59                                 | 0.37                           | 0.14      |
| 2004/2005      | 1,186   | 740.26                                 | -0.36                          | 0.13      |
| 2005/2006      | 1,062   | 664.84                                 | -0.38                          | 0.15      |

\* This is calculated from the monthly average rates of the Australian dollar vs the Won (stated on the website of the Reserve Bank of Australia), and then multiplying these rates by the monthly average rate of the New Zealand dollar vs the Australian dollar (stated on the Reserve Bank of NZ website).

28. Chart 8 and Table 10 show the comparative data for *first-time* Korean approved student visas and permits. It is apparent that there was an inverse correlation between first-time Korean visa/permit approvals and the value of the \$NZ in 1999/00 and 2005/06. Table 9 shows, however, that there was a *positive* correlation from 2000/01 to 2001/02. These marked shifts in correlations indicate that factors other than currency values were more important in driving student interest from South Korea.

Chart 8: First-time South Korean student visas/permits vs the Won

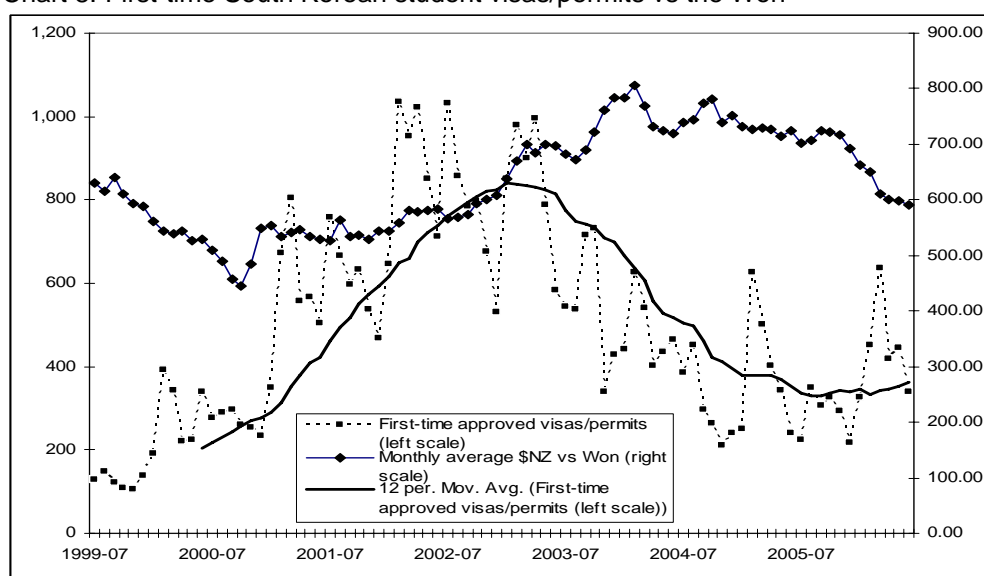


Table 10: Monthly averages for first-time South Korean students

| Financial Year | Average monthly first-time approved South Korean student visas and permits (x) | Average monthly value of \$NZ/Won* (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|--|--------------------------------|-----------|
| 1999/2000      | 205  | 576.82                                 | -0.80                          | 0.64      |
| 2000/2001      | 422  | 514.04                                 | 0.53                           | 0.29      |
| 2001/2002      | 740  | 554.99                                 | 0.62                           | 0.39      |
| 2002/2003      | 814  | 633.20                                 | 0.01                           | 0.00      |
| 2003/2004      | 518  | 737.59                                 | -0.27                          | 0.07      |
| 2004/2005      | 351  | 740.26                                 | -0.34                          | 0.12      |
| 2005/2006      | 361  | 664.84                                 | -0.64                          | 0.41      |

29. Table 11 shows a similar correlation of first-time visa/permit approvals with the value of the currency, but incorporates a *one-year time-lag* (i.e. visa/permit

approvals in 2000/01 are correlated with the value of the \$NZ/Won in 1999/00). This approach actually produces lower correlations for 2000/01 onwards than are shown in Table 10, indicating that the 'lag effect' for South Korean students was **not** a significant factor *overall*.

Table 11: Monthly averages for first-time South Korean students (one-year time-lag)

| Financial Year | Average monthly first-time approved Korean student visas and permits (x) | Average of monthly values of \$NZ/Won (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|---|--------------------------------|-----------|
| 1999/2000      |  | 576.82                                    |                                |           |
| 2000/2001      | 422  | 514.04                                    | -0.79                          | 0.62      |
| 2001/2002      | 740  | 554.99                                    | 0.43                           | 0.19      |
| 2002/2003      | 814  | 633.20                                    | 0.02                           | 0.00      |
| 2003/2004      | 518  | 737.59                                    | -0.34                          | 0.12      |
| 2004/2005      | 351  | 740.26                                    | 0.13                           | 0.02      |
| 2005/2006      | 361  |   | -0.45                          | 0.20      |

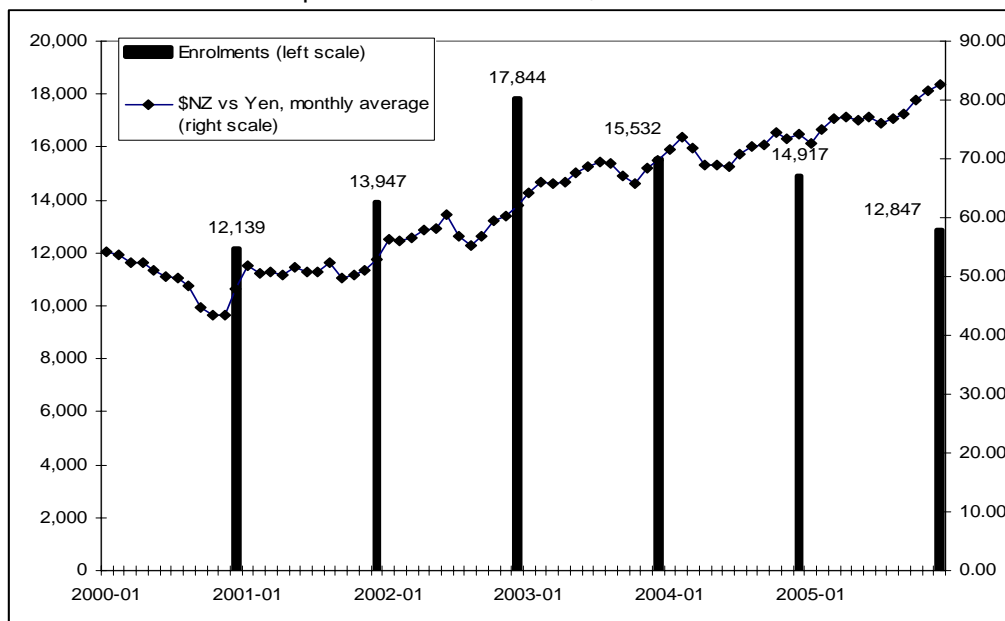
## Japan

30. Table 12 disaggregates the total enrolments from Japanese students according to providers. Most Japanese students enrol within English language schools (71 percent in 2005). In the public tertiary education institutions there has been a gradual fall in enrolments since 2002, to below the level recorded in 2000.

| Table 12: Japanese student enrolments    | 2000          | 2001          | 2002          | 2003          | 2004          | 2005          |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| Schools                                  | 1,254         | 1,422         | 1,482         | 1,509         | 1,530         | 1,676         |
| Public Tertiary Education Institutions   | 1,210         | 1,363         | 1,424         | 1,325         | 1,276         | 1,171         |
| Private Tertiary Education Organisations | 650           | 1,040         | 1,202         | 858           | 861           | 856           |
| English Language Schools                 | 9,025         | 10,122        | 13,736        | 11,840        | 11,250        | 9,144         |
| <b>Totals</b>                            | <b>12,139</b> | <b>13,947</b> | <b>17,844</b> | <b>15,532</b> | <b>14,917</b> | <b>12,847</b> |

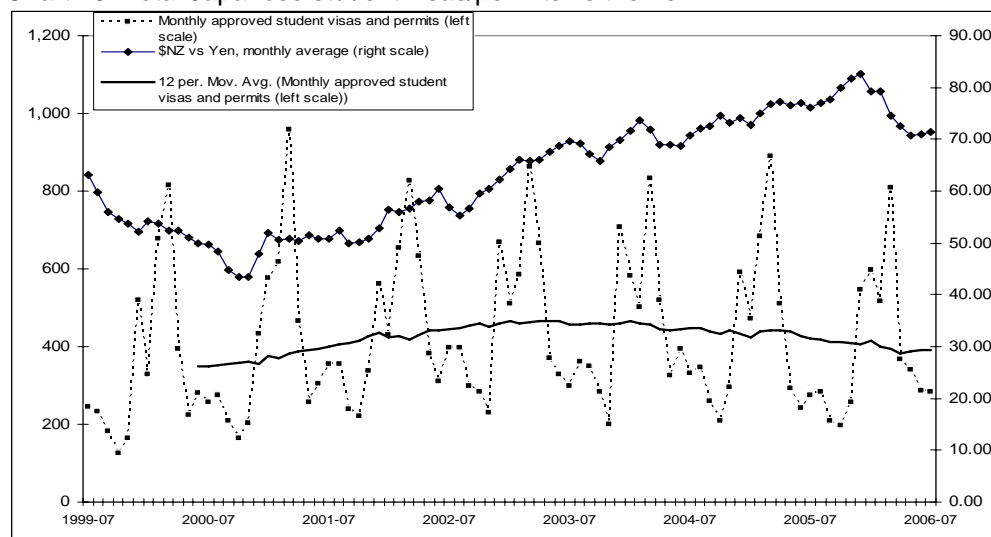
31. Chart 9 shows that the decline in total Japanese enrolments from 2003 to the end of 2005 coincided with a continuing rise in the value of the \$NZ vs the ¥en.

Chart 9: Enrolments of Japanese students vs the \$NZ/¥en



32. The student visa and permit trends information is largely consistent with the enrolment data, except that the numbers of student visas and permits granted to people from Japan is much lower than enrolment levels. This is because many Japanese students enrolled with English language schools are understood to be in New Zealand on tourist/visitor visas. The trend line of total approved Japanese visas/permits has been relatively stable from 1999 to 2006, despite the significant appreciation of the \$NZ against the ¥en from 2001.

Chart 10: Total Japanese student visas/permits vs the ¥en



33. The apparent lack of any linear relationship between currency values and the total level of approved student visas/permits is confirmed by reference to the (generally low) coefficients of correlation over the period 1999 to 2006, as shown in Table 13. This indicates that Japanese student interest is not substantially affected by the value of the \$NZ, an outcome that could be expected given the higher level of per capita income in Japan<sup>3</sup>. Notably, a significant positive correlation between currency value and approved visas and permits occurred in 2003/04.

Table 13: Monthly averages for Japanese students

| Financial Year | Average monthly number of approved Japanese student visas and permits (x) | Average of monthly values of \$NZ/¥en (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|---|--------------------------------|-----------|
| 1999/2000      | 349   | 54.4                                      | -0.29                          | 0.09      |
| 2000/2001      | 392   | 48.6                                      | 0.58                           | 0.34      |
| 2001/2002      | 442   | 54.4                                      | 0.45                           | 0.20      |
| 2002/2003      | 466   | 62.4                                      | 0.41                           | 0.16      |
| 2003/2004      | 446   | 69.5                                      | 0.61                           | 0.37      |
| 2004/2005      | 427   | 74.4                                      | 0.31                           | 0.10      |
| 2005/2006      | 390   | 76.9                                      | 0.06                           | 0.00      |

34. Chart 11 and Table 14 show the comparative data for *first-time* Japanese approved student visas and permits. The trend-line in the Chart shows that there may have been an inverse correlation between first-time Japanese visa/permit approvals and the value of the \$NZ from 2002/03 to 2005/06. Table 13 shows that there was, however, generally a limited *positive* correlation from

<sup>3</sup> In 2005 Japan's per-capita Gross Domestic Product (in purchasing-power-parity terms) was \$US 31,500. In 2005 New Zealand's Gross Domestic Product (in purchasing-power-parity terms) was \$US 25,200 (Source: CIA World Factbook).

2000/01. These limited correlations indicate that factors other than currency values may have been more important in driving student interest from Japan.

Chart 11: First-time Japanese student visas/permits vs the ¥en

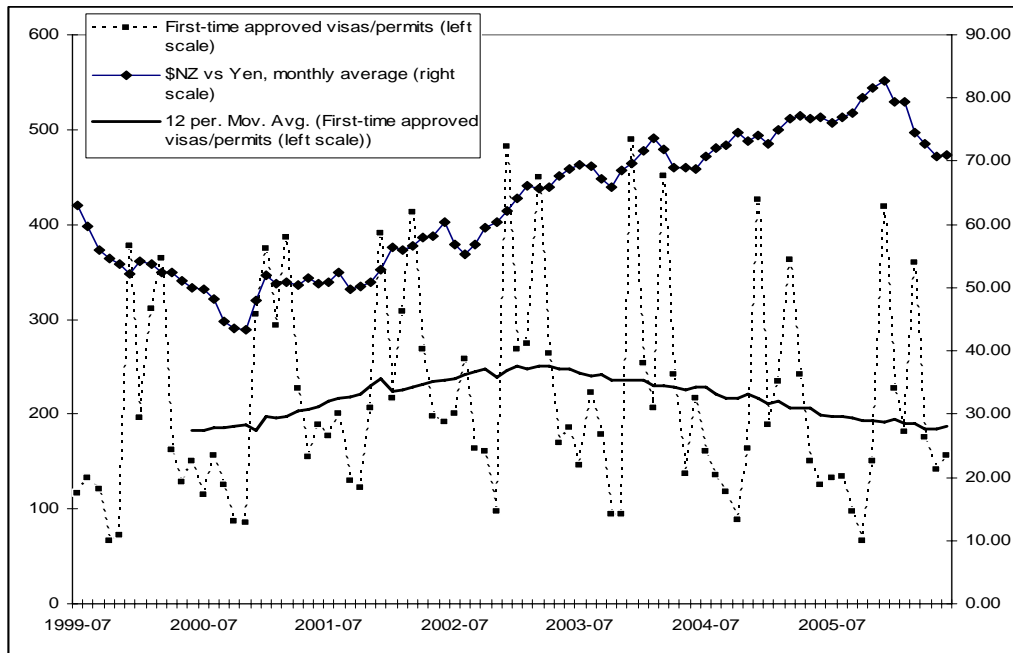


Table 14: Monthly averages for first-time Japanese students

| Financial Year | Average monthly first-time approved Japanese student visas and permits (x) | Average of monthly values of \$NZ/¥en (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|---|--------------------------------|-----------|
| 1999/2000      | 183  | 54.4                                      | -0.32                          | 0.10      |
| 2000/2001      | 208  | 48.6                                      | 0.65                           | 0.42      |
| 2001/2002      | 235  | 54.4                                      | 0.34                           | 0.12      |
| 2002/2003      | 248  | 62.4                                      | 0.21                           | 0.05      |
| 2003/2004      | 228  | 69.5                                      | 0.46                           | 0.21      |
| 2004/2005      | 200  | 74.4                                      | 0.28                           | 0.08      |
| 2005/2006      | 187  | 76.9                                      | 0.21                           | 0.05      |

35. Table 15 shows a similar correlation of first-time visa/permit approvals with the value of the currency, but incorporates a *one-year time-lag* (i.e. visa/permit approvals in 2000/01 are correlated with the value of the \$NZ/¥en in 1999/00). This approach does not produce significant correlations for 2000/01 onwards than are shown in Table 14, with the exception of a limited positive correlation for 2004/05. These results indicate that there was not a significant 'lag effect' for Japanese student visa/permit approvals overall.

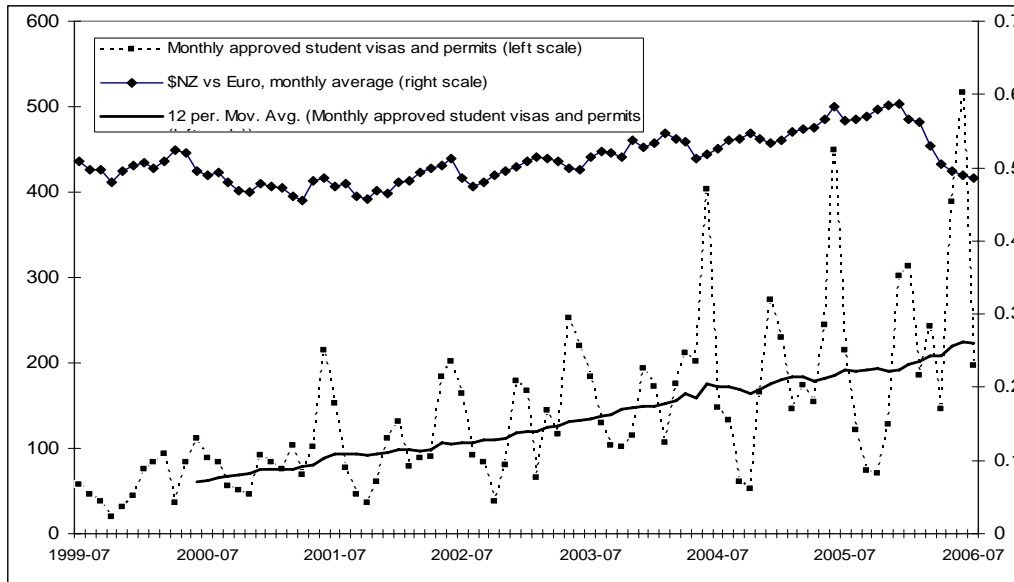
Table 15: Monthly averages for first-time Japanese students (one-year time-lag)

| Financial Year | Average monthly first-time approved Japanese student visas and permits (x) | Average of monthly values of \$NZ/¥en (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|---|--------------------------------|-----------|
| 1999/2000      |  | 54.4                                      |                                |           |
| 2000/2001      | 208  | 48.6                                      | -0.36                          | 0.13      |
| 2001/2002      | 235  | 54.4                                      | 0.42                           | 0.18      |
| 2002/2003      | 248  | 62.4                                      | 0.21                           | 0.04      |
| 2003/2004      | 228  | 69.5                                      | 0.25                           | 0.06      |
| 2004/2005      | 200  | 74.4                                      | 0.54                           | 0.29      |
| 2005/2006      | 187  | 76.9                                      | 0.24                           | 0.06      |

## Germany

36. Interest from German students has been a small but growing market for the New Zealand international education sector. Chart 12 shows the trend line for student visas/permits has been consistently rising since 1999. Over the same period, the relative value of the \$NZ against the €uro has been very stable, with a relatively slight currency appreciation recorded from 2002 to late 2005.

Chart 12: Total German student visas/permits vs the €uro



37. As would be expected from the information outlined in Chart 12, Table 16 shows there is generally no consistent correlation between the currency value and the total level of German student visas/permits. An exception occurred in the 2001/02 financial year, when a slight increase in the value of the \$NZ had a positive correlation with an increase in visa/permit approvals. In 2004/05 there was also a positive correlation between the rise in the value of the \$NZ and a rise in approved student visas/permits, whereas in 2005/06 there was a *negative* correlation between a fall in the value of the \$NZ, and the rise in approved student visas/permits. These large shifts in correlations are difficult to explain, and indicate that there is no substantial relationship between the two variables.

Table 16: Monthly averages for German students

| Financial Year | Average monthly number of approved German student visas and permits (x) | Average of monthly values of \$NZ/€uro (y) | Coefficient of correlation (r) | R-squared |
|----------------|---|--|--------------------------------|-----------|
| 1999/2000      | 60  | 0.50                                       | 0.27                           | 0.07      |
| 2000/2001      | 88  | 0.48                                       | 0.36                           | 0.13      |
| 2001/2002      | 105   | 0.48                                       | 0.72                           | 0.52      |
| 2002/2003      | 133   | 0.50                                       | 0.20                           | 0.04      |
| 2003/2004      | 175   | 0.53                                       | -0.23                          | 0.05      |
| 2004/2005      | 186   | 0.55                                       | 0.61                           | 0.37      |
| 2005/2006      | 225   | 0.55                                       | -0.62                          | 0.38      |

38. Chart 13 and Table 17 show the comparative data for *first-time* German approved student visas and permits. The picture presented is very similar to that shown for the total stock of approved student visas and permits for German

students, shown in Chart 12. This supports data that most German students stay in New Zealand for short periods, i.e. by enrolling in English language schools<sup>4</sup>.

39. While this comparison of the flow of approvals is skewed towards the large numbers of short-term students, it is apparent that there was a positive correlation between first-time German visa/permit approvals and the value of the \$NZ for 2000/01 to 2001/02. Table 17 shows that there was, however, a negative correlation in 2005/06. Again, the results listed in this table indicate it is likely that factors other than currency values are more important in driving student interest from Germany.

Chart 13: First-time German student visas/permits vs the €uro

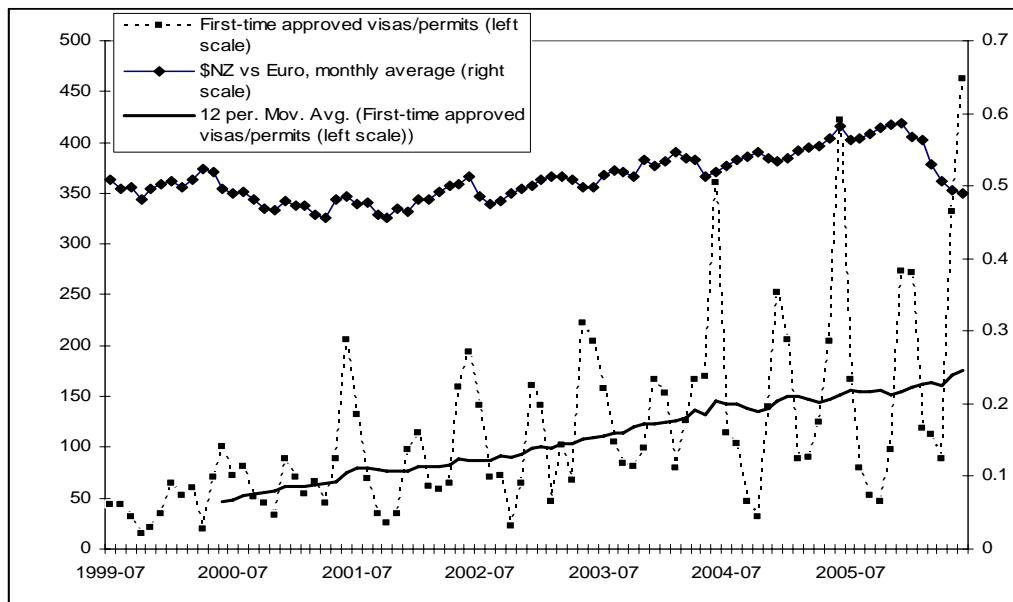


Table 17: Monthly averages for first-time German students

| Financial Year | Average monthly first-time approved German student visas and permits (x) | Average of monthly values of \$NZ/€uro (y) | Coefficient of correlation (r) | R-squared |
|----------------|--|--|--------------------------------|-----------|
| 1999/2000      | 46   | 0.50                                       | 0.16                           | 0.03      |
| 2000/2001      | 75   | 0.48                                       | 0.50                           | 0.25      |
| 2001/2002      | 87   | 0.48                                       | 0.68                           | 0.46      |
| 2002/2003      | 110  | 0.50                                       | 0.11                           | 0.01      |
| 2003/2004      | 146  | 0.53                                       | -0.28                          | 0.08      |
| 2004/2005      | 152  | 0.55                                       | 0.56                           | 0.31      |
| 2005/2006      | 175  | 0.55                                       | -0.53                          | 0.28      |

<sup>4</sup> Information from the Statistics NZ Survey of English Language Providers is that there were 1,240 enrolments of German students in English language schools for the year ended 31 March 2006.

## Appendix: An explanation of correlation coefficients

In [statistics](#), the **Pearson product-moment correlation coefficient** (sometimes known as the PMCC) ( $r$ ) is a measure of the tendency of two variables  $X$  and  $Y$  measured on the same object or organism to increase or decrease together. It is defined as the sum of the products of the [standard scores](#) of the two measures divided by the [degrees of freedom](#):

$$r = \frac{\sum z_x z_y}{n - 1}.$$

Note that this formula assumes that the standard deviations on which the Z scores are based are calculated using  $n - 1$  in the denominator.

The result obtained is equivalent to dividing the [covariance](#) between the two variables by the product of their [standard deviations](#). In general the [correlation coefficient](#) is one of the two [square roots](#) (either positive or negative) of the [coefficient of determination](#) ( $r^2$ ), which is the ratio of explained variation to total variation:

$$r^2 = \frac{\sum(Y' - \bar{Y})^2}{\sum(Y - \bar{Y})^2}$$

where:

$Y$  = a score on a [random variable](#)  $Y$

$Y'$  = corresponding predicted value of  $Y$ , given the correlation of  $X$  and  $Y$  and the value of  $X$

$\bar{Y}$  = **sample mean** of  $Y$  (i.e., the mean of a finite number of independent observed realizations of  $Y$ , **not** to be confused with the [expected value](#) of  $Y$ )

The correlation coefficient adds a sign to show the direction of the relationship. The formula for the Pearson coefficient conforms to this definition, and applies when the relationship is linear.

The coefficient ranges from  $-1$  to  $1$ . A value of  $1$  shows that a linear equation describes the relationship perfectly and positively, with all data points lying on the same [line](#) and with  $Y$  increasing with  $X$ . A score of  $-1$  shows that all data points lie on a single line but that  $Y$  increases as  $X$  decreases. A value of  $0$  shows that a linear model is inappropriate – that there is no linear relationship between the variables.

The Pearson coefficient is a statistic which estimates the [correlation](#) of the two given [random variables](#).

The linear equation that best describes the relationship between  $X$  and  $Y$  can be found by [linear regression](#). This equation can be used to "predict" the value of one measurement from knowledge of the other. That is, for each value of  $X$  the equation calculates a value which is the best estimate of the values of  $Y$  corresponding the specific value of  $X$ . We denote this predicted variable by  $Y'$ .

Any value of  $Y$  can therefore be defined as the sum of  $Y'$  and the difference between  $Y$  and  $Y'$ :

$$Y = Y' + (Y - Y')$$

The [variance](#) of  $Y$  is equal to the sum of the variance of the two components of  $Y$ :

$$s_y^2 = s_{y'}^2 + s_{y.x}^2$$

Since the [coefficient of determination](#) implies that  $s_{y.x}^2 = s_y^2(1 - r^2)$  we can derive the identity

$$r^2 = \frac{s_{y'}^2}{s_y^2}.$$

The square of  $r$  is conventionally used as a measure of the association between  $X$  and  $Y$ . For example, if the coefficient is 0.90, then 81% of the variance of  $Y$  can be "accounted for" by changes in  $X$  and the linear relationship between  $X$  and  $Y$ .