Kilometres and kiwifruit: Evaluating the food miles debate

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Sir Nicholas Stern's recent review of the economics of climate change predicted a bleak future for the global economy if the world fails to cut back emissions of greenhouse gases. Against this backdrop, former UK cabinet minister Stephen Byers asserted that flying one kilogram of kiwifruit from New Zealand to Europe results in the release of five kilograms of carbon dioxide into the atmosphere. Such statements have rekindled 'food miles' arguments for trade restrictions, particularly in the UK. Contrary to this view, this article argues that the logic behind the food miles movement suggests that UK consumers should replace locally-grown food with New Zealand produce.

What are food miles?

Food miles measure the total distance travelled as food is transported from its place of origin to the consumer's plate. The calculation may include kilometres travelled as food is shipped from farms to processors, from processors to storage depots, from storage depots to vendors, and from vendors to consumers. Greenhouse gases (mainly carbon dioxide, CO_2) associated with food transportation have prompted many commentators to argue for barriers to food trade and/or for consumers to buy local produce instead of imported alternatives. Due to its geographical isolation and large quantities of agricultural exports, New Zealand is particularly vulnerable to such restrictions.

On the surface, economics appears to support the food miles argument for restricting trade. This is because when, say, a European buys a New Zealand kiwifruit the CO_2 released by its transportation will contribute to global warming, causing, for example, rising sea levels and destruction of life on low-lying islands in the Pacific and elsewhere. As such, economists refer to the emission of CO_2 as a negative externality. The presence of a negative externality means that, from society's point of view, too many kiwifruit will be traded (i.e., markets will not generate an efficient outcome). This is because producers do not incur the full cost of supplying kiwifruit (defined as the costs borne by kiwifruit producers plus environmental costs due to CO_2 emissions). Imposing a tax on imported kiwifruit equal to the cost of environmental degradation resulting from CO_2 emitted during transportation is, therefore, required to encourage producers to export the socially efficient (reduced) amount.

There's more to it than miles

Simply taxing *imported* food, however, is not the solution. As CO_2 is emitted at almost all stages of the process of delivering food to the dining room table, an assessment of the environmental consequences of consuming food from different countries should evaluate CO_2 emissions during the product's entire lifecycle. Stages in a food's lifecycle

Table 1: New Zealand CO_2 emissions relative to UK emissions per tonne of output (%)

Product	NZ–UK relative CO2 emissions
Lamb	24.1%
Dairy	48.7%
Apples	68.1%
Onions	108.6%

Source: Adapted from Saunders *et al.* (2006, Tables 7.1 & 7.3-7.5).

The results indicate that, having accounted for CO_2 emissions from production and transportation in both countries, a tonne of New Zealand lamb (carcass weight) supplied to UK consumers releases less than a quarter of the CO_2 than the production of a tonne of UK lamb. Likewise, the supply of New Zealand dairy products and apples to British supermarkets produce, respectively, around one half and two thirds of the CO_2 generated by the supply of the UK equivalent. Onions – where transport emissions account for around two-thirds of all CO_2 resulting from the supply of New Zealand crops – are the only product for which UK consumers can reduce CO_2 emissions by favouring domestic produce.

A major contributor to New Zealand's relative CO_2 efficiency in dairy production is that UK cows consume a significantly larger amount of grain-based supplements

"Simply taxing imported food, however, is not the solution."

include sowing, growing, harvesting, packaging, storage, transportation and consumption. All phases use energy and therefore produce CO_2. For example, production of fertiliser, fodder (hay and silage) and feed supplements all use large amounts of energy.

So the food miles argument for favouring domestic produce is only valid if food is produced using identical processes around the globe. Put another way, concluding that buying domestically-produced food instead of imported varieties reduces CO_2 emissions is equivalent to inferring that the winner of a rugby match is the team that kicked the most penalty goals (not the team that scored the most points).

Saunders *et al.* (2006) assess total CO_2 emissions released in the supply of four New Zealand and UK food products to British markets. Data from their report is summarised in Table 1. The table displays CO_2 emissions per tonne of output associated with New Zealand production and transportation to the UK as a percentage of emissions from UK production. So a figure less (greater) than 100% indicates that UK consumption of a New Zealand product generates less (more) CO_2 than UK consumption of the equivalent locally-produced good.

and fodder than their New Zealand counterparts. For lamb production, UK producers emit large quantities of CO_2 because they use more than 13 times more nitrogen fertiliser per hectare than Kiwi farmers.

Overall, these figures highlight New Zealand's natural advantage in agriculture and indicate that a shift in UK consumption away from Kiwi foodstuffs, which are transported nearly 18,000 kilometres, towards domestically-grown alternatives would increase (rather than decrease) CO_2 emissions. In fact, this implies that encouraging UK consumers to buy more New Zealand produce will help save communities vulnerable to rising sea levels.

Another factor to consider when evaluating the environmental friendliness of consuming different types of food is CO_2 generated from alternative modes of transport. Sea and rail transportation are the most efficient, followed by road and finally air, which accounts for 1% of food miles but 11% of food-mile CO_2 emissions. Furthermore, research by Britain's Department for Environment, Food and Rural Affairs (DEFRA) indicates that bulk transportation of food to centrally-located supermarkets is more energy efficient than a large number of personal visits to farms.

Milking food miles

Stephen Byers' comments (referred to above), and a UK advertising campaign implying that consumers are essentially eating oil when they buy New Zealand butter, are evidence of a strong food miles movement in Europe. Agriculture Minister Jim Anderton (and others) has argued that the food miles argument "is being used in Europe by self-interested parties trying to justify protection in another guise" (New Zealand Government Press Release, 14 September 2006) rather than to champion environmental concerns.

This is because European farm lobby groups exert a large amount of political clout and there is global pressure for the European Union to dismantle its trade-distorting system of export subsidies, rural development grants, direct aids and market support known as the Common Agricultural Policy (CAP). Consequently, critics argue that food miles arguments are being used by European farmers to replace support provided by the CAP.

Commentators in Jim Anderton's camp appear to have a point. There is little doubt that increased CO_2 emissions are harming the environment and therefore corrective action such as a carbon tax is needed to curtail pollution. If reducing total CO_2 emissions is the main objective of the tax, the tax should be applied to all CO_2 emitting activities, including food and non-food production and transportation. A carbon tax (on all CO_2 emissions) may, due to the relative energy efficiency of Kiwi farmers, raise New Zealand food production costs by a smaller amount than it would increase European farm costs. Accordingly, such a tax may improve New Zealand's competitiveness in Europe. A food miles tax or a change in preference towards local produce, however, may result in greater environmental damage by encouraging consumers to purchase energy-intensive domestic varieties.

Conclusion

Measuring the number of miles food travels from farm to fork provides a poor estimate of environmental damage associated with the delivery of food to the dining room table. An accurate assessment of the environmental friendliness of food from different sources requires consideration of CO_2 emitted during both transportation and production. Contrary to the "buy local" message touted by food miles activists, such an analysis suggests that encouraging UK consumers to buy New Zealand produce will reduce CO_2 emissions. Negative externalities in the form of CO_2 emissions associated with most economic activities provide grounds for a tax on all CO_2 emissions – not just emissions associated with food transportation.

Some questions to think about

1. Suppose a global tax on CO_2 emissions is introduced. What difficulties do you think policy makers will face in deciding how much to tax each tonne of CO_2? (Hint: To achieve an efficient outcome, what should policy makers set the tax equal to?)

2. If CO_2 emissions due to transportation account for a large share of total emissions from supplying a product to a foreign market, do you think buying local produce is likely or unlikely to decrease CO_2 emissions? Why?

Further reading

More about food miles is available in DEFRA (2005), *The Economist* (2006), Saunders et al. (2006) and Stephenson (2006). Externalities and economic efficiency are reviewed in Genç (2004). Grafton (2004) discusses the economics of climate change.

References

DEFRA (2005), The validity of food miles as an indicator of sustainable development. Report Number ED50254, Issue 7.

M Genç (2004), Auckland's traffic: Does economics offer a decongestant? In: P Hansen & A King (eds), *Keeping Economics Real: New Zealand Economic Issues*, Auckland: Pearson Education, 84-7.

Q Grafton (2004), Hot air and cold cash: The economics of climate change. In: P Hansen & A King (eds), *Keeping Economics Real: New Zealand Economic Issues*, Auckland: Pearson Education, 77-82.

C Saunders, A Barber, & G Taylor (2006), Food miles – comparative energy/emissions performance of New Zealand's agriculture industry. Research Report No. 285, Agribusiness and Economics Research Unit, Lincoln University.

J Stephenson (2006), Green-washing protectionism: The food miles farce. *NZIER UPDATE*, New Zealand Institute of Economic Research, December, 1-3.

The Economist (2006), Voting with your trolley, 9 December, 67-71.

Rekindling the ANZAC spirit:
Has the time come for a common currency with Australia?

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There has been a continuing debate for some years as to whether Australia and New Zealand should have a common currency. In particular, the introduction of the euro in 2002 (a currency now shared by 13 European countries and 315 million people) gave a renewed push to the idea of a common currency for Australia and New Zealand. This magazine published an article a few years ago on the question of whether Australia and New Zealand should adopt a common currency (King 2000), dubbed by the author the "ANZAC$".[1] Since then, new research on this issue has been carried out. Also, the economics profession has different opinions on the extent of the advantages and disadvantages of a common currency and this article presents some of these viewpoints.

The New Zealand dollar is quite a young currency by any standard. It was not until August of 1934 that New Zealand got its own money, issued solely by the Reserve Bank. Interestingly, prior to 1897 Australian (and British) coins were circulating as legal tender, alongside banknotes issued by trading banks. Is it time for a change again?

Figure 1 (see the next page) shows how volatile the exchange rate between the Australian and New Zealand dollar has been in recent years. These movements are largely unpredictable; in particular the dates for the turning points are not predictable. Lately, newspapers have been reporting complaints from the export and tourism sectors about the Kiwi dollar being 'too high' (e.g., the article titled "Kiwi's strength a bugbear", in *The Press*, 31/01/2007). On the other hand, when the New Zealand dollar falls in value, prices of imports generally increase.[2] That leads to complaints by consumers who have to pay higher prices.

Would a common currency with Australia solve these problems?

No, because the ANZAC$ would still fluctuate against the other currencies like the US$, the Japanese yen and the Chinese renminbi. New Zealand trades with many other countries besides Australia. However, Australia is our major trading partner in terms of both exports and imports of goods and services, including tourism. For New Zealand, total exports of goods and services account for some 28% of the gross domestic product (GDP), which is a large share. A common currency eliminates the transactions costs associated with exchanging money and hence facilitates trade. It also eliminates exchange rate volatility and the associated exchange rate risks. Empirical evidence suggests that a common currency leads to substantial welfare gains.

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1 A revised version of this article was published as King (2004).
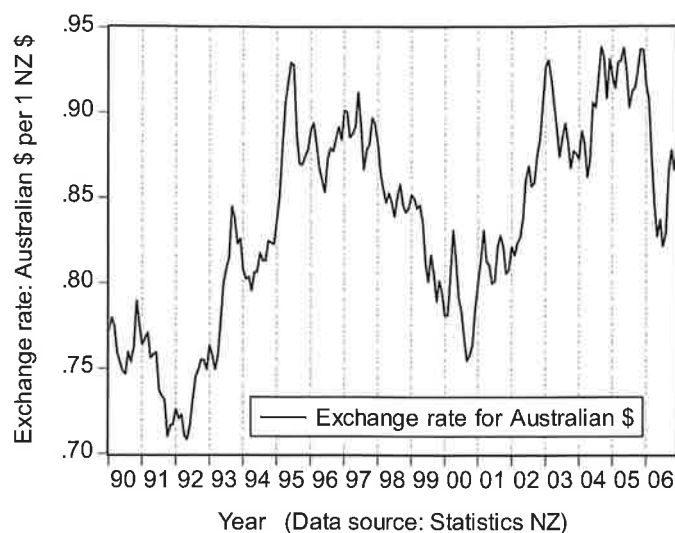2 The overall effect will depend on the extent of exchange-rate pass-through to import prices.

Figure 1: The ups and downs of the Kiwi

How large might the gains be from adopting a common currency?

There is some controversy over this question. At one extreme, Andrew Rose estimated, in a widely cited empirical paper published in 2000, that currency or monetary unions lead to a tripling in trade.[3,4] This figure seems somewhat unrealistic. Richard Baldwin estimated the increase in trade from forming a monetary union, in this case the euro area, to be only about 9% on average.[5] However, it may be a bit early to pass judgement on the euro. Furthermore, the introduction of the euro was preceded by many years of coordinating economic policies and eliminating cross-border trade barriers which may not have happened without the long expressed goal of working towards a common currency in Europe. Most empirical studies on the effect of monetary unions on trade find an increase in trade in the range of 30% to 90%, which are very large effects nevertheless. Based on these numbers, it would seem worthwhile to pursue a monetary union between New Zealand and Australia.

What are the economic losses from forming a monetary union?

New Zealand would no longer have its own monetary policy or its own central bank. Decisions on monetary policy would be made by the central bank for the ANZAC$ region as a whole. Also, Australia and New Zealand would have to agree on a power-sharing arrangement for running monetary affairs.[6] The only policy instrument left at New Zealand's own discretion would be fiscal policy (e.g. changes in government expenditures and tax), though even fiscal policy would have to be in harmony with monetary policy, at least to some degree. If New Zealand and Australia were hit by similar economic shocks, then this would not be a matter of concern as the same monetary policy would be appropriate in each country. However, if the shocks that

affect the two economies are very different (asymmetric), then this may pose a problem.

As the exchange rate fluctuates in response to economic shocks, the relative prices of imports to domestically produced goods and services changes. Eventually, the economy moves back to equilibrium, with possibly a period when things get worse before they improve. If the exchange rate can no longer perform this function for New Zealand, and New Zealand is hit by different shocks than Australia, then other markets have to perform the adjustment to economic shocks. If prices and wages are flexible, then there is no problem. However, with fairly sticky prices and wages, and inflexible labour markets, this process may lead to longer adjustment processes than would be the case with flexible exchange rates. Business cycles could therefore be more drawn out, and differ across regions of the monetary union. An important question is therefore whether the economies of Australia and New Zealand face similar economic shocks and digest such shocks in a similar way.

Are the economic cycles in New Zealand and Australia similar?

My own research, and that of several others, indicates that the Australian and New Zealand economies face fairly similar shocks and also have similar business cycles.[7] Further, Grimes (2006) looked at employment cycles in Australia and New Zealand, treating New Zealand as one region, and splitting Australia into eight regions. He disaggregated each region into nine industry classifications and found that industry structures within each region are not much different across the nine geographic regions.[8] He concluded that his results imply "sectoral differences between the two countries are not a major obstacle to consideration of an Australasian currency union" (Grimes 2006, p42).

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3 For a discussion and references to this and related studies, see Rose (2006).
4 Many authors use the terms "currency union" and "monetary union" interchangeably to refer to countries sharing a single currency. Others reserve this definition for monetary unions and define a currency union as countries fixing their exchange rate irrevocably but using different monies.
5 See The Economist (2006).
6 A separate question is how best to conduct monetary policy and whether monetary policy should be used at all to fine-tune business-cycle fluctuations. It may be preferable to use monetary policy solely for achieving price stability in the longer run. See Haug and Dewald (2004) for empirical evidence supporting this view.
7 See Haug, Karagedikli and Ranchhod (2005) and the references therein.
8 The only region that differs significantly is the Australian Capital Territory.

What do we conclude?

On economic grounds, I believe that it would be worthwhile pursuing a monetary union with Australia. It would lead to more trade and more integrated financial markets that should be easier to regulate, especially in the banking sector. Small country size is generally regarded as an obstacle to financial market development, especially for bond markets.[9] A monetary union would offer New Zealanders a much wider range of financial instruments (shares, bonds, etc.) and would therefore open up a larger array of retirement savings options. The central banks of New Zealand and Australia have fairly similar monetary policies so there would not have to be big policy changes in this respect.

Some questions to think about

1. What is meant by the New Zealand dollar being "too high" in the eyes of exporters and the tourism industry?

2. Why is it generally not possible for a central bank to keep an exchange rate either above or below its market value (through intervention in foreign exchange markets) for long periods of time?

3. What are some examples of transactions costs in international trade?

4. Why might business cycles be asymmetric between Australia and New Zealand?

5. What are the pros and cons of "one world, one currency"?

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9 See Eichengreen (2006).

References

B Eichengreen (2006), On the sequencing of regional integration. *North American Journal of Economics and Finance* 17, 329-334.

A Grimes (2006), "Intra & inter-regional industry shocks: A new metric with application to Australasian currency union. *New Zealand Economic Papers* 40, 23-44.

A A Haug & W G Dewald (2004), Longer-term effects of monetary growth on real and nominal variables, major industrial countries, 1880 - 2001. European Central Bank, Working Paper No. 382. Available online (http://www.ecb.int/pub/pdf/scpwps/ecbwp382.pdf).

A A Haug, O Karagedikli & S Ranchhod (2005), Monetary policy transmission mechanisms and currency unions: A vector error-correction approach to a Trans-Tasman currency union. *Journal of Policy Modeling* 27, 55-74. Available online as a Reserve Bank of New Zealand working paper (http://www.rbnz.govt.nz/research/discusspapers/dp03_04.pdf).

A King (2000), All for one and one for all? Prospects for a Trans-Tasman currency. *EcoNZ@Otago*, Issue 5, 1-3.

A King (2004), All for one and one for all? Prospects for a Trans-Tasman currency. In: P Hansen & A King (eds), *Keeping Economics Real: New Zealand Economic Issues*, Auckland: Pearson Education, 200-205.

A K Rose (2006), Currency Unions. Draft Paper prepared for *The New Palgrave*. Available online (http://faculty.haas.berkeley.edu/arose/Palgrave.pdf).

The Economist (2006), Economic focus: The euro and trade, 22 June, 90.
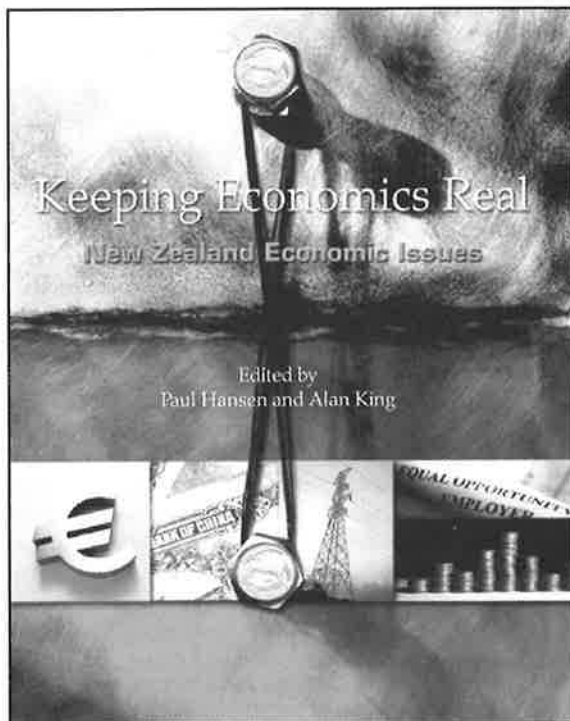
Big cities, small cities: Which grow faster?

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Though agriculture accounts for the largest share of our exports, New Zealanders live predominantly in cities. As the population has grown over the decades, so has the proportion of the population living in towns and cities, from about 40% in the 1880s to over 85% now. And these cities themselves vary tremendously in population, from small centres of less than 1000 to Auckland, which houses over a quarter of the nation's population. Of interest are growth rates. Which cities grow at the fastest rates, big ones or small ones?

When we talk about rates, we mean percentages. The population of the Auckland urban area, for example, grew by about 9% between 1996 and 2001. Starting in 1996 with about 885,000 people, its population grew by about 112,000. The population of Tauranga, in contrast, increased by about 13,500 people, which represents an increase of about 16% on Tauranga's 1996 population of 82,800. Tauranga grew at a faster rate, i.e., its relative growth was faster, but Auckland's absolute growth was much greater: 112,000 versus 13,500 people.

If all cities grow at about the same rate, then their positions in the *city-size distribution* don't change over time. Neither Tauranga (number 7 in the city-size distribution) nor Auckland (number 1) changed positions between 1996 and 2001. But relatively fast-growing Tauranga moved from number 8 to number 7, surpassing Palmerston North in population, between 1991 and 1996. And Invercargill and Gisborne, both of which fell in population between 1996 and 2001, fell in rank.

City-size distributions have received a lot of attention from researchers over the last century. The main reason for the attention is that the cities in many countries appear to follow the "rank-size rule". The rank-size rule was proposed in 1913 by German demographer Felix Auerbach (see Auerbach 1913). It says that if you multiply the population of any city by its rank in the city-size distribution, you'll get roughly the same number: the population of the largest (i.e., top-ranked) urban area. For example, Christchurch was in 2001 the third-largest urban area in New Zealand. Multiplying its population by three gives 1.03 million, remarkably close to Auckland's 1.09 million in 2001.

As it turns out, the New Zealand city-size distribution does not follow the rank-size rule. Christchurch is an anomaly. In general, New Zealand urban-area populations fall faster with rank than the rank-size rule permits. For example, the Napier-Hastings urban area is ranked fifth in 2001. Five times its population is only 0.58 million. Volker Nitsch, of the Free University of Berlin, recently surveyed 515 studies of city-size distributions across countries, regions, and over time, and found that about two-thirds of these roughly follow the rank-size rule (see Nitsch 2005). But he also finds quite a bit of variation in how quickly urban-area populations fall with their rank in the city-size distribution.

Quantifying the City-Size Distribution

The New Zealand city-size distribution does not follow the rank-size rule. But it does closely follow a "power law". What is a power law? The rank-size rule says:

$$Rank \; x \; Pop = A$$

where A is the population of the largest urban area (i.e., Auckland), Pop is the population of each urban area, and Rank is its rank in the city-size distribution. We can re-arrange this a little bit:

$$Rank = \frac{A}{Pop} = A \; x \; Pop^{-1}$$

Note that Pop is raised to the *power* -1. The rank-size rule is an instance of a power law. More generally, the city-size distribution follows a power law if:

$$Rank = \frac{A}{Pop^{\alpha}} = A \; x \; Pop^{-\alpha}$$

where α is a parameter that may or may not equal 1.

How can we estimate the value of α for New Zealand? It turns out that we can use a simple linear regression model. We can take the logarithm of both sides of the equation above, and apply a couple of rules of logarithms to get:

$$\log Rank = \log A - \alpha \log Pop$$

Adding an error term (simple equations do not describe real data perfectly), we get a standard regression equation, where α is the coefficient on log Pop:

$$\log Rank = \log A - \alpha \log Pop + u$$

Estimating this equation requires information only on the populations of the urban areas in New Zealand. Fortunately, Statistics New Zealand provides these estimates. Urban-area populations include all of the people who live in the relatively built-up (i.e., densely-developed) areas around central employment areas. Table 1 shows population estimates for urban areas of more than 10,000 people in 2001, and growth rates for 1991 - 2001.

Table 1: Urban-area populations, 2001

Rank	log Rank	Urban Area	Pop '01	log Pop	Growth
1	0.00	Auckland	1,087,155	6.04	22.8%
2	0.30	Wellington	342,825	5.54	19.8%
3	0.48	Christchurch	342,285	5.53	11.4%
4	0.60	Hamilton	167,325	5.22	12.6%
5	0.70	Napier-Hastings	116,211	5.07	5.4%
6	0.78	Dunedin	110,757	5.04	1.1%
7	0.85	Tauranga	96,276	4.98	36.0%
8	0.90	Palmerston North	73,845	4.87	4.1%
9	0.95	Rotorua	56,304	4.75	4.8%
10	1.00	Nelson	55,569	4.74	17.3%
11	1.04	New Plymouth	47,967	4.68	-1.1%
12	1.08	Invercargill	46,530	4.67	-10.5%
13	1.11	Whangarei	46,053	4.66	4.2%
14	1.15	Wanganui	39,771	4.60	-3.5%
15	1.18	Kapati	33,474	4.52	22.3%
16	1.20	Gisbourne	31,899	4.50	1.3%
17	1.23	Blenheim	27,282	4.44	15.4%
18	1.26	Timaru	26,856	4.43	-2.8%
19	1.28	Taupo	22,557	4.35	22.8%
20	1.30	Masterton	19,812	4.30	-1.0%
21	1.32	Levin	18,819	4.27	-0.8%
22	1.34	Pukekohe	18,684	4.27	24.5%
23	1.36	Whakatane	18,027	4.26	7.3%
24	1.38	Ashburton	15,576	4.19	2.7%
25	1.40	Queenstown	14,379	4.16	75.9%
26	1.41	Tokoroa	14,265	4.15	-14.3%
27	1.43	Feilding	13,398	4.13	0.2%
28	1.45	Oamaru	12,957	4.11	-6.3%
29	1.46	Rangiora	10,800	4.03	23.7%
30	1.48	Hawera	10,674	4.03	-4.3%
31	1.49	Greymouth	10,170	4.01	-4.1%

Source: Statistics New Zealand

Figure 1 (see the next page) shows a scatter plot of log Rank against log Pop. Super-imposed on the scatter plot is the estimated regression line, i.e., the line of best fit. The slope of the line (i.e., α) is 0.74, and the fit, as measured by the regression R-squared, is 0.990 (where 1.00 represents a perfect fit). Thus, the New Zealand city-size distribution does not follow the rank-size rule - city size falls faster with rank than it would if $\alpha = 1$ - but it does rather closely follow a power law with ($\alpha = 0.74$).

Dynamics of the city-size distribution

So far we haven't done any economics. We've *described* the city-size distribution using regression analysis, but we haven't *explained* why cities vary in population, or used that explanation to hypothesize how city-size distributions might change over time.

Cities exist and vary in size due in large part to the trade-offs between the cost savings from large-scale production (i.e., scale economies) and lower transportation costs. We can think about these trade-offs in several contexts:

- *Freight transport*: A port exploits scale economies by using specialised equipment, logistics software, and labour. A large port has lower operating costs per

freight container handled than does a smaller port. But containers must be trucked to the port, which is expensive. Having multiple ports raises the average cost of handling containers at the port, but reduces *total* costs by reducing the distances containers travel to port.

- *Manufacturing:* Manufacturers reduce costs by producing at higher volumes using specialised equipment and labour. They also reduce costs by locating close to a variety of suppliers (i.e., they exploit *agglomeration* economies). But raw materials have to be shipped to the manufacturer, and finished product to markets. Manufacturers locate to minimise total costs.

- *Retail and consumer services:* A grocer, for example, with a large customer base can offer a wider variety of items at lower cost than can a grocer with a small customer base. But customers have to travel to the store. Grocery stores in rural areas sacrifice variety and low cost to reduce travel times for rural customers.

So cities grow to exploit scale economies. But a city's growth is limited in part by the costs of transporting freight and people from other areas. It is also limited by the availability of building sites and the capacity of transportation systems within the city.
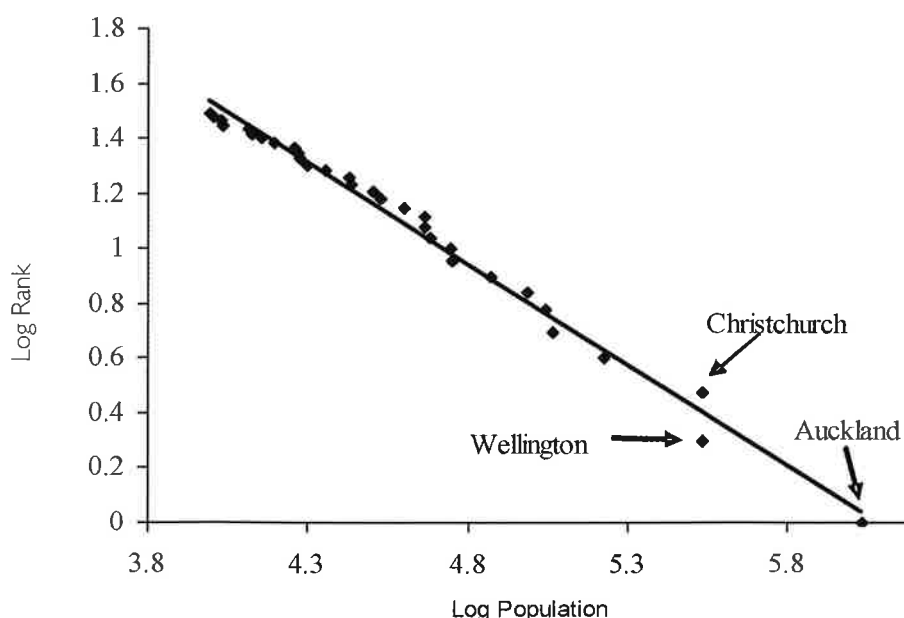
Figure 1: NZ city-size distribution, 2001

How might the city-size distribution have changed over time? Advances in technology appear to favour the growth of large cities. First, improvements in farm technology have reduced the workforce in rural areas. So the demand for the goods and services supplied in rural centres has diminished with the rural population. And second, improvements in both manufacturing processes and transportation technology have reduced the costs of transporting people and freight. This suggests a hypothesis: larger urban areas have tended to grow at faster rates than smaller urban areas.

This hypothesis is testable. If small centres tend to grow more slowly than large centres, then α, the slope parameter in the city-size distribution, gets smaller over time. We can test this hypothesis because Statistics New Zealand reports the populations of all urban areas with populations of at least 10,000 in each census year from 1971 to 2001! We can therefore estimate α for those years to see how it has changed over time. The results are shown in Table 2.

Table 2: City-size distribution, 1971 - 2001

Year	UAs	α	95% Conf Int	R^2
1971	30	0.781	±0.039	0.984
1976	30	0.785	±0.036	0.986
1981	30	0.786	±0.036	0.986
1986	30	0.778	±0.038	0.985
1991	30	0.760	±0.033	0.988
1996	31	0.746	±0.030	0.989
2001	31	0.739	±0.028	0.990

UA = urban areas, Conf Int = confidence interval

The point estimates of α indicate that the relatively small regional centres grew at about the same rate as the large centres in the 1970s (contrary to our hypothesis). The large cities appear to grow relatively quickly (i.e., α gets smaller)

after 1981, and the small 95% confidence intervals indicate that the drop in α by 2001 is statistically significant. This supports the hypothesis that larger cities have recently been growing at faster rates than smaller cities.

There is even a bit more support. Growth in two of the large centres, Auckland and Wellington, is constrained by topography; it's difficult to build on water. Might they have grown faster without these constraints?

Some questions to think about
1. How do relatively small, but fast-growing, tourist towns, such as Queenstown, Taupo, and Blenheim affect the estimate of α?

2. How might a major upgrade of Auckland's transportation system affect α?

3. Our hypothesis is that larger size has led to faster recent growth. Looking at the cities and their growth rates in Table 1, what other variables might affect growth rates?

Further reading
You can learn more about New Zealand urban areas and how Statistics New Zealand tracks their populations on the Stats NZ web-site (www.stats.govt.nz/urban-rural-profiles/default.htm).

O'Sullivan (2003) discusses the rank-size rule and the determinants of urban growth.

References
F Auerbach (1913), Das gesetz der Bevölkerungskonzentration. *Petermans Geographische Mitteilungen* 59, 74-76.

V Nitsch (2005), Zipf Zipped. *Journal of Urban Economics* 57, 86-100.

A O'Sullivan (2003), *Urban Economics* (5th edition), Boston: McGraw-Hill/Irwin.

Going my way? Globalization, convergence and the nation state

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For the greater part of the twentieth century, the varieties of capitalism found in Britain, the USA, Germany and Japan – to list only the more dominant players – belied the notion of an obvious and steady gradual convergence to the prescriptions of neo-classical economics. The institutions and economic behaviour of the former two nations reflected market-led and managerial/shareholder capitalism more generally than did the latter two. But even so there was an ebb and flow over the century in all these countries between state interference, the primacy of the market, the 'mixed economy', and the power that institutions, culture, history and circumstance exerted on economic performance. In more recent times, the denouement of the Japanese economy in particular has strengthened calls for that still major economy to embrace Anglo-Saxon capitalism as the only sound basis for future growth and stability. Is such a conversion inevitable or desirable? Are 'varieties of capitalism' endemic or merely a reflection of the stages countries go through before finally accepting the rationality of the free market capitalist ethos?

Is convergence the norm?

During the 1950s and 1960s technology was regarded as the engine of convergence. Countries, it was commonly assumed, advanced along similar paths of innovation and eventually adopted similar social, political, and economic structures. There was considerable evidence to support convergence theory, including the switch of Soviet economic regimes to markets and democracy, the rise of the Asian giants, and the promotion of monetary integration in Europe. As Figure 1 (see the next page) illustrates, there appears to be some convergence in GDP per capita across the industrialized countries since the 1950s, with the exception of the United States continuing to pull ahead of the pack. The question that then needs to be addressed is whether this convergence of per capita income can be taken to imply that economic systems will necessarily converge.

The idea of technological determination shared by liberals and Marxists suffered a severe setback with mounting evidence of companies making similar products with common technologies but under fundamentally different organisational structures. The strikingly different economic institutions and practices adopted in post-1945 Germany and Japan, for example, demonstrated that growth and prosperity could flow from economies that worked in very different ways from the neo-classical norm. Economic purists were far from convinced. Before the 1980s the strength of the Japanese and German economies was frequently regarded as the result of them exploiting the free-trade international regime and spurning the rules of the capitalist system shaped by free market competitiveness. Their capitalisms produced advantage because they were distorted by state intervention which shaped markets to national advantage but at the expense of others in the international economic order who were subject to more constraints on the use of state power. In some dominant quarters, in other words, the distortions of history and politics were compromising the essentials of fair trade which required a common set of market rules and structures (Berger and Dore 1996).

The relative advance of Japan and Germany during the high growth period of the 1950s and 1960s focused attention nonetheless on the political, organisational, and societal factors that might explain why state-coordinated, as distinct from market-based, economies could be workable alternative forms of capitalism rather than deviant departures from the neo-classical ideal. Growth accounting models rooted in such idealism embraced simplified notions about market structures and economic behaviour, postulating almost as a scientific law that only the liberal allocatively efficient free market form could ensure optimum growth outcomes, deviations from which would require corrective action. The central tenet of this orthodoxy was that specific factors (land, labour, capital and enterprise) were linked in distinct production functions subject to the law of diminishing returns. Market forces would produce growth over time and eventual convergence of growth paths as diminishing returns encouraged a long-term redeployment of resources.

What fate diversity?

However, the components of growth are now more generally recognized to encompass not only resource endowments and technology but the influence of institutions, state policy, history, social capability (as reflected in education, levels of trust and the network of relationships that underpin social interaction and cooperation), and how these mechanisms and processes alter over time. Moreover, the variety of growth experiences across different economies in the post-1945 period challenged the view that the state's role was limited merely to dealing with market failures or to meeting the needs of the victims of the competitive process. General laws about economic behaviour which paid scant attention to national specific factors were seriously undermined by empirical observation of the progress of different countries.

Although such evidence weakened the argument that economic convergence was an inevitable outcome of the capitalist process, it did not diminish its intuitive appeal.
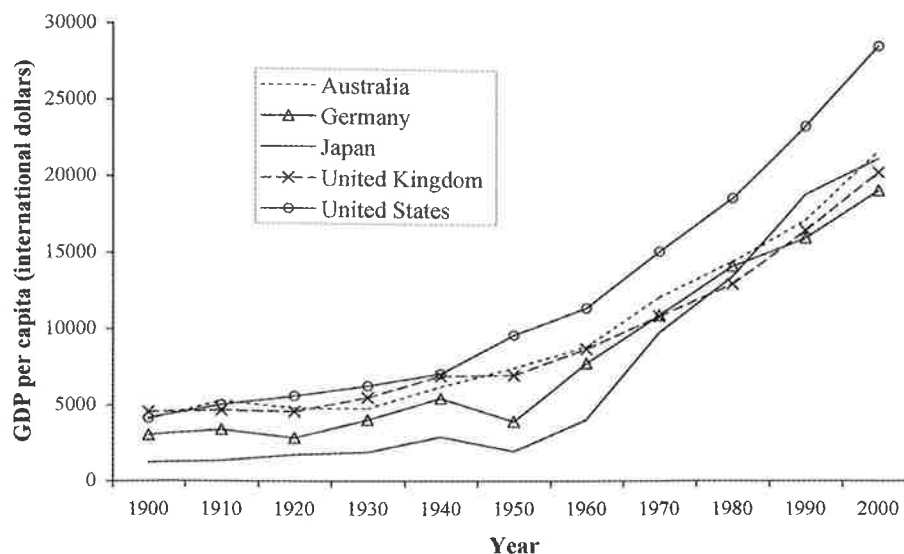
Figure 1: GDP per capita over time

Indeed, more recent events in economic history have breathed fresh life into its apparent logic. The 1997 East Asian crisis did much more than simply reflect worrying evidence of capital flight and collapsed currencies. It raised questions about whether the much lauded variant forms of capitalist economic and social organization could withstand the pressures of international global integration. Did the crisis not signal the need to replace statism, 'crony capitalism', and cosy government/business relations with more transparent Anglo-American market centred practices? (Beeson 2002). Was not the ready availability of technological innovation to societies irrespective of their social infrastructure and the ability of trade and finance to reach far beyond national boundaries synonymous with new forms of convergence as productivity growth and patterns of economic life became subject to globalization and regional integration? (Berger and Dore 1996). In short, were not nation states and their discretionary economic policies now impotent?

Not quite. At a generic level it is still debatable just how far the integration of capital markets and the diffusion of innovation have actually led to any general or secular trend towards convergence of profit rates, wages, incomes, and interest rates even amongst advanced countries and the expectation that differences between the most advanced and the less developed countries would narrow has proved to be the most disappointing. At an empirical level the notion for example that, financial hubris apart, the Japanese economy would be best served by jettisoning the societal, cultural, and political impulses that proved so advantageous in the 'miracle' years might seem attractive in the face of highly publicised accounts of fraud and corruption but it ignores the extent to which the country might still balk at the individualistic, self-serving premises of Anglo-Saxon capitalism.

The fact remains that, even in the era of globalization, across the board convergence is by no means inevitable or automatic. What convergence has occurred in recent decades, as Boyer has noted, "is restricted to the small club of nations that have been able to invest sufficiently in productive investment, infrastructure, and education" and is associated "with the choice and implementation of an adequate strategy" (Boyer 1996, pp57-8). German and Japanese brands of capitalism, to name but two, could continue to embrace the very distinctive strengths and weaknesses that have subjected each system to gains and losses over time. Globalization apart, economies can adopt very different institutional arrangements to meet common economic challenges.

Moreover, self-sustaining differential growth paths can remain once markets are regarded as social institutions (Coates 2005). Both states and markets are limited in their ability to produce desirable results when they operate according to their own logic. What is required is a combination of their different logics to produce positive outcomes. Since the capitalist system is not coherent but made up of multiple interlocking markets, each of which has itself been shaped by state action, the state can have a significant effect on how those markets work by interacting with the choices made by individual decision-makers operating within markets. From this perspective, the state can act as a network builder and strategist, exchanging information with private sector firms to assist co-operative structures within a competitive environment (Burlamaqui et al 2000).

Is there only one model of capitalism?

Although convergence theory has returned with renewed vigour in recent years, the contemporary experience of Sweden, France, Germany, the UK, and Japan is of a search for that alchemy mix of state/market power which, by acknowledging national, institutional, social, cultural, and historical specifics, could sustain growth and stability even in face of the juggernaut of globalization. In an era of mobile capital and skilled labour, nation states have the opportunity/obligation to retain such vital resources. The institutional, educational, and operational framework against which economic transactions are performed will therefore remain vital, ensuring that varieties of capitalism are more likely to be the 21st century norm than any slavish adherence to a single stylized form.

Some questions to think about

1. What are the essential characteristics of 'Anglo Saxon capitalism'?

2. Is state management of an economy always less efficient than the free play of market forces?

3. Has globalization made the nation state redundant?

4. Is there evidence to suggest that market economies since the 19th century at least have depended for their success upon state activity?

Further reading

Some interesting references on this topic, additional to those cited in the article, include Hall and Soskiche (2001), Coates (2000) and Abramovitz (1986).

References

M Abramovitz (1986), Catching up, forging ahead and falling behind. *Journal of Economic History* 46, 385-406.

M Beeson (2002), *Reconfiguring East Asia: Regional Institutions and Organisations after the Crisis,* London: Routledge.

S Berger & R Dore (eds) (1996), *National Diversity and Global Capitalism,* Ithica: Cornell University Press.

R Boyer (1996), The convergence hypothesis revisited: globalization but still the century of nations. In: S Berger and R Dore (eds) (1996), *National Diversity and Global Capitalism,* Ithica: Cornell University Press.

L Burlamaqui, A C Castro & H-J Chang (2000), *Institutions and the Role of the State,* Cheltenham (UK): Elgar.

D Coates (2000), *Models of Capitalism: Growth and Stagnation in the Modern Era,* Cambridge: Polity Press.

D Coates (ed) (2005), *Varieties of Capitalism, Varieties of Approaches,* New York: Palgrave Macmillan.

P A Hall & D Soskiche (eds) (2001), *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage,* Oxford: Oxford University Press.

WINNER OF THE ERKIN BAIRAM MEMORIAL PRIZE FOR 2006

CHRISTOPHER MCDONALD

In memory of the life of Professor Erkin Bairam (1958-2001) and his many contributions to the Department of Economics and the University of Otago, the *Erkin Bairam Memorial Prize* is awarded annually to the student with the highest marks across the core third-year honours Economics papers. The winner for 2006 is Christopher McDonald (past winners: Aaron Carson, 2003; Madeline Penny, 2004; Ashley Dunstan, 2005).

Born in Cyprus, most of Erkin's working life was spent in the Department of Economics at the University of Otago. At the age of 33, he became one of the youngest full professors to be appointed in NZ and by the time of his death had published over 60 articles and 4 books.

The annual cash prize ($500) is from a fund established from the donations of Erkin's former students, friends and colleagues.

Commentary on the New Zealand economy

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	Sep 2006	Jun 2006	Mar 2006	Dec 2005	Sep 2005
GDP (real, annual growth rate, %)	1.4	1.6	2.0	2.1	2.5
Consumption (real, annual growth rate, %)	2.9	3.6	4.6	4.8	4.9
Investment (real, annual growth rate, %)	-6.2	-0.5	4.2	3.9	6.0
Employment: full-time (000s)	1665	1670	1645	1626	1634
Employment: part-time (000s)	453	457	461	462	452
Unemployment (% of labour force)	3.8	3.6	3.9	3.6	3.7
Consumer Price Inflation (annual rate, %)	3.5	4.0	3.3	3.2	3.4
Food Price Inflation (annual rate, %)	3.9	2.2	1.8	1.5	1.6
Producer Price Inflation (outputs, annual rate, %)	4.5	5.6	4.0	3.9	4.1
Producer Price Inflation (inputs, annual rate, %)	6.9	7.8	7.2	6.5	6.1
Salary and Wage Rates (annual growth rate, %)	3.2	3.3	3.2	3.1	3.1
Narrow Money Supply (M1, annual growth rate, %)	3.7	2.3	-1.8	-1.8	0.3
Broad Money Supply (M3, annual growth rate, %)	13.4	10.9	9.8	7.3	9.8
Interest rates (90-day bank bills, %)	7.56	7.47	7.49	7.66	7.09
Exchange rate (TWI, June 1979 = 100)	65.7	62.3	65.6	71.9	70.3
Exports (fob, $m, year to date)	33,850	32,430	31,098	30,817	30,770
Imports (cif, $m, year to date)	40,014	39,040	38,160	37,279	36,539
Exports (volume, June 2002 [not seas. adj.] = 1000)	1061	999	995	1018	974
Imports (volume, June 2002 [not seas. adj.] = 1000)	1451	1427	1473	1475	1473
Terms of Trade (June 2002 = 1000)	1070	1091	1069	1060	1087
Current Account Balance (% of GDP, year to date)	-9.1	-9.7	-9.6	-9.0	-8.5

Sources: Statistics New Zealand (www.stats.govt.nz), Reserve Bank of New Zealand (www.rbnz.govt.nz)

New Zealand's trade deficit peaked in the March 2006 quarter and has fallen by $900m (on an annualised basis) over the last two quarters. How long this easing of the deficit will continue is unclear. Recent falls in oil prices should underpin the strong terms of trade in the short term, but the dollar's recovery in the second half of last year and indications that the economic slowdown may be less pronounced than earlier thought may keep the deficit high for a considerable period.

Cost-inflation pressure on domestic producers has been high recently, but to a significant degree this is a consequence of high oil and (wholesale) electricity prices during the winter. Both have come back sharply in recent months and this should be reflected in lower PPI inflation rates over the next quarter or so. The fall in electricity prices is thanks to the wet spring, and this is not the weather's only effect on the table. The spell of cool, wet weather contributed to shortages of some fruits and vegetables, driving prices in September to a level 22% higher than that of a year earlier. To a large extent this accounts for the sharp rise in food price inflation during 2006.

Taking all these factors into account, the short-term outlook for CPI inflation is that it should quickly fall back within the RBNZ's target zone (1-3%) and remain within it for at least the next two or three quarters. Will this prospect make the RBNZ happy enough to start lowering interest rates any time soon? Almost certainly not. The RBNZ's focus on the underlying (or trend) rate of inflation means that it cannot design monetary policy around individual events, like fluctuations over short time frames in the price of oil, the exchange rate or the weather. Potential sources of underlying inflationary pressure still exist in the form of the tight labour market, the strong property market and solid demand growth. At most, the easing of the 'headline' inflation rate will only reduce the pressure on the RBNZ to further increase interest rates. It could be some considerable time before interest rates start coming down.

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