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Choosing an anchor currency for the Pacific*

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Abstract:

This paper analyses currency options for six Pacific states - Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu – that issue their own currencies. Empirical estimates indicate that these states already stabilize their currencies against the US dollar because of their large and increasing trade with emerging Asia which denominates its trade in US dollars. Building on the theory of an optimal peg, we argue that the replacement of present currencies by the US dollar would strengthen these countries' trade. Gravity model estimations indicate that adopting a common external currency would be a major stimulus to Pacific trade. While the Australian dollar has been suggested because of the Pacific's traditional trade relations with Australia this choice would be the result of a reverse causality bias. A binary choice method is applied to trace endogeneity biases in the Pacific sample. The gains for trade from the adoption of an external currency are lower but remain positive.

Keywords: Currency regimes, gravity model, binary choice, Pacific.

JEL: C21, F15, F33

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1. **Introduction**

Analyses of Pacific development widely agree that despite large aid flows, living standards have improved only slightly since independence in the 1970s (Hughes 2003, Stewart 2006, Hughes and Sodhi 2008). Most Pacific states are richly endowed with agricultural land, marine and mineral resources and tourist sites. They are also well located close to the burgeoning markets of East Asia. Trade is thus a potential driver of economic development in the Pacific. Stable exchange rates can deliver macroeconomic stability and reduce transaction costs such as currency conversion (McKinnon 1979, European Commission 1990, Rose 2000, McKinnon and Schnabl 2004). This paper examines the trade effects of the replacement of individual Pacific currencies by a single anchor currency. Following Frankel and Wei (1994) our econometric estimates indicate that the US dollar dominates the Pacific currency baskets.

Two possible directions of causality are examined to determine an optimal currency for the Pacific. Firstly, causality can run from trade towards the choice of an anchor currency. The theory of the optimal peg (Black 1976, Crocket and Nsouli 1977 and Connolly 1983) argues that countries choose the currency of their principal (past) trading partners as a monetary anchor. From this perspective the Australian dollar would be a suitable monetary anchor for the six Pacific states. Secondly, the choice of a monetary anchor may reflect a shift of a country's trade towards future markets. Adoption of the US dollar as a monetary anchor could strengthen the already strong and still intensifying trade with dollarized East Asia by reducing transaction costs.

Econometric estimations quantify the trade effect of the adoption of external currencies by the six Pacific states. A gravity model of international trade (Anderson 1979 and Rose 2000) dating from 1990 to 2005 is applied. Pacific islands that already use external currencies are taken as a control group. The gravity model estimates show a large and significant effect of adopting an external currency on Pacific trade. These results, however, are likely to be biased upwards by reverse causality bias. A common currency could have been established because Pacific trade with the anchor currency country was already high as argued by the optimal peg theory. Binary choice methods are hence employed to trace possible endogeneity biases. By modelling 'statistical twins' from treated observations and control group observations, the positive effect of a common currency on trade is reduced but remains positive and statistically significant.

The paper is organized as follows: section two examines directions of trade and monetary regimes in the Pacific; the third section models the optimal choice of an anchor currency;

section four quantifies the effect of the adoption of external currencies on trade relations with a special focus on endogeneity biases; section five concludes with policy recommendations.

2. **Current trade and monetary regimes**

The Pacific's range of exports is narrow, being concentrated in tourism, agricultural products, and minerals (CIA *World Fact Book* 2009). Fiji's principal exports are tourism, sugar and garments. Papua New Guinea exports gold, petroleum, copper, timber and coffee. Samoa's exports are marine products, copra and coconut oil. Tonga exports marine products, timber and vegetables. Vanuatu exports copra, beef and cocoa. The Pacific's imports, however, consist of a highly diversified range of manufactures and services from Australia, China, Japan, South Korea, France or the United Kingdom.

Figure 1 shows exports to trading partners as a share of all exports. Australia and emerging Asia have been the dominant export destinations in 2008 accounting for more than 30 per cent of all exports. Pacific exports to the European Union, Japan, the United States and New Zealand have been falling. Past trade ties between the Pacific and Europe go back to colonial linkages with France and the United Kingdom. In 2008 European imports accounted for only 12 per cent of all Pacific exports. Pacific exports to Japan have fallen from 29 per cent in 1980 to 11 per cent in 2008. Pacific exports to the United States and New Zealand are even lower, reaching only about five per cent of Pacific exports in 2008.

Figure 2 plots Pacific imports by source as a fraction of all imports. There has also been a shift in imports. Australia and emerging Asia are the principal import sources, but while by 2008 the share of imports from Australia had fallen to less than 40 per cent, imports from emerging Asia have grown to some 50 per cent. Imports from New Zealand have been stable at about 10 percent. Imports from Europe, Japan and the United States have been falling. All three regions accounted for less than five per cent of Pacific imports in 2008.

Figure 3 shows that since the 1990s the exports of all six Pacific states have grown strongly. Emerging Asian countries have become important export destinations with Fiji, Solomon Islands and Vanuatu exporting to these markets since 2000. Fiji's exports to emerging Asia have doubled, reaching US$ 290 million in 2008. Exports from Fiji to the United States have grown steadily since the early 1990s, reaching a peak of about US$ 178 million in 2008. Fiji's exports to Australia, in contrast, fell to US$ 120 million in 2008. From the late 1990s, (timber) exports from the Solomon Islands shifted from Japan to emerging Asia, growing rapidly after 2000 to US$ 264 million in 2008. Other export destinations became negligible. Emerging Asia similarly became Vanuatu's principal export destination. Nevertheless

Australia has remained a principal export destination for Papua New Guinea and Samoa. In 2008 Papua New Guinea's exports were US$ 2.5 billion to Australia, US$ 1.1 billion to emerging Asia and some US$800 million each to Japan and Europe. Samoan exports to emerging Asia have grown quickly to US$ 7.6 million, exceeding exports to Australia by 2008. Tonga is the smallest Pacific state with its own currency. Its exports fluctuate with climatic conditions. It has maintained exports to Japan and the United States but exports to emerging Asia have also clearly risen.

Emerging Asia's even greater dominance of imports is shown in Figure 4. With the exception of Papua New Guinea, emerging Asia has been the principal import source to all six Pacific states. Imports from East Asia to Fiji have grown from US$ 200 million in 2000 to US$ 800 million in 2008, but also Australia (US$ 375 million) and New Zealand (US$ 282 million) remained important import sources. Imports from emerging Asia have become even more important for Samoa, Solomon Islands, Tonga and Vanuatu. Although imports from emerging Asia have also grown rapidly since the 1990s, for Papua New Guinea Australia has remained the most important source of imports, totalling US$ 1.5 billion in 2007.

As indicated by table 1 the six largest Pacific states have their own currencies, while the smaller islands use the Australian dollar, the French Pacific franc (bound to the euro since 1999), the New Zealand dollar or the US dollar as a currency. The six Pacific states have officially stabilized their currencies by tying to 'basket' strategies (Fiji dollar, Samoan tala, Solomon Islands dollar and Tonga pa'anga) or by managed floats (Papua New Guinea kina and Vanuatu vatu).

Until the adoption of present currency regimes, island monies were pegged to the Australian dollar (Papua New Guinea kina from 1975 to 1978, Solomon Island dollar from 1978 to 1983, Tonga from 1976 to 1991), the New Zealand dollar (Samoa from 1970 to 1985), the pound sterling (Fiji dollar from 1975 to 1984) or to special drawing rights (Vanuatu from 1981 to1998). Figure 5 shows exchange rates of Pacific currencies against the US dollar from 1975 to 2009 based on low frequency (monthly) data. The starting point of 1975 is taken as a base year. For better comparability the same vertical scale is applied for all states (except for Solomon Islands). The low frequency data indicate a similar pattern of crawling peg policies for all Pacific states from 1975 onwards. All followed a seesaw of stabilizing against the dollar and discretionary currency depreciations, but the magnitude of currency depreciations widely differs from country to country.

Fiji, Tonga and Vanuatu maintained close dollar pegs that were only interrupted by short periods of discretionary currency depreciations. The Fiji dollar, was stable against the US dollar except for two phases of depreciation since 1985. Following a political coup in 1987 the Fiji dollar lost about 30 per cent of its value. A second political coup in 2000 led to a loss of about 60 per cent of the currency's value.

Fiscal and monetary policy difficulties led to periodic sharp currency devaluations in Papua New Guinea, Samoa and Solomon Islands. Papua New Guinea maintained a relatively close US dollar peg from 1975 to 1994. After the kina was officially floated in 1994, the Reserve Bank of Papua New Guinea allowed for vast currency depreciations. The government borrowed heavily abroad and forced the Reserve Bank to print money so that inflation ensued (de Brouwer 2000). Policy tightening began in 2003. The Samoan tala and the Solomon Islands dollar have shown even more acute swings between currency depreciations and stable exchange rates. Since 2000 exchange rates have become more stable in all the Pacific states; the Papua New Guinea kina and the Samoan tala have appreciated slightly (Browne and Orsmond 2006).

Pacific reserve banks do not publish the composition of their currency baskets. To reveal currency basket compositions we apply an OLS estimation method based on high-frequency following Frankel and Wei (1994). An external currency – the Swiss franc – is used as a numeraire measuring the exchange rate volatility of Pacific currencies. The volatility of Pacific currencies against the Swiss franc is explained by the volatility of potential anchor currencies. If, for instance, the volatility of the Fiji dollar was largely explained by the volatility of the US dollar, the latter had a high weight in the currency basket of the Fiji dollar.

Pacific currency baskets may be pegged to the currencies of principal trading partners, major world currencies or currencies of former colonial powers. We regress the exchange rates of six Pacific currencies on the Australian dollar, the Japanese yen, the euro (French franc[1]), the US dollar and the pound sterling applying the Swiss franc as a numeraire:

$$(1)\quad e_{PacificcurrencyCHF_t} = \alpha + \beta_1 e_{AUDCHF_t} + \beta_2 e_{EURCHF_t} + \beta_3 e_{GBPCHF_t} + \beta_4 e_{JPYCHF_t} + \beta_5 e_{USDCHF\,t} + u_t$$

Currencies of emerging East Asia are excluded because of East Asia's dollarization (McKinnon and Schnabl 2004). The logged change rates of daily bilateral exchange rates are expressed by *e*. The residuals are controlled for heteroscedasticity and autocorrelation. The day-to-day data are taken from Olsen and Associates Ltd. The *ß* coefficients indicate the weight of the respective currency in the currency basket. If $ß_1$ took a value close to unity the weight of the Australian dollar in the currency basket was very high. The respective currency basket was shown to be pegged to the Australian dollar. If $ß_1$ was close to zero there was no exchange rate stabilization against the Australian dollar. As a robustness test we analyse possible changes in the currency basket composition over time by applying a rolling regression approach.

We estimate the composition of the Pacific currency baskets from September 23, 1995 to June 11, 2009. More recent exchange rate data on a daily basis are not available for the Pacific. As shown in table 2 the US dollar is the dominant money in Pacific currency baskets. The coefficients for $ß_5$ range from 0.7 in Fiji to 1.0 in Solomon Islands and Vanuatu indicating a high dollar weight in the currency baskets. Most $ß_5$ coefficients have a high statistical significance. The Australian dollar, the Japanese yen and the pound sterling are also shown to have explanatory powers for some currencies: Fiji stabilizes against the US dollar (71%), the Australian dollar (21%) and the pound sterling (8%). Tonga shows a high weight for the US dollar (92%) and a lower value for the pound sterling (3%), the Australian dollar (3%) and the Japanese yen (3%). The remaining Pacific states completely stabilize against the US dollar. The results for Samoa are not statistically significant probably because of the extreme policy changes during the period studied. A similar analysis based on high frequency exchange rate data by Bowman (2003) excluded Samoa from the estimations.

The R^2 values for the Fiji dollar (0.41), the Solomon Islands dollar (0.71), the Tonga pa’anga (0.71) and the Vanuatu vatu (0.43) indicate that volatilities of these currencies against the Swiss franc are strongly explained by the model. Much lower R^2 values for the Papua New Guinea kina (0.17) and Samoan tala (0.01) might be explained by phases of imprudent monetary policy in these countries that are also indicated by the low frequency data in Figure 5.

As a robustness test we analyze the composition of the currency baskets over time applying a rolling regression approach. Rolling 130-day coefficients are plotted for the six Pacific currencies. The 130-day window includes daily data for about four months (7-day weeks). The first window starts on October 23, 1995 and ends on February 29, 1996. After the coefficient for the first window is calculated, the window is shifted by one day. The coefficients are calculated again for the next window. The shifting process is repeated up to June 2009. If the coefficient takes a value close to unity, a 100 percentage weight of the respective monetary anchor in the currency basket is indicated.

Figure 6 summarizes the US dollar's weight in each Pacific currency basket from 1995 to 2009. The rolling regression approach confirms the results of the static estimations. The fluctuations of the US dollar coefficient are relatively low for the currencies exclusively pegged to the US dollar, such as the Solomon Island dollar and the Vanuatu vatu. The dynamic currency weights in the Fijian and Tongan currency baskets swing around their static weights. The higher the standard deviations of the exchange rate volatility the stronger are the coefficients fluctuations across the static currency basket weight. Again, Papua New Guinea, and Samoa particularly, show the largest standard deviations in the rolling regression graphs, indicating imprudent monetary policies. The estimation process for both currencies becomes unstable.

3. Choosing an optimal anchor currency

Optimal peg theory assumes past trade determining the choice of an anchor currency (Black 1976, Crockett and Nsouli 1977 and Connolly 1983). It is argued that the composition of currency baskets should exactly mirror the directions of trade of a country. The initial contribution by Black (1976) applied a dependent economy model with two sectors – traded and non-traded goods. The stabilization of domestic relative prices for traded goods is seen as a principal aim of exchange rate policies. Therefore the major exchange rate policy variable is the effective exchange rate rather than nominal exchange rate. The effective exchange rate takes into account the nominal exchange rates against currencies of all trading partners weighted by their trade volume. It reflects the development of relative prices for traded goods under the assumption of constant non-traded goods prices. Black (1976) concluded that the currency baskets weights should exactly mirror the effective exchange rate and thereby the country's directions of trade.

In the 1970s and 1980s when Pacific states adopted their currency baskets Australia was their principal trading partner. But ties with Australia have loosened while those with Japan and more recently, emerging Asia, have strengthened. The choice of the Australian dollar as a monetary anchor thus reflects past trade ties. The Australian dollar is nevertheless a favoured anchor currency for Pacific development in a number of studies (Duncan 2002, de Brouwer 2002, Jayaraman 2004, Bunyaratavej and Jayaraman 2005). Most of these contributions focused on he macroeconomic aspects of 'aussification'. De Brouwer (2002) argued that the Australian dollar was the most suitable monetary anchor for the Pacific because of past trade and that its adoption would transaction costs for Pacific trade. Duncan (2002) argued that adopting the Australian dollar would import macroeconomic stability into the Pacific, tying Pacific inflation rates to stable Australian price levels, thus improving the investment climate.

The empirical evidence about the extent to which the Australian dollar would meet the Pacific's anchor currency requirements is mixed. Jayaraman (2004) and Bunyaratavej and Jayaraman (2005) show that Pacific states and Australia do not experience common external shocks. They find that macroeconomic indicators, such as GDP and inflation, diverge rather than converge between Pacific states and Australia. Following the classical optimum currency area theory (Mundell 1961, McKinnon 1963 and Kenen 1969) economies' structures need to be symmetrical to enable monetary policy to be coordinated.

The debate on the effects of a common currency on trade suggests that opposite causality to exogenous trade – endogenous trade – should be used to examine the effects of a common currency on trade. In 1990 the European Commission argued that the adoption of the European Monetary Union would strengthen European trade. The Commission estimated that adopting the euro would reduce transaction costs of European trade by € 13 to 20 billion per year.

A study by the European Union Commission (1990) encouraged a new line of mostly empirical studies scrutinizing the effect of a common currency on trade. The initial study by Rose (2000) applied the gravity model to international trade (Anderson 1979), using a common currency dummy as an explanatory variable for trade. For a sample covering a wide proportion of global trade, Rose found a large, statistically significant and robust effect of the common currency dummy on trade. Countries with a common currency were seen to trade three times as much as countries which were not members of the same currency area.

This empirical finding provoked further studies that analysed technical aspects, such as endogeneity biases (Persson 2001, Flandreau and Maurel 2005, Barro and Tenreyo 2007). Meta-analyses taking into account the more recent contributions to the debate affirmed the existence of the effect: though markedly lower (down by 30 to 90 per cent on previous estimates), the effects on trade were still robust (Rose and Stanley 2005, deGrauwe and Mongelli 2005 and Baldwin 2006)

The positive trade effects of a common currency were seen to be largely explained by a reduction in such transaction costs as currency conversion and exchange rate uncertainty. Emerson et al. (1992) showed that currency conversion costs are particularly large for small countries. Because their currencies are seldom traded internationally, costs of conversion are relatively high.

Exchange rate uncertainty implies costs of unexpected price changes in tradable goods. Hedging the risk of exchange rate changes by derivates, such as forward contracts is costly and elements of risk remain. As stated by McKinnon (1979) the exporter never knows the exact future dates of sales. Forward contracts can reduce, but not fully cover currency risks. Kenen (2002) similarly argued that since exporters are uncertain about prices and quantities of their long-term future exports, hedging can only reduce short-term currency risks.

In addition to microeconomic benefits, the adoption of a common currency area leads to macroeconomic gains, such as price stability and growth. Macroeconomic gains are in turn seen as fostering trade. Following McKinnon (1963) open economies with flexible exchange rates are vulnerable to external shocks and thus inflation. Currency unions are seen as a path towards stabilizing prices and thereby trade relations of small and open countries.

A choice of the US dollar as a monetary anchor would reflect the shift of Pacific trade towards emerging Asian and global markets. The dollar is the dominant invoice currency in emerging Asia and most world markets. Most global commodity trade is invoiced in dollar (McKinnon and Schnabl 2004, Freitag and Schnabl 2009). In this context Lipschitz (1979) has indicated that an anchor currency should be chosen by trade invoicing rather than by directions of trade.

4. **Empirical estimations**

We first evaluate the effect of a common currency on trade for the six Pacific states applying a standard gravity model framework (Rose 2000). Secondly, possible endogeneity biases are addressed by a binary choice approach following Persson (2001). Economic gravity models relate bilateral trade ties to economic masses, geographical distance and a number of control variables based on Newton's law of universal gravitation. The gravity model finds trade ties between two countries to increase, the closer the countries are located and the larger their economic size. We apply a standard gravity equation of the following specification:

(2) $$TRADE_{ijt} = \alpha + \beta_1(g_{ijt}) + \beta_2(gc_{ijt}) + \beta_3(d_{ij}) + CONTROLS + \varepsilon_{ijt}.$$

Variable $TRADE_{ijt}$ represents the magnitude of bilateral trade between country$_i$ and country$_j$. The dependent variable is measured by the logged arithmetic average of the two bilateral trade flows of the country pair (exports and imports) at time t. The economic mass of each country pair at time t is measured by the logged product of its GDPs g_{ijt}. The product of each country pairs GDPs per capita, variable gc_{ijt} accounts for the level of economic development. As usual in the literature we measure distance d by the great circle formula that calculates distances by latitudes and longitudes of the capital or the largest city of each country as the crow flies.

We add a set of binary control variables, including common currency, common language, common colonial history and trade diversion to the estimation equation, which take the following shape:

$$(3) \quad D_{ijt} = \left\{ \frac{1,_{i,j} \in Z}{0, otherwise} \right\}$$

The common currency dummy is unity when both countries belong to the same currency area. Two countries that speak the same language or have a common colonial history have closer trade relations because of lower transaction costs.[2] The trade diversion dummy also introduced by Rose (2000) is unity if one country has an external currency, otherwise it is zero. Only if the coefficient of the dummy is significantly negative would it indicate a trade diversion effect within a common currency area. The error variable is ε_{ijt}.

The common currency dummy in estimation (2) is plagued with severe endogeneity biases. Prior research (Persson 2001, Tenreyo 2001, Alesina et al. 2002 and Smith 2002) assumes reverse causality in the common currency coefficients. It is argued that country pairs with strong bilateral trade ties might have adopted a currency union endogenously to strengthen bilateral trade as also argued by the optimal peg theory. A currency union reduces transaction costs and thereby fosters bilateral trade ties.

Subtracting possible endogeneity biases from equation (2) is a comprehensive exercise. For an estimation of the common currency's effect on trade which excludes the reverse causality bias we needed a benchmark value telling us how large the bilateral trade of the respective country pair would have been without a common currency. This benchmark value is obviously not observable. Two econometric tools have been suggested to identify potential reserve causality biases.

Firstly, the within estimator (Rose and VanWincoop 2001) addresses endogeneity biases by comparing the country pair's trade ties before and after the adoption of a common currency. The within estimator adds country fixed effects for each country in the dataset. The country dummies extract the common currency's effect on trade for each country pairs and thereby correct for possible endogeneity biases. However, the practicability of the within estimator is limited because data are only available prior and post currency for a small fraction of global trade data. For the same reason the within estimator is not applicable to a Pacific sample.

The second instrument for identifying possible reverse causality biases is a binary choice or matching technique following Persson (2001). Based on a two step matching approach as proposed by Rosenbaum and Rubin (1983) or Deheija and Wahaba (1999) he controlled for systemic differences in the country pairs. It is argued for an adjusted control group having the same probability of joining a currency union as the treated country pairs. Persson firstly calculated the probability of having a common currency union for all country pairs in the sample. Secondly, the control group was adjusted with regard to the probabilities of the treated country pairs. Non-treated control pairs having a significantly smaller probability of being treated were excluded from the control group. The omitted country pairs were regarded as systematically different from the treated country pairs by endogeneity biases (Ritschl and Wolf 2002). The treated group and the selected control group observations can be seen as 'statistical twins'.

The sample includes twenty Pacific island countries[3] and their ten principal trading partners[4]. The directions of trade data start in 1990 and end in 2005. Earlier data are not available for the sample. Trade data are taken from the United Nation's *Comtrade Statistics* that reports the most comprehensive trade data for the Pacific. All trade data are expressed in US dollars and are deflated by the US Consumer Price Index. We have taken GDP data from the International Monetary Fund's *International Financial Statistics* and *World Economic Outlook*, the United Nations Conference on Trade and Development *Handbook of Statistics Online* and the Pacific Regional Information System. All GDP data are in US dollars and are deflated by the US Consumer Price Index. Population data are from *International Financial Statistics* and the *Handbook of Statistics Online*. The distance, language and colonial dummies come from Centre d'Etudes Prospectives et d'Informations Internationales data bases.

The standard gravity equation results are compared with the binary choice estimations to control for possible endogeneity biases of the common currency's effect on trade in our sample. The gravity estimations show very significant and - with one exception -plausible results as shown in Table 5. The distance coefficient finds that the closer two countries are the more they trade. Economic size, a common language and a similar colonial history strengthen bilateral trade ties. No trade diversion effect can be detected in our estimations. The common currency coefficient is 1.4, indicating trade expansion by 322 per cent! This result seems excessive, reflecting an upward effect of endogeneity biases.

A further step follows Persson (2001). He first constructs an artificial, more appropriate control group. Table 3 shows systemic differences among treated and non-treated observations. The treated country pairs are smaller, more often speak the same language and more often have a common or similar colonial past. These systematic differences might reflect endogeneity biases in the sample. The combined effect of two regressors on bilateral trade – such as same language and a common colonial past - might be more than the linear sum of their effects. In formal terms this non-linearity reflects the endogeneity biases.

Referring to the observable characteristics (all regressors included) of all country pairs, a control group more similar to the treated group was constructed. Similarity was defined by the propensity score, that is, the probability of each country pair adopting a common currency. The probability values of the logit estimations in the following shape deliver the propensity score for each country pair in the sample:

$$CU_{ijt} = \alpha + \beta_1(g_{ijt}) + \beta_2(gc_{ijt}) + \beta_3(d_{ij}) + CONTROLS + \varepsilon_{ijt}. \quad (4)$$

Table 4 reports the propensity score for the whole sample. Five out of seven regressors taken from equation (2) help to explain the probability of adopting a common currency area. Based on the propensity score two matching estimators being robust to the endogeneity biases are computed – the stratification estimator and the nearest matching estimator. For the stratification estimator we excluded all non-treated country pairs having a lower propensity score than the lowest score of the treated pairs. In other words all country pairs not having a common currency were excluded if their probability of joining a common currency area was lower than for the treated country pair with the lowest probability value. The excluded observations were viewed as non-comparable to any treated country pair because of reverse causality. The excluded observations account for 748 out of 1037 country pairs in the control group (five-yearly sample). As reported in Table 5, the stratification estimator yields a highly significant point estimate for the common currency dummy of 1.1. This coefficient implies a trade expansion of about 203 per cent by the adoption of an external currency. Compared to estimation results of the Rose estimator, the stratification estimator is significantly lower but still very large.

Even more stringent is the nearest matching estimator. Now, each treated observation is compared with only one non-treated counterfactual. The counterfactual pairs are again matched by the propensity score. Each treated observation is matched with the nearest non-treated observation as measured by the propensity score.[5] If certain controls are the best fit for more than one treated observation, they are applied more than once. To create the nearest matching sample we have built four stratums accounting for a range of propensity score values as proposed by Dehejia and Wahba (1999).[6]

The nearest matching point estimate is 0.5, indicating an expansion of trade by 68 per cent. The common currency dummy, and most other variables also, are again highly significant. The nearest matching estimator has again led to less effect on trade. In sum, a clearly positive and significant common currency effect on trade persists for the Pacific after applying endogeneity controls.

5. **Conclusions**

The Pacific states' trade relations with East Asian countries have been growing. Traditional trade ties with Australia are still large, but have lost importance for most Pacific states since 2000. Despite the variety of exchange rate regimes in Pacific, empirical estimations indicate that the US dollar is the dominant anchor currency for the six Pacific large independent states.

The theory of the optimal currency peg argues that small and open countries choose the currency of their principal trading partner as a monetary anchor. The Australian and US dollars were thus potential external currencies for the Pacific states. While the Australian dollar would reflect past trade ties, adopting the US dollar as an external currency would foster already intensifying trade relations with dollarized emerging Asia.

A gravity model for a large Pacific dataset shows that, after controlling for endogeneity biases by a binary choice approach, countries with an external currency trade about 68 per cent more with members of the same currency area than with non-member countries. The Pacific states would be likely to increase their trade by adopting one external currency.

A dollarization of the Pacific would reduce transaction costs with East Asia and for most global resource trade that is also invoiced in US dollars. The Pacific states could focus on their global comparative advantage in resource exports and tourism. The large and rapidly growing East Asian markets promise vast export opportunities for Pacific states. Because of relatively high transaction costs, 'aussification' would divert the Pacific states from their largest markets.

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[1] Before January 1, 1999 the euro is represented by the French franc. France's trade ties with the Pacific are stronger than Germany's because of the colonial past.

[2] We have not applied a free trade arrangement dummy because most Pacific states are members of inter-Pacific and extra-Pacific trade arrangements. Many industrial countries have given preferential market access to the

Pacific states (Freitag 2006). As the dummy takes the value one for nearly all observations, the information content of a free trade arrangement dummy is limited in a Pacific context.

[3] These are the 14 Pacific Forum members (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Marshall Islands, Solomon Islands, Samoa, Tonga, Tuvalu and Vanuatu), the French oversees territories (French Polynesia, New Caledonia and Wallis&Futuna), the British oversees territory (Pitcairn Islands), the New Zealand territory (Tokelau) and the American territory (North Marianna Islands).

[4] The principal trading partners of the developing Pacific were selected according to the Asian Development Bank's *Key Indicators,* 2006. These countries are Australia, China, France, Hong Kong, Japan, Singapore, South Korea, New Zealand, the United Kingdom and the United States.

[5] Because of data shortcomings we had to apply yearly data for the nearest stratification estimator. Running the nearest matching estimator on the usual five-yearly dataset would have shrunk the sample to 78 observation, that is, the estimation results would not have been significant. As we are concerned with time effects, we ran the Rose estimator for a yearly dataset. Time effects seem not to play a role; the yearly sample and the five-yearly sample give very similar estimation results.

[6] Stratum 1 includes observations with p-values being smaller than 0.1. Observations in the further strata range from $0.1 < p < 0.25$ (stratum 2), $0.25 < p < 0.5$ (stratum 3) and $0.5 < p < 1.0$ (stratum 4). The first stratum includes 84 treated and 6931 non-treated observations. The second stratum includes 72 treated observations and 437 non-treated observations. In stratum 3 there are 52 treated and 100 non-treated observations. Stratum 4 includes 40 treated and 16 non-treated observations.

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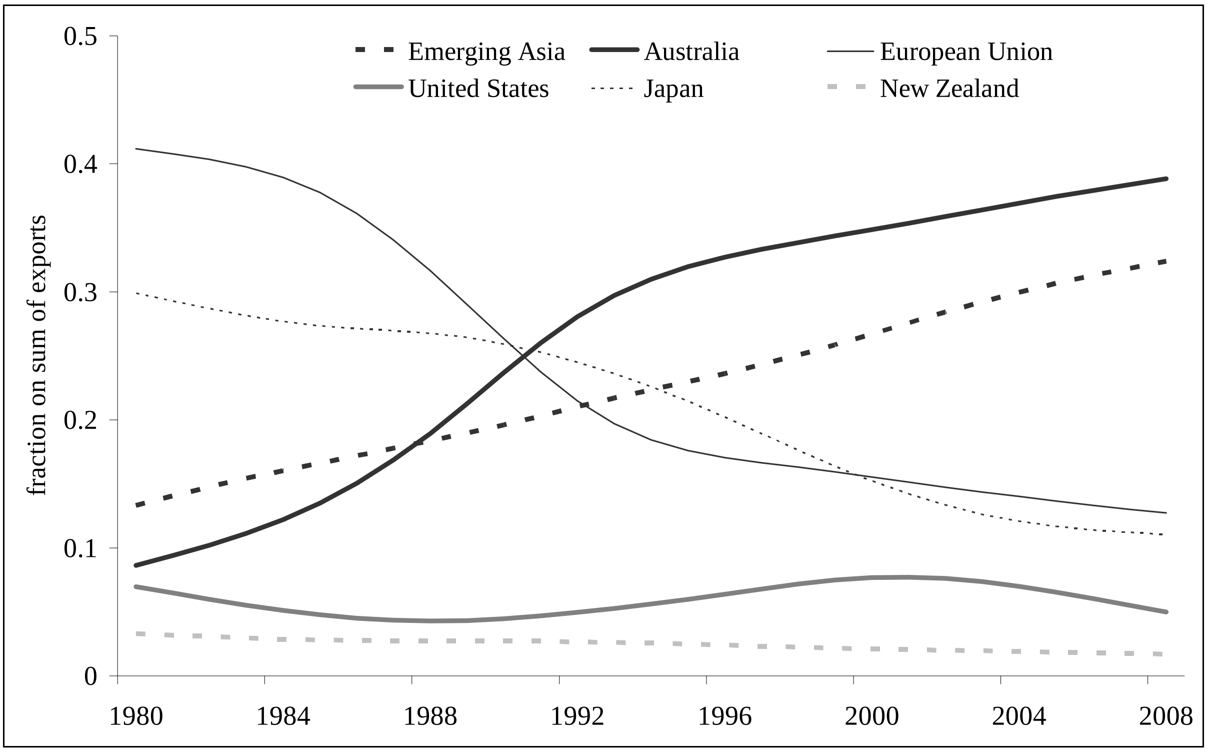
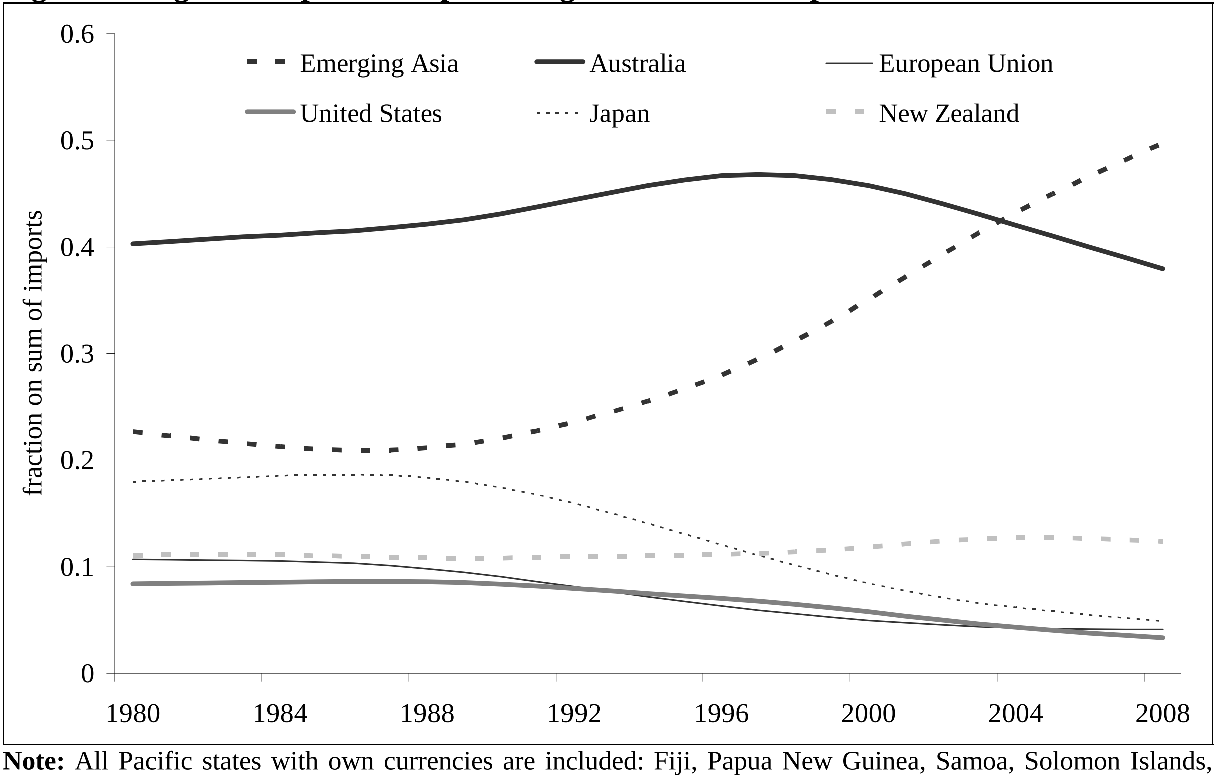
Figure 1: Regional exports as a percentage of all Pacific exports



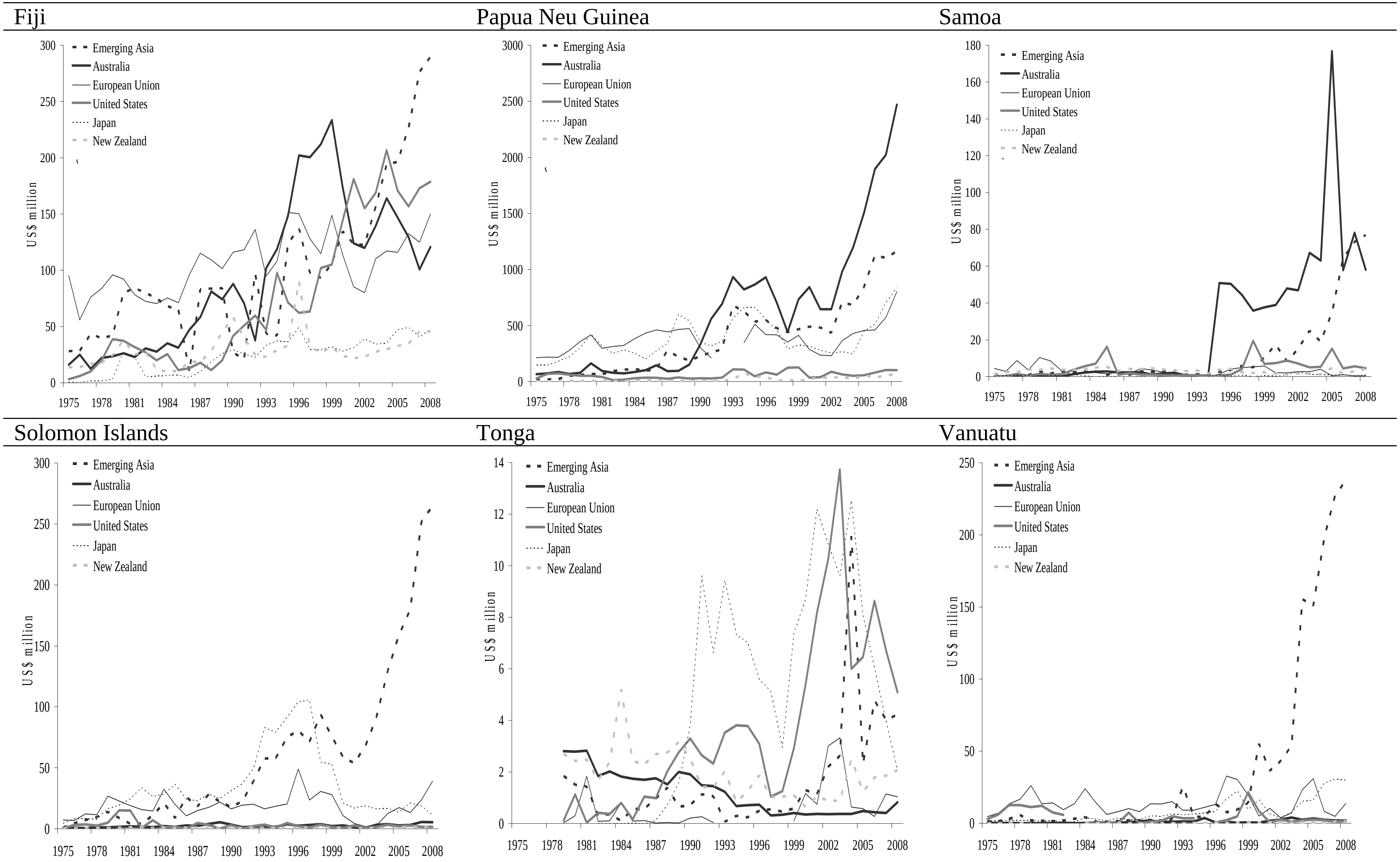
Note: All Pacific states with own currencies are included: Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu. To reveal trends time series are smoothed by the HP filter (lambda=100).
Source: International Monetary Fund: *Direction of Trade Statistics*, 2009.

Figure 2: Regional imports as a percentage of all Pacific imports



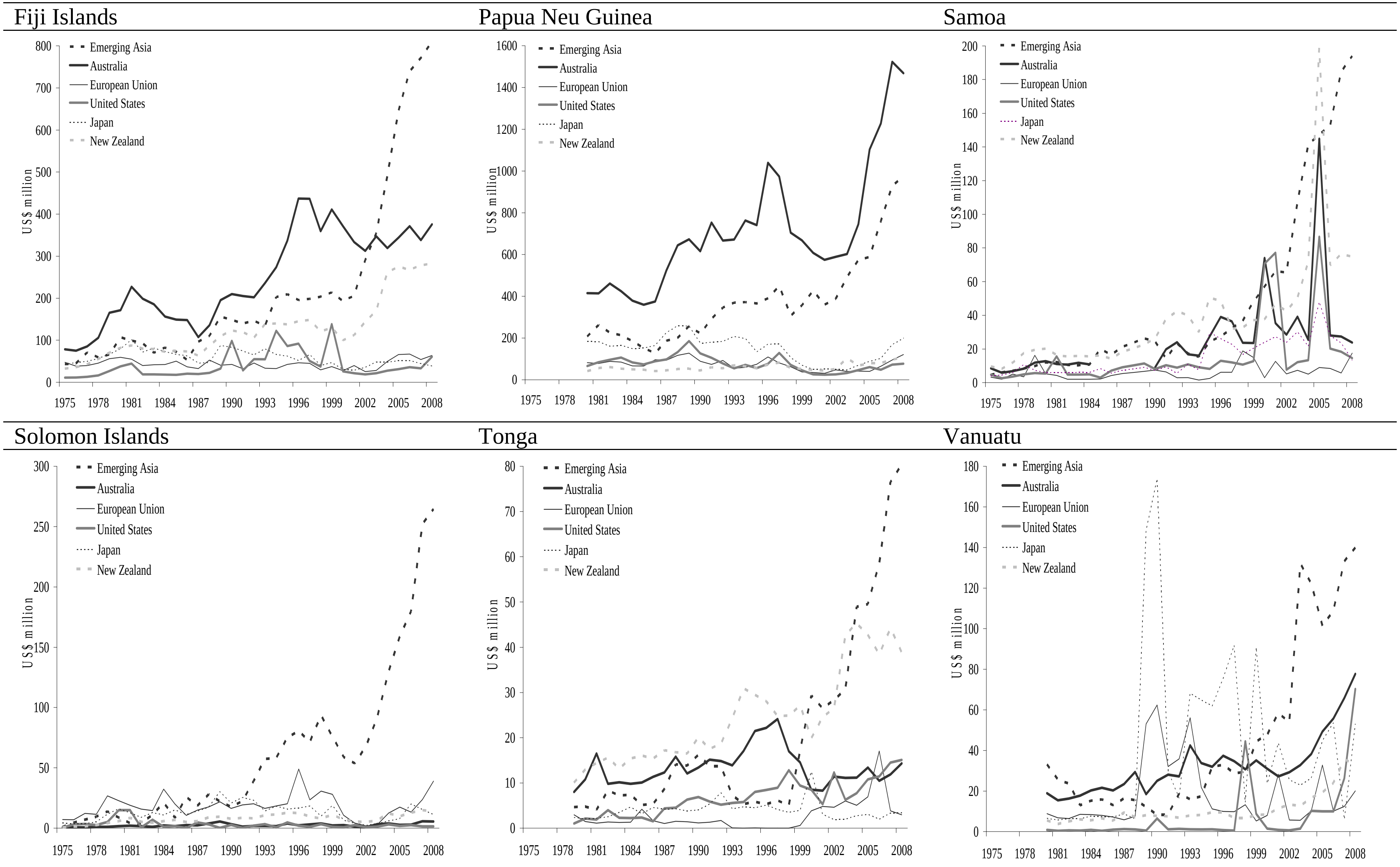
Note: All Pacific states with own currencies are included: Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu. To reveal trends time series are smoothed by the HP filter (lambda=100).
Source: International Monetary Fund: *Direction of Trade Statistics*, 2009.

Figure 3: Exports of Pacific states with own currencies, 1975-2009 (US$ million)



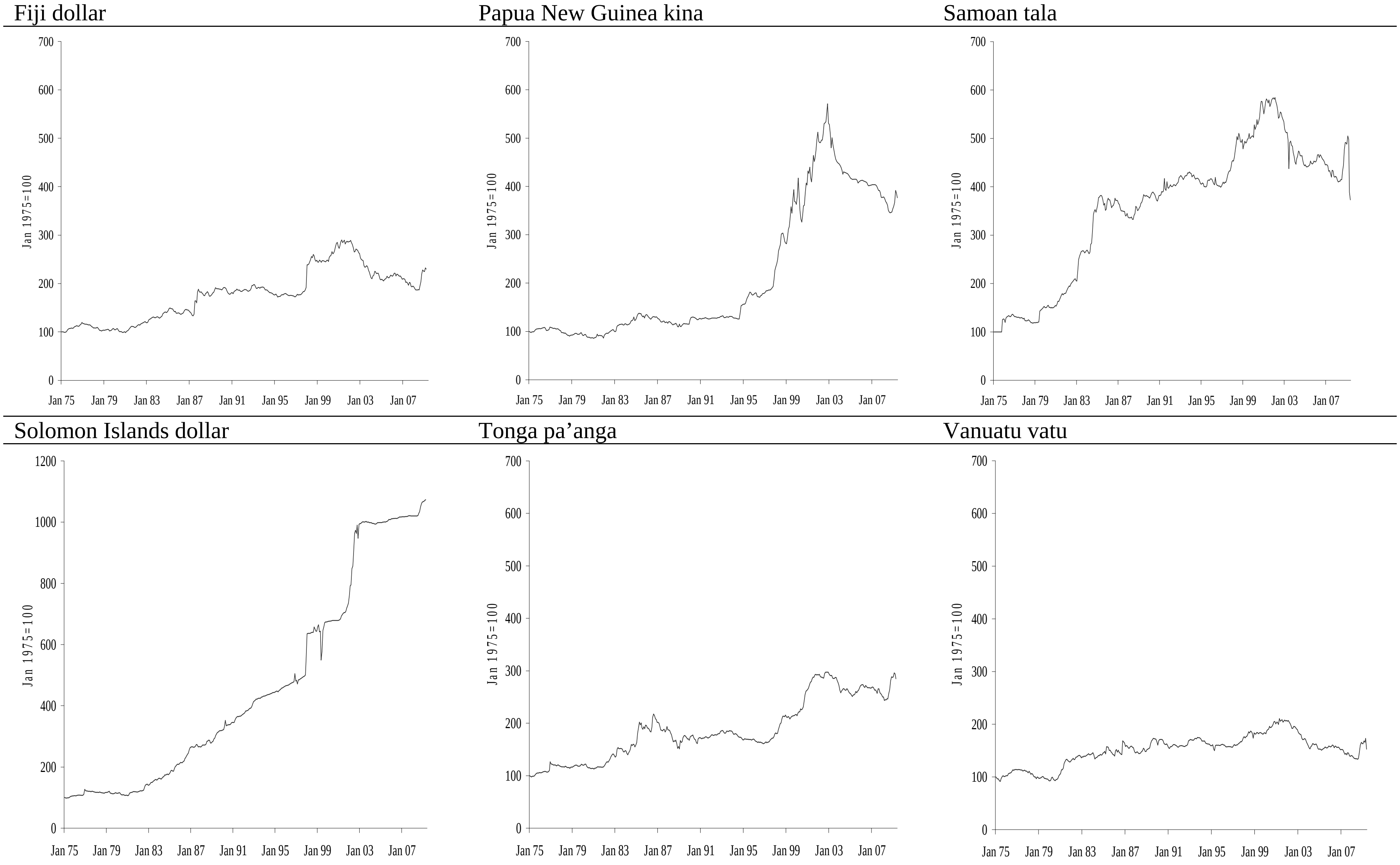
Source: International Monetary Fund: *Direction of Trade Statistics*, 2009.

Figure 4: Imports of Pacific states with own currencies, 1975-2009 (US$ million)



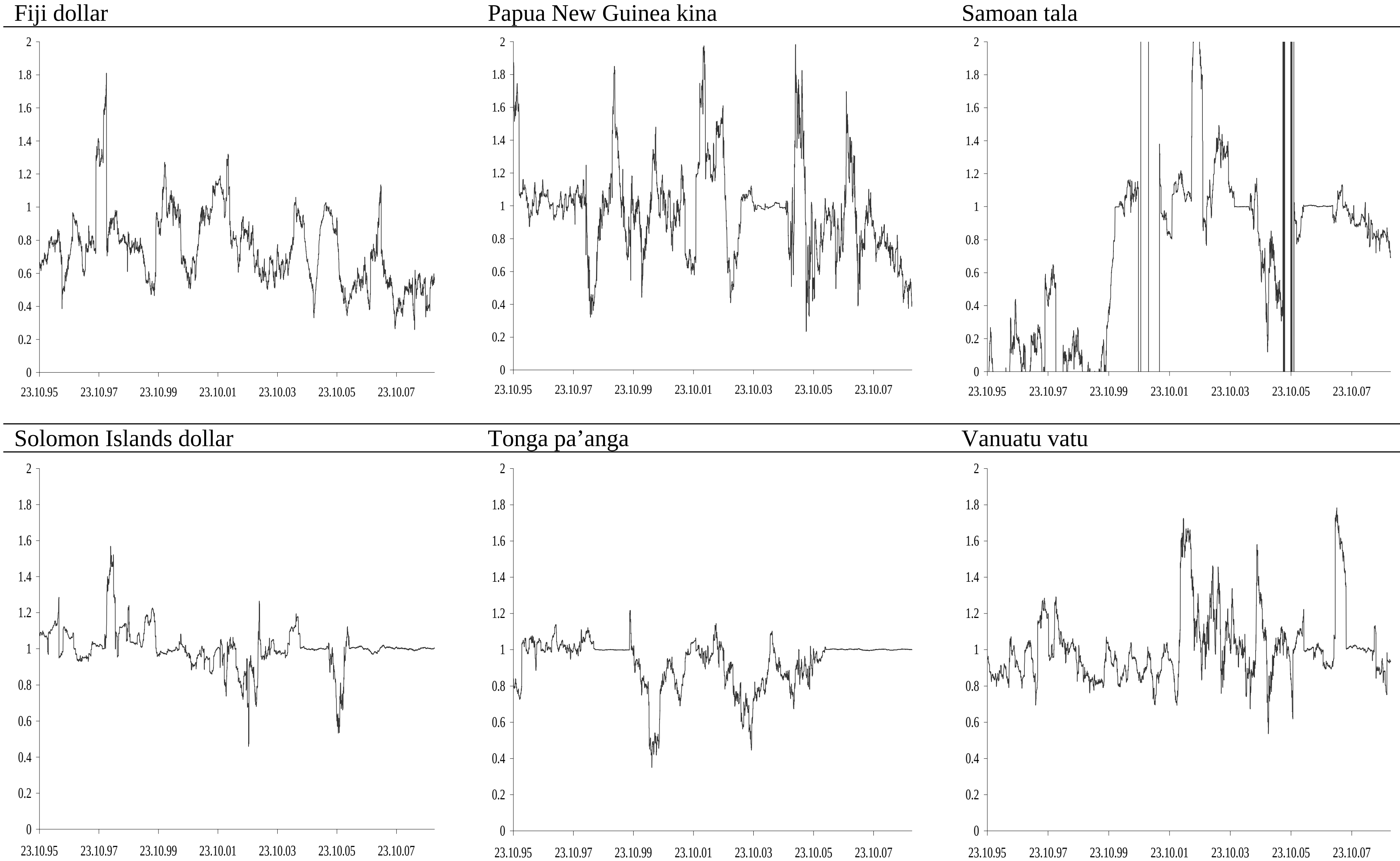
Source: International Monetary Fund: *Direction of Trade Statistics*, 2009.

Figure 5: Pacific exchange rate pegs against the US dollar, 1975-2009 (monthly)



Note: Index Jan 1975 = 100. Note different scale for Solomon Islands.
Source: International Monetary Fund: *International Financial Statistics*, 2009.

Figure 6: US dollar’s weight in Pacific states currency baskets: 130-day rolling regressions, 1995-2009



Note: Calculations are based on daily data. 1 corresponds to 100 per cent. A coefficient close to unity indicates strong US dollar pegging.

Table 1: Exchange rate arrangements in the Pacific

Country	Currency	Classification according to IMF
Cook Islands	New Zealand dollar	External currency
Fd. St. of Micronesia	US dollar	External currency
Fiji	Fiji dollar	Other conventional fixed peg arrangement
French Polynesia	French Pacific franc	External currency
Kiribati	Australian dollar	External currency
Marshall Islands	US dollar	External currency
Nauru	Australian dollar	External currency
New Caledonia	French Pacific franc	External currency
Niue	New Zealand dollar	External currency
Palau	US dollar	External currency
Papua New Guinea	PNG kina	Managed floating
Samoa	Samoan tala	Other conventional fixed peg arrangement
Solomon Islands	Solomon Isl. dollar	Other conventional fixed peg arrangement
Tokelau	New Zealand dollar	External currency
Tonga	Tonga pa'anga	Pegged exchange rate with horizontal bands
Tuvalu	Australian dollar	External currency
Vanuatu	Vanuatu vatu	Managed floating
Wallis and Futuna	French Pacific franc	External currency

Source: International Monetary Fund, *Recent Economic Developments*, 2009.

Table 2: Pegging in the Pacific states on a high-frequency basis (10/23/1995 – 06/11/2009)

Pacific currencies	Monetary anchors						
	α Constant	β_1 AUD	β_2 FRF/EUR	β_3 GBP	β_4 JPY	β_5 USD	Adjusted R^2
Fiji dollar	-0.006 (0.008)	0.210*** (0.023)	-0.041 (0.047)	0.083 (0.034)	-0.003 (0.022)	0.708*** (0.029)	0.407
Papua New Guinea kina	-0.016 (0.016)	0.028 (0.027)	0.075 (0.054)	0.018 (0.045)	0.023 (0.029)	0.944*** (0.046)	0.175
Samoan tala	158.845 (156.159)	148.972 (0.100)	-256.979 (241.725)	59.886 (44.035)	-40.250 (36.889)	99.792 (101.192)	0.001
Solomon Islands dollar	-0.013** (0.006)	0.017 (0.015)	-0.008 (0.017)	-0.001 (0.003)	-0.003 (0.010)	1.003*** (0.003)	0.710
Tonga pa'anga	-0.007* (0.004)	0.026** (0.009)	0.015 (0.027)	0.033*** (0.013)	0.028*** (0.008)	0.924*** (0.014)	0.718
Vanuatu vatu	0.003 (0.008)	0.002 (0.017)	-0.057 (0.057)	0.018 (0.022)	-0.005 (0.016)	1.017*** (0.028)	0.431
Observations	4980	4980	4980	4980	4980	4980	-

Notes: Calculations are based on daily data. Standard errors in parentheses. ***, **, * denotes significance at 1%, 5% and 10% level. White heteroscedasticity-consistent standard errors and variances.

Table 3: Systematic differences between treated and non-treated observations

	Common currency = 0				Common currency = 1			
	Mean	Stdev.	Max	Min	Mean	Stdev.	Max	Min
Trade	15.23	4.248	25.54	1.573	14.70	2.971	19.74	8.733
Output	45.29	6.072	59.54	27.41	40.98	5.236	49.10	32.55
Output per capita	16.29	2.743	43.98	13.65	16.16	1.651	19.17	12.91
Distance	8.517	0.787	9.865	5.837	8.213	0.860	9.726	6.587
Common language	0.569	0.495	1	0	1	0	1	1
Common colonizer	0.123	0.329	1	0	0.373	0.484	1	0
Colonial relationship post 1945	0.037	0.189	1	0	0.313	0.464	1	0
Trade diversion	0.538	0.498	1	0	0.219	0.414	1	0
Observations	5613	5613	5613	5613	447	447	447	447

Notes: Data are based on annual data at a 5-year interval.

Table 4: Propensity score	
Trade	0.416***
	(4.461)
Distance	0.864***
	(2.566)
Output	-0.631***
	(-6.645)
Output per capita	-0.1817
	(-1.339)
Common language	2.214***
	(3.164)
Common colonizer	-0.239
	(-0.406)
Colonial relationship post 1945	3.252***
	(5.231)
Trade diversion	-3.588***
	(-7.966)
Observations	1076
McFadden R^2	0.484

Notes: Z-Statistics are reported in parentheses. ***, **, * denote significance at 1%, 5% and 10% level. The estimations are based on annual data at a 5-year interval. The propensity score is calculated by logit-estimations.

Table 5: Estimation results

	Standard	Stratification	Nearest matching
Common currency	1.447***	1.110***	0.522***
	(0.296)	(0.348)	(0.201)
Percentage Expansion of Trade	325	203	68
Distance	-1.724***	-1.443***	-1.966***
	(0.101)	(0.155)	(0.244)
Output	0.821***	0.686***	0.706***
	(0.022)	(0.043)	(0.049)
Output per capita	0.015	0.040	0.075***
	(0.044)	(0.044)	(0.019)
Common language	0.805***	-0.067	0.589
	(0.145)	(0.325)	(0.525)
Common colonizer	0.560***	1.087***	-1.124***
	(0.212)	(0.271)	(0.320)
Colonial relationship post 1945	0.505***	1.043***	0.302**
	(0.167)	(0.340)	(0.160)
Trade diversion	0.400***	0.011	4.660***
	(0.120)	(0.423)	(0.411)
Observations	1076	328	496
Treated	39	39	248
Controls	1037	289	248
Adjusted R^2	0.817	0.690	0.802

Notes: Standard errors are reported in parentheses. ***, **, * denotes significance at 1%, 5% and 10% level. All estimations are calculated with White heteroskedasticity-consistent standard errors and variances. The standard estimator and the stratification estimator are based on annual data at a 5-year interval. The nearest matching estimator is calculated for annual data because of data shortcomings. A common currency coefficient of 0.522 implies that trade between common-currency pairs was $exp\,(0.522) \approx 1.68$ times larger than between non common-currency pairs. That means sharing a common currency increases trade by 68 per cent.