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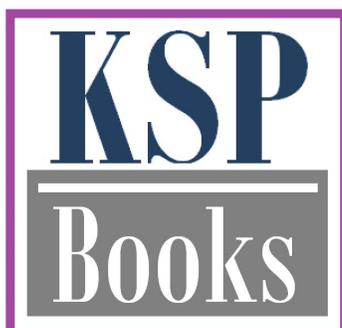
AN ANALYSIS OF THE PERFORMANCE OF CURRENCY BOARDS

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Johns Hopkins Institute for Applied Economics,
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An Analysis of the Performance of Currency Boards

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About the Series

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Abstract

Most countries that have ever had currency boards no longer do. This paper evaluates the economic performance of countries during currency board and non-currency board periods. Compared to the monetary systems that preceded or succeeded them (typically, central banking), currency board systems generally had lower inflation, exchange rates less prone to depreciation, fewer financial crises, fewer years of government budget deficits, and slightly higher growth of GDP per person. Supporting data are available in an accompanying spreadsheet workbook.

Acknowledgements

Introduction

The currency board is an alternative monetary system to the common central bank. More than 70 countries have had currency boards, and recent decades have seen renewed interest in this type of monetary authority. The typical benefits of currency boards are the lowering and stabilization of inflation and the fixing of exchange rates backed by foreign reserves equal to 100 percent or slightly more of the monetary base.

Several previous researchers have examined the historical performance of currency boards. Schuler (1996) compared the performance of various monetary authorities in 155 countries in the post-World War II period and found the performance of central banks generally wanting. Hanke (1999; 2002: 92) compared currency boards and central banks, surveying 98 developing countries from 1950-1993 concerning GDP growth, annual average inflation, and fiscal deficit as a percentage of GDP. He found that the GDP growth rate was higher for currency boards than for central banks, while annual average inflation and fiscal deficits were lower for currency boards. These data illustrate how currency board systems impose fiscal discipline. Wolf and others (2008: 204-205) performed an econometric investigation, with an emphasis on recent currency boards. They found that currency boards had low inflation, good output and trade performance, and no greater susceptibility to financial crises than other regimes. The only drawback they noted was higher volatility of output.

This paper analyzes the performance of 54 former and three current currency boards through data including inflation, GDP per person, deficits, foreign reserves as a percentage of the monetary base, financial crises, exchange rates, and convertibility. These measures will analyze how well the countries fared in their currency board and non-currency board periods.[1] The major difference with previous studies is that this one goes back farther for data. Previous studies have relied mainly on post-World War II databases that focus on independent countries. In recent years, prewar and colonial data have become more readily available.

Data

Data come from a number of standard sources, including the International Monetary Fund's International Financial Statistics database, Global Financial Data, and work by Carmen Reinhart and Kenneth Rogoff for their book *This Time Is Different.* For a full list, see the references at the end of the paper. All the data are available in an accompanying spreadsheet workbook, and unless otherwise stated, data mentioned in the paper come from the workbook and its sources. Because some data are from copyrighted sources, only part of the workbook will be posted, but the full workbook will be available on request to interested researchers for their personal use, on the condition that they respect copyright.

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[1] Some economists distinguish between orthodox currency boards, which have no central banking-type powers, and unorthodox currency boards, which do (Hanke and Schuler 2015 [1994]: 1, 42-44). Even acknowledging the distinction, the difference in theory and in performance between currency boards on the one hand, whether orthodox or unorthodox, and non-currency board systems—in practice almost all central banks—is stark enough that it seems worthwhile to consider all currency boards together.

The data coverage starts in 1914 since there are not many currency boards before then and because 1913 or 1914 is typically the first year of data coverage by the League of Nations. The League made the first really comprehensive international data collection of statistics from independent countries, and a few dependencies. Its efforts were later be carried on by the United Nations and the IMF. In addition, 1914 marks a break with certain pre-World War I economic and political institutions, notably the "classical" gold standard and the dominance of European empires. As a result, the modern world is more like 1920 than the world of 1920 was like the world of 1910.

The focus on currency board and former currency board countries is done as a way of controlling for some economic, political, and cultural factors. Also, comparing currency board and former currency board countries to all countries, including those that have never had currency boards, would have been a much bigger data-gathering endeavor, not feasible within the timeframe of this research.

The paper omits a number of countries that currently have currency boards or quasi currency boards but that lack good pre-currency board data. They include the Cayman Islands, Gibraltar, and other cases that do not seem significant enough to change the conclusions based on the countries that are included. Readers should also note that data for many countries and years are missing. For example, for inflation, there are a total of 1,608 currency board years and 4,116 years that are not during a currency board. The inflation data collected consist of 546 years of currency board data and 2,674 years of non-currency board data. This is 40 percent of the currency board era inflation data and 65 percent of the non-currency board era data. Other indicators have similar percentages. Data since 1948 are readily available for most independent countries because that is when the IMF's International Financial Statistics database begins since then. Global Financial Data has a majority of the data before this period, with various other sources supplying the rest.

Inflation

The data on inflation for currency boards reveal several key trends that permeate the entire data set. Initially, one must consider that for the period covered, 1914-2015, there are more data for non-currency board systems. There are 546 total currency board years, and 2,674 non-currency board years. The average annual inflation rate for the currency board years is 7.3 percent, compared to 34.0 percent for the non-currency board years.

Another metric to analyze the relative performance of the different periods is how many years the inflation rate exceeded certain thresholds. Overall, currency boards have 6.6 percent of total years above 20 percent inflation compared with 13.3 percent for non-currency board systems. Per the table below, currency boards have lower incidences of inflation above 100 percent and 1,000 percent compared with non-currency board systems. These figures suggest that a currency board leads to less inflation overall than not having a currency board.

Selected Inflation Rate Data

	Currency Board	Non-Currency Board
Total Years of Data	546	2,674
Mean Annual Inflation Rate	7.3%	34.0%
Years above 20% (and % of Total)	36 (6.6%)	355 (13.3%)
Years above 100% (and % of Total)	3 (0.6%)	72 (2.7%)
Years above 1,000% (and % of Total)	1 (0.2%)	13 (0.5%)
Median Annual Inflation Rate	2.9%	5.4%
Standard Deviation	47.7%	347.3%

In addition to the mean being lower for currency boards, the median and standard deviation are also much lower. This is a result of a higher frequency of low inflation levels for currency boards than for non-currency boards. There are, however, several currency board countries that have experienced high inflation. Their cases warrant further consideration, because they support the view that currency boards typically result in lower inflation rates.

Lithuania established a currency board in 1994. Inflation at the end of the Soviet period was repressed by price controls. After the Soviet Union dissolved and Lithuania became independent again in late 1991 it reduced or eliminated controls, resulting in high open inflation, which was exacerbated by a newly reconstituted and inexperienced central bank. Inflation reached 410 percent in 1993. In April 1994 Lithuania established a currency board to curb inflation, which fell to 72 percent that year, falling further to 40 percent in 1995 and 25 percent in 1996. By 2000, the inflation rate was at 1 percent and did not climb above the 20 percent a year benchmark for the duration of the currency board era. In 2015 Lithuania joined the euro area and ceased to issue a national currency.

Similar events happened in nearby Estonia, which like Lithuania became independent again in late 1991 when the Soviet Union dissolved. Estonia at first continued to use Russian currency, but in June 1992 became the first of the newly independent former Soviet republics to establish its own currency. Its currency board lasted from 1992-2010 with the initial currency board era having inflation rates that peaked in 1992 at 90 percent, stabilizing at 8 percent five years later. The inflation rate would never climb higher than 10 percent until the currency board period ended when Estonia joined the euro area.

Another Eastern European country with a successful currency board is Bulgaria, which adopted this monetary policy in 1997, continuing to today. At the time of adoption, the inflation rate was a staggering 1,058 percent as the country was in the midst of a period of high inflation for the past five years. As a result of the shocks arising from the political collapse of communism in Eastern Europe, the parallel collapse of Soviet-led economic arrangements, and a central bank not equipped to handle the transition, the country experienced inflation of 338 percent in 1991. Inflation would not dip below 20 percent until the introduction of the currency board system. After two years of the currency board, the inflation rate stabilized to 2.6 percent. This stable rate has continued for the duration of Bulgaria's currency board era, never reaching above 15 percent.

Yet another notable case is that of Argentina. The South American country experienced inflation rates of 4,925 percent in 1989 and 1,344 percent in 1990. A currency board was established in 1991 and inflation dropped to 84 percent that year, never reaching higher than 20 percent for the currency board's duration from 1991-2001. However, Argentina's "convertibility" system, as it was called did not act in the way that Professor Steve Hanke originally proposed an orthodox currency board, and Hanke warned that the convertibility system would act like a central bank, leading to failure. The later portion of the 1990s saw the Argentine convertibility system act as a central bank, engaging in actions such as sterilization, with the system ultimately failing (see Hanke and Schuler 2015 [1994]: 44-45). The year after the currency board system was replaced, inflation rose to 41 percent a year. Average inflation was 13.5 percent a year from 2002-2015 by the official measure, eventually acknowledged by the government itself to have been understated in the later years of the period. By comparison, the inflation rate during the currency board era from 1992-2001 was 2.7 percent a year.

Another country to consider is Zimbabwe, which had a currency board from 1939 to 1955. The average inflation rate during this time was 4.3 percent a year, compared with 367,658 percent from 1956 to today. This African country fared well during the currency board period, further promoting the idea that the currency board is an effective measure against rising inflation.

The table below gives explanations for periods of double-digit or higher inflation in currency board systems where they could be ascertained. The table shows a hitherto unremarked spate of inflations in the early 1950s, definitely in some cases and possibly in others related to Korean War demand for certain products.

The currency board that started in the Philippines in 1903 would see tumultuous inflation by the next decade as a result of deviation from currency board principles. The Currency Reserve Fund lost 84 percent of its pesos due to loan defaults by 1919, and as a result, the government lost or diverted 80 percent of annual revenue from taxes and tariffs to refill the reserve. Because of these fiscal issues, the country suffered staggering inflation in 1919, reaching 94.0 percent. Two years later, as a result of the inflated prices surrounding sugar and other goods collapsing, the country suffered massive deflation of 49.9 percent. The matter would be fixed by a net decline in currency circulation, export trade being revitalized, and a curbing of imports that would lead to the peso's return to near par by 1922. The original issues were caused by a misunderstanding by Philippine government officials regarding the currency board arrangement and the gold–exchange standard (Luthringer 1934: 175).

Moderate and High Inflation Episodes in Currency Board Systems

Country	Years Inflation ≥ 10%	Explanation
Argentina	1991-92	Inflation stabilization
Bahrain	1973	OPEC price hike oil boom
Barbados	1951	Korean War commodity boom
Bulgaria	1997-98	Inflation stabilization
	2000, 2008	Rapid growth
Burma (Myanmar)	1949	Devaluation of pound sterling
Cyprus	1943	Word War II shortages
	1947-48	Postwar price liberalization
	1951	Korean War boom
Estonia	1993-97	Inflation stabilization
	2008	Rapid growth
Fiji	1946-47	Postwar price liberalization
	1951	Korean War boom
	1972	Floating and depreciation of pound sterling
Ghana	1949-51	Devaluation of pound sterling; cocoa boom
Guyana	1951	Korean War commodity boom
Hong Kong	1949	Devaluation of pound sterling
	1951	Korean War boom
	1989-91	Rapid growth
Iraq	1940-43	World War II oil boom
Ireland	1940-42	World War II growth and inflation
Israel	1938-39	Rapid growth
Jamaica	1940	Word War II shortages
	1947-48	Requires further investigation
	1951	Korean War commodity boom
Kenya	1951	Korean War commodity boom
Lithuania	1994-96	Inflation stabilization
	2008	Rapid growth
Malaysia	1950-51	Korean War commodity boom
Malta	1951	Korean War commodity boom
Mauritius	1948	Post-World War II price liberalization
	1951	Korean War commodity boom
Philippines	1927	Commodity boom
	1934	Recovery from bottom of Great Depression
Seychelles	1971-77	Depreciation of pound sterling from 1972
Singapore	1950-51	Korean War commodity boom
Sri Lanka	1939, 1942	Word War II shortages
Swaziland	1974-75, 1977	Double-digit inflation in anchor country
Tanzania	1951-52	Korean War commodity boom
	1965	Requires further investigation
Tonga	1977, 1980-82	Double-digit inflation in anchor country
	1985-86	Inflation near double digits in anchor country
Trinidad and Tobago	1940, 1942-43	Word War II shortages
	1946	Postwar price liberalization
Zimbabwe	1949	Devaluation of pound sterling

One key year to discuss is 1949, when the pound sterling was devalued. The currency issued by a board currency acts more or less like a clone of the anchor currency and will adjust and respond to market forces in tune with the anchor currency. As a result of this devaluation, inflation increased in many countries that had the pound sterling as their anchor currency. The countries that experienced the biggest increases in inflation were Burma (Myanmar), Ghana (then known as the Gold Coast), Hong Kong, and Zimbabwe (then known as Southern Rhodesia). Zimbabwe's inflation increased 5.2 percentage points, Hong Kong's increased 17.2 percentage points, Ghana's increased 13.0 percentage points, and Burma's increased 18.7 percentage points from the previous year.

Iraq is yet another country to focus on, for its extremely high inflation during its currency board in World War II. From 1940-1944, the country's average inflation was 46.9 percent, peaking at 119.7 percent in 1942. This is a result of Britain's sudden surge in demand for Iraq's oil. However, the inflation did not cause pressure for a currency devaluation, but rather was in the nature of international arbitrage. The Iraqi economy suddenly grew as a result of the surging demand for Iraqi oil and other wartime goods Iraq supplied to the British.

Experience indicates that ordinarily, the annual inflation rate of the currency board system should stay within 5 percentage points of inflation in the anchor currency as a result of a fixed exchange rate plus arbitrage. However, there are a few exceptions such as the Eastern European inflation stabilization episodes or other countries experiencing unusually fast growth. The generalization still holds, though, so for currency board years where data is lacking, periods over several years more or less tracked inflation in the anchor currency country.

Consider the pound sterling, the anchor currency of most currency boards. While the UK's retail price inflation rose into low double digits during World War I, a reversal into deflation followed the postwar depression and the resulting inflation remained in low single digits until 1940. Then, the first full year of World War II, the UK's inflation again rose into low double digits and rose to almost 10 percent during the Korean War, dropping down until the end of the Bretton Woods international monetary system in late 1973. Consequently, inflation was in the low double digits from 1974-1981 for all but one year. Currency boards that anchored their currencies to the pound sterling experienced the general inflation trends that the UK did over the period mentioned—an empirical illustration of the theoretical point that arbitrage keep a currency board system's inflation close to that of the anchor currency.

There have been some episodes in currency board systems of very high inflation, 100 percent a year or more. The reason for such high inflation rates is usually the legacy of a pre-currency board crisis. For example, as already discussed, Argentina and Bulgaria had crises in the years directly preceding the establishment of their currency board. The inflation rates of Argentina and Bulgaria in the year before their currency boards were established were 1,343 percent and 121 percent, respectively. Even though the inflation rate was exceptionally high, the currency board corrected rampant inflation and within a short period brought the rate to a manageable value. While countries that were experiencing inflation crises and employed a currency board found that doing so lessened inflation, ex currency board countries usually inherited single-digit

inflation and would subsequently have episodes of rising inflation. For example, Tanzania, Zimbabwe, and Singapore experiencing double-digit inflation in the years after their currency boards ended. In the two years following Singapore's currency board era, inflation reached 19.6 percent and 22.3 percent. By the mid 1970s Singapore had become a low-inflation country, but Tanzania experienced a number of years of inflation in low to mid double digits and Zimbabwe suffered the second-largest hyperinflation on record. As another example, Mauritius had a stable inflation rate of 2.5 percent in its last year as a currency board, yet less than ten years later, its inflation would skyrocket to 29.1 percent. From these results, there is more evidence of a high correlation of high inflation being internally generated rather than just being an inheritance.

One final note to be made is that for the most part, simple tabulations were used rather than sample statistics. This was done because as the share of actual data points to possible total data points becomes large, one is no longer sampling, and as a result, sample statistics were not appropriate for the situation.

GDP per Person

The data results for GDP per person growth are summarized in the table below. The average annual world growth in GDP per person from 1960 to 2015 was 1.9 percent. The average annual growth in GDP per person over the same period was 3.3 percent for currency boards and 3.2 percent for non-currency boards—a difference so small as to be within the likely margin of error.

Number of Years Growth of GDP per Person Was Below 0 and -3 Percent

	Currency Board	Non-Currency Board
Years with Data	588	3010
Years below 0% Growth (% of Total)	146 (24.8%)	825 (27.4%)
Years below -3% Growth (% of Total)	78 (13.3%)	415 (13.8%)

Growth of Average Annual Real GDP per Person in Currency Board and Non-Currency Board Systems versus World Average over Ten-Year Intervals (Percent)

	1961-70	1971-80	1981-90	1991-00	2001-10	2011-15
World	3.4	2.0	1.4	1.3	1.6	1.4
Currency Board	3.0	6.7	7.6	4.0	4.3	2.4
Non-Currency Board	3.9	4.6	1.6	2.8	3.8	3.9

Reminder: "Non-currency board" countries have at some point had currency boards, so "world" includes many countries not in the currency board or non-currency board groups.

The above data highlight a distinction between currency boards and alternative monetary systems. While the difference in annual growth of real GDP per person between currency and non-currency boards from 1961 to 2015 was only 6 basis points, looking more in depth at the numbers generates further insights. Note that there are fewer years of data for currency boards

than for non-currency boards. While 24.8 percent of currency boards experienced periods of growth under 0 percent, non-currency boards fared worse, at 27.4 percent. The statistic for number of countries below -3 percent growth is only separated by 52 basis points, currency boards having slightly fewer episodes of -3 percent growth though it is open to question whether the difference is economically significant. This is much less than the 257 basis points separating the two in the previous statistic, so there are more non-currency boards that fared worse than currency boards categorized under less than 0 percent growth.

The most interesting data come from comparing currency and non-currency boards with the world average over ten-year intervals since 1961. This is done to highlight that certain periods overall experienced higher growth, and to point them out. The 1960s are distinct in being the only period out of the six considered where the currency board systems were below the world average and the non-currency board data were above it. However, in subsequent periods, and overall, currency boards had higher growth rates than non-currency boards and than the world average

Argentina provides an example that follows the trends just mentioned. In the ten years before the establishment of the currency board, its average growth in real GDP per person was -2.3 percent. For the eleven-year duration of the currency board, it was on average 2.1 percent. The currency board helped the country increase growth per person on average while stabilizing inflation. Three years before Argentina establishing the currency board exhibited economic shrinkage.

There are caveats to be discussed in relation to the data. For many countries, GDP data were not collected until after World War II, and even into the 1960 and 1970s some data may be retrospective estimates. Further, GDP is not directly observable like exchange rates, and it is a statistical concoction. Thus, the GDP data are subject to greater uncertainty than any of the other data discussed here except perhaps the data on classifying financial crises.

In small countries and commodity exporting countries, GDP tends to be more variable. The currency board countries disproportionally meet both criteria. A comparison of currency boards to all countries might show more variable growth in currency board countries, which might be smaller if corrected for size and commodity exporter status, but the procedure used in this paper of only focusing on countries that have at some point had a currency board eliminates this source of potential bias.

Government Budget Balance

Do currency boards tend to instill discipline in government finance, as their advocates often claim? The data suggest that they do. As with previous data, there are more non-currency board years than currency board years, so the surplus and deficit data are based on the total number of years for the respective monetary systems as the denominator. The data clearly show that currency boards have a higher percentage of surplus years and a lower number of

years with budget deficits. On the other hand, the non-currency boards show the opposite patterns, having more years with deficits and fewer with surpluses.

Government Budget Balance		
	Currency Board	**Non-Currency Board**
Total Years of Data	784	2544
Deficit Years (% of Total)	458 (58%)	1928 (76%)
Surplus Years (% of Total)	326 (42%)	616 (24%)

Economists generally scale calculations involving budget balance by GDP to give comparability across countries and across time. However, no nominal GDP calculations exist for the majority of currency board episodes or for many non-currency board episodes in the data set. While a simple "surplus or deficit" classification is crude, it is still a useful measurement, because a country with persistent budget surpluses rarely experiences crises in government finances.

A reason why currency boards have more years with budget surpluses is that government borrowing is restricted to what can be financed from domestic saving and foreign lending. As Allan Meltzer (1983: 703) and other observers have discussed, the currency board will not survive if there is too large of a budget deficit compared with the money in supply. In theory, such a phenomenon could bias the data in favor of currency boards, but in practice, Argentina's system of the 1990s seems to be the only case where there is a plausible argument that government budget deficits broke a currency board system.

Turning to some particular cases, African countries that have had currency boards show a greater share of currency board years having budget surpluses than non-currency board years. The ten years before Zambia's currency board had four years of a budget surplus, and the ten years after the currency board had only one year of a surplus. In the ten years during Zambia's currency board for which data are available, seven had a budget surplus. Uganda reveals more startling results, having a budget surplus in 23 out of its 45 years as a currency board, while the 50 years after the currency board only had six years with a budget surplus. Comparable results have occurred in Tanzania, where 29 percent of its 45 currency board years had a budget surplus and only 6 percent of the 50 years after the currency board yielded a surplus. Nigeria, Malawi, Ghana, Mauritius and Kenya all exhibited similar results; for instance, Kenya had 21 years of a budget surplus during the currency board from 1914 to 1965, and only one year in the following half-century of non-currency board years. Sierra Leone had 23 years of a budget surplus under the currency board and a budget deficit in every year after the currency board era.

In the Caribbean, Jamaica had twice as many years of a budget surplus in its 40 currency board years as in the 55 years afterwards. Barbados has not had a budget surplus since its currency board era, while its 26-year currency board had 11 years of budget surpluses. However, Trinidad and Tobago shows similar frequencies of budget surpluses during and after its currency board years.

Turning to other regions, Sri Lanka had budget surpluses for 19 years during its currency board period dating from 1914 to 1949, where it has had deficits in all but two years of the 66 years since. Argentina's 11-year currency board in the 1990s had three years of a budget surplus, while the previous 61 non-currency board years only had a single year of a budget surplus. Another interesting example is that of the Philippines, where 54 percent of the 22-year currency board era from 1914 had a budget surplus, compared with 30 percent of the 67 years without a currency board. Additionally, the Eastern European countries of Bulgaria and Estonia have had budget surpluses in 37 percent and 50 percent of their currency board periods, respectively. Finally, Hong Kong has had much success with its currency board, evidenced by the 26 years of a budget surplus in the last 32 years of its currency board epoch.

Foreign Reserves

One criticism of currency boards, dating back at least to the 1950s, is that the 100 percent foreign reserve ratio is too high and unnecessarily channels funds into foreign assets that could be used for domestic economic development (Schuler 1992: 113-116). Thus, it is worth analyzing the ratio to determine its average for non-currency boards. As the table shows, the average percentage of foreign reserves as a fraction of the monetary base is lower for non-currency boards, except for Middle Eastern countries. An orthodox currency board holds reserves equal to or slightly greater than the monetary base (its coins and notes in circulation plus deposits with it[2]), so the data for currency board periods will show ratios near 100 percent. The data for non-currency board periods are more variable because their monetary policies are less uniform.

Foreign Reserves as a Percentage of the Monetary Base

	Currency Board	Non-Currency Board
Total Years of Data	852	2245
Average Reserves, All Countries (%)	118.1	88.9
Average, African Countries (%)	99.4	16.6
Average, Middle Eastern Countries (%)	105.1	165.6
Average, Caribbean Countries (%)	98.3	83.9

The average foreign reserve makeup of the money base for African countries after their currency board period is much lower than the average for their currency board period. At 12.8 percent, most of these African countries have little foreign reserves, and have faced a myriad of other issues, among them excessive inflation and exchange rate depreciation. Ghana's average foreign reserve percentage is 0.6 percent and its average inflation rate in the post currency board era is 23.7 percent. Zambia and Zimbabwe had average foreign reserves of -124.7 percent and -21.0 percent, respectively, in their era following the currency board. (Negative foreign reserves mean that the monetary authorities had foreign currency liabilities exceeding

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[2] Strictly speaking, a currency board may not issue all parts of the monetary base. In British colonies, coins were often issued by the local treasury, or there were no locally issued coins and colonies used British coins. A currency board is not responsible for parts of the monetary base it does not issue.

their foreign currency assets.) Like Ghana, they also had high average inflation rates: 41.9 percent for Zambia and 367,658.2 percent for Zimbabwe since the end of their respective currency boards. Further, the median inflation for Zambia is 23.3 percent and 8.9 percent for Zimbabwe since their currency boards ended. While the foreign reserves requirement was lifted in the time after the currency board, inflation skyrocketed as foreign reserves dwindled.

While African countries exhibited much lower foreign reserves in the post currency board period, Middle Eastern countries had very high reserves in the following period, above the 100 percent threshold. Bahrain's average foreign reserve percentage is 239.5 percent, while the lowest average percentage in this group is Israel at 97.9 percent. This group includes oil-rich nations such as Kuwait and Oman, each above 200 percent average foreign reserves as a percentage of the monetary base. Not by coincidence, the Middle East oil exporters are also among the countries that have seen little or no exchange rate depreciation over the long run against their former or continuing anchor currencies.

Whereas the Middle Eastern countries have high foreign reserve ratios and the African states generally have low ratios, Caribbean nations' practices are varied. While the average for these islands is close to the currency board standard at 82.6 percent, some outliers must be mentioned. Trinidad and Tobago's average is a staggering 196.6 percent, while Jamaica's is only 7.9 percent. Trinidad and Tobago's membership in the British Caribbean Currency Board ended in 1964 and Jamaica's ended in mid 1961, so the two countries began their central banking experience within a close period. The ten years following Jamaica's currency board had an average foreign reserve percentage of 109.2 percent, but the next ten years saw a decrease in foreign exchange percentage in seven out of ten years, averaging -14.5 percent during this period. Jamaica would not have a positive percentage of foreign reserves until 1994, increasing steadily for the next twenty years. Thus, this long period of a negative percentage for foreign reserves as a percent of the monetary base contributes to Jamaica's small figure in the overall average. While Jamaica experienced seventeen years of a negative percentage, Trinidad and Tobago never had a negative percentage in this value. At one point, their foreign reserve ratio to the monetary base was at 617.9 percent in 1978, the fourth highest out of all countries surveyed in their post-currency board eras.

The Bahamas and Barbados had higher percentages, 91.7 percent and 75.2 percent, respectively. All members of the Eastern Caribbean Central Bank—the successor to a regional currency board—had ratios above 70 percent except for Dominica. Dominica's average foreign reserve compared to the monetary base was 39.0 percent, mainly driven by a period of six years between 1981 and 1986 where the foreign reserve percentage was negative. The median for this tiny Caribbean nation is 63.0 percent, only sixteen percentage points away from the median of the next lowest ECCB country.

Singapore presents an interesting case study. While obeying the currency board requirements during its currency board era, during the post currency board period it has maintained a very high level of foreign reserves relative to the monetary base, averaging 516.9 percent, the

highest mean out of every country surveyed. Singapore has enjoyed inflation of 2.6 percent a year during the post currency board period.

Financial Crises

Financial Crises Summary		
	Currency Board	**Non-Currency Board**
Total Years of Data	546	2,674
Total Years of Crises	53	432
Average Number of Crises Per Year	0.097	0.161
Countries with at least 10 Years of Crises	1	14

The main source this paper uses for identifying financial crises is Carmen Reinhart and Kenneth Rogoff's (2010) spreadsheets on financial crises, accompanying their book *This Time Is Different.* They cover currency crises, inflation crises, stock market crashes, domestic and external sovereign debt crises, and banking crises. Reinhart and Rogoff's criterion for an inflation crisis is the inflation rate exceeding 20 percent. Their criterion for a currency crash is that the exchange rate depreciated at least 15 percent against the anchor currency, in the majority of cases the UK pound or the US dollar. Also, currency debasements are classified as a reduction in the metallic content of coins in circulation of at least 5 percent. They use two criteria to identify banking crises. One is bank runs that led to the public sector taking control of at least one financial institution. The other was that even if there were no runs, a public sector takeover of an important financial institution identifies a crisis. They define both external and domestic debt crises as failure to meet the payment on the due date. They also include episodes where external debt is renegotiated on less favorable terms to creditors than the original terms.

The second source of data on crises is a working paper by Miloni Madan and Alec Maki (2015) detailing the financial crises of currency boards in India, Singapore, Argentina, the Philippines, Palestine (Israel), Hong Kong, Bermuda, Estonia, Lithuania, and Bulgaria. They consider banking crises, in which banks failed or were bailed out by the government, and currency crises, in which the currency depreciated or the government took unusual action to prevent speculative attacks on the currency. They do not consider inflation, stock market, or sovereign debt crises, the implicit reason being that those other crises are not as closely related to the smooth operation of the monetary system.

The final source is Luc Laeven and Fabián Valencia's 2012 update to their Systemic Banking Crises Database. To be denoted a banking crisis, two criteria must be met. First, there need to be momentous financial issues plaguing the banking system, such as bank runs, losses in the system, and bank liquidations. The second criterion is that government intervention occurs in response to the losses as a result of the financial distress.

While the above sources, especially Reinhart and Rogoff, highlight the major and many minor crises, there are still many gaps in this field. As a result, additional episodes may come to light

in some of the smaller countries after more research. There seem, however, to have been no sovereign defaults by currency board systems except Argentina, and not many currency board systems have had local stock markets that were important parts of the local financial system. Additionally, the sources understate the problems of these financial systems in centrally planned countries, albeit there were not many of these countries in the data set here. Centrally planned economies direct resources to inefficient uses, and rather than the bank going bankrupt, the consumer bears the brunt of these effects. Persistent shortages of consumer goods result and thus the overall problems are severely understated. Further research, then, may well find few additional crises among currency board systems and quite a few additional crises among non-currency board systems.

The data show that currency boards experienced crises in 9.7 percent of all years, compared with 16.1 percent of all years for non-currency boards. Per the financial crises definitions of the sources, rampant inflation is considered a period of crisis. Thus, overall currency boards maintained lower inflation than their non-currency board counterparts. When a country would have inflation above 20 percent, such as Ghana's nine-year period between 1976 and 1984 of inflation not dipping below 22 percent, these nine years of high inflation were categorized as a financial crises period in the spirit of Reinhart and Rogoff's criteria. Many non-currency board countries experienced rampant inflation in the period preceding the currency board, such as Bulgaria, Estonia, and Lithuania, or excessive inflation in the subsequent period.

There are several countries that deserve mention as a result of their sheer number of crises. India and Argentina were the only two countries with over 50 years of crises. India only had five crisis years in its currency board era, while Argentina had 12. Argentina has the most number of crisis years out of any country in its currency board era, whereas 14 had ten or more years of crises during their non-currency board eras. While Zimbabwe had over forty years of crises during the post currency board period, there were no crises during its currency board. Ghana and Burma (Myanmar) also had a significant number of crisis years in the post-currency board period, totaling 66 between the two. Yet, each country only had one crisis year in their respective currency board eras.

As an extreme example of how a country has gone off the rails since abandoning its currency board, consider Zimbabwe. By Reinhart and Rogoff's criteria, Zimbabwe experienced external debt crises from 1965-1974 as a result of an external default or restructuring. There was a stock market crash in all years from 1976-1986 except for 1979 and 1985. Further, the period from 1988 to today has been a very tumultuous period for the country. Every year between 1988 and 2009 has seen Zimbabwe meeting one of the criteria for a financial crisis that Reinhart and Rogoff have defined. In this period, Zimbabwe experienced 16 years of currency crises, 17 years of inflation crises, 12 years in which the stock market collapsed, one year of a domestic debt crisis, ten years of external debt crises, and 14 years of banking crises.

Financial Crises in Currency Board Systems, Multiple Sources

Country	Crisis Years	Explanation
Argentina	1912-1914	Unsustainable growth, crop failure, World War I panic
	1929	U.S. Great Depression
	1991-1996	Aftermath of pre-reform currency crisis; banking and sovereign debt crisis (1995: contagion from Mexico)
	1998	Stock market crash
	2000-2001	Asian, Russian, and Brazilian financial crises
Philippines	1919-1922	End of World War I causing drop in demand for exports and mismanagement by government
Singapore	1920	Currency crisis (appreciation and crash of silver)
	1950	Currency and inflation crisis (devaluation of pound sterling)
Sri Lanka	1920	Currency crisis (appreciation and crash of silver)
	1931	Currency crisis (Britain abandoned gold standard)
	1939	Currency crisis (start of World War II)
	1942	Inflation crisis (wartime)
Ireland	1931	Currency crisis (Britain abandoned gold standard)
	1939	Currency crisis (start of World War II)
Palestine	1935-1936	Religious tensions and international political instability
	1940	Panic regarding start of World War II
Hong Kong	1961	Rapid expansion of banking sector, rising property prices
	1965	Falling property prices and Hang Seng Bank rumors
	1987	1987 stock market crash
	1991	Scrutiny of BCCI and false rumors
	1997-1998	Asian Financial Crisis
	2008	Global financial crisis
Malaysia	1948	Currency crisis
	1950	Inflation crisis
Mauritius	1948	Inflation crisis
Burma	1949	Inflation crisis
Ghana	1949	Currency crisis (devaluation of pound sterling)
Nigeria	1950	Currency crisis (devaluation of pound sterling)
Zambia	1950	Currency crisis (devaluation of pound sterling)
Estonia	1992-1994	Underdeveloped system and asset freezes from Moscow*
	1997	Asian Financial Crisis and speculative attack on kroon
	1998	Asian and Russian Financial Crises
Lithuania	1995-1996	Banking adjustment to capitalist economy **
	1998-2000	Asian and Russian Financial Crises
Bulgaria	2015	Rapid growth of fourth-largest bank

Countries are listed in order of their earliest crisis.

*Laevan has the ending date as 1994, Madan and Maki only had 1992 for the crisis.

**Laevan has the ending year as 1996, Madan Maki only have 1995 as the crisis year.

Additional Cases of Financial Crises under Currency Boards, from Madan and Maki		
Country	Crisis Years	Explanation
India	1907-1909	Crop failures and U.S. financial panic of 1907
	1912-1915	Banking crises
Straits Settlements (Singapore)	1907-1908	Unexpected rise of value of silver and general financial distress of period
Hong Kong	1941-1945	Japanese occupation; illegal note issues
Bermuda	1975	Regulators observed problems at Bermuda Provident Bank
	1979	Regulators observed problems at Rego Trust and Savings

Exchange Rates

A currency board maintains a fixed exchange rate with an anchor currency. The most common anchor currencies have been the pound sterling and the U.S. dollar. Some non-currency board systems maintain rigid exchange rates, while others have floating rates. If non-currency board systems on average maintain the external value of a currency as well as currency boards do, then over long periods we would expect to see that even though a number of currencies had depreciated against their former anchors, a roughly equal number would not have.

The exchange rate data start the calculations at the end of the last full year of the currency board period, and calculate the exchange rate every year since then as data permit. Some countries have data extending many decades since their currency board era, such as India at almost 100 years, while others have much shorter periods, such as Estonia and Lithuania at less than a decade each. The exchange rate of the first year calculated was set at 1, and each year was calculated as either above or below this figure for ease in comparisons of exchange rate depreciation and appreciations, and for uniformity. Therefore a factor of 3.5 after ten years would indicate substantial depreciation, because it would take 3.5 times as many units of the currency to buy one unit of the anchor currency as in the first year. On the other hand, a factor of 0.8 would indicate appreciation, because it would only take 0.8 times as many units of the currency to buy one unit of the anchor currency as in the first year. Per the above data table, the majority of countries experienced depreciation within the first ten years after the end of the currency board, and forty years later, there were only ten countries out of 48 with an exchange rate appreciation compared with the last year of the currency board's era.

Few countries experienced great depreciation by the end of the first ten years after their currency boards: only Argentina, Israel, and Swaziland's exchange rate depreciation exceeds a factor of 2.0. Over longer periods, great depreciation becomes more frequent. Twenty years after the currency board era, Uganda saw the biggest increase in exchange rate factor, increasing by a factor of 83.37 and increasing by factors in the tens of thousands for the next several decades. Thirty and forty years after the currency board era saw a majority of monumental exchange rate depreciations as a result of economic crises and rampant inflation. Only a handful of countries experienced appreciation, yet they are the outliers in this dataset of countries experiencing significant depreciation.

Exchange Rate Changes		
Exchange Rate Change of Former Currency Board Countries against Their Former Anchor Currencies	10 Years After End of Currency Board	40 Years After End of Currency Board
Total Number of Countries	53	48
Appreciated	11	10
Depreciated	28	38
Depreciated by More than a Factor of 10	0	16

African countries including Ghana, Nigeria, Sierra Leone, Somalia, Uganda, Zambia, and Zimbabwe experienced extremely high exchange rate depreciation from their last currency board year. These numbers at times numbered in the millions, a result of financial issues that have been plaguing these countries for the majority of their history. In contrast, Libya's respective exchange rate never increased above a factor of one, even fifty years later. While Ethiopia's exchange rate increased by a factor of five 70 years later, when compared with other African countries, the country maintained a much more stable exchange rate, as did Eritrea, never rising above a factor of six.

Middle Eastern countries fared much better than African nations. For the majority of the Middle Eastern countries' history, their exchange rates depreciated only slightly, rather than by factors of thousands. Bahrain's exchange rate actually appreciated. Fifty years after the end of Iraq's currency board period, the exchange rate depreciated by a factor of 2910, yet the Middle Eastern country's exchange rate appreciated in the previous forty years. The sudden and staggering rise could be attributed to the consequences of the 2000s Iraq War, bringing much instability to the region and consequently affecting exchange rates. As Jordan's exchange rate was depreciating since twenty years after the currency board's termination, Kuwait's figures appreciated. A potential result of appreciation could be the persistent low inflation coupled with numerous years of a budget surplus.

Jamaica fared the worst out of the Caribbean countries, its exchange rate continually depreciating. It would peak forty years after the currency board ended at a factor of 62.8. While Trinidad and Tobago did not fare nearly as worse, the country still reached an exchange rate depreciation factor of one. Countries using the Eastern Caribbean dollar, including Antigua and Barbuda and Grenada, saw appreciation, along with Barbados.

Singapore presents an interesting case, as the country's exchange rate has been appreciating in each subsequent decade since the end of the currency board. Singapore focuses on a target exchange rate zone, adjusting the rate depending on target levels set in advance against an undisclosed weighted basket of currencies of important partner countries in trade and finance. As a result, Singapore's central bank does not set interest rates, unlike most of its peers, and the exchange rate target zone has been relatively successful at keeping inflation low as a result.

See the Appendix for a table of appreciations and depreciations by the currency boards covered in this study.

Exchange controls (Currency Convertibility)

Exchange control, or currency convertibility, is the extent to which a government allows people to use a currency in foreign payments. Kurt Schuler has devised a table for the Historical Financial Statistics data set that attempts to cover all countries since 1931, when the Bank for International Settlements began making the first survey of convertibility in its annual report. Since 1949 the major source of data is the International Monetary Fund's *Annual Report on Exchange Arrangements,* now called the *Annual Report on Exchange Arrangements and Exchange Restrictions.* A third source, the long defunct *Pick's Currency Yearbook,* later called *World Currency Yearbook,* relied heavily on the IMF report but also included information for many countries that were not IMF members. These sources often did not explicitly cover colonies, but exchange controls were with rare exceptions the same as in the metropolitan country. The classifications are based on a large degree of judgment, and therefore any conclusions are to be viewed cautiously.

The typical division of convertibility is into current account and capital account convertibility. Current account convertibility means that a currency can be used with few restrictions for payments involving foreign goods and services. Capital account convertibility means that a currency can be used with few restrictions for foreign investment. Usually, a currency that has capital account convertibility also has current account convertibility. Implicit in both kinds of convertibility is internal convertibility, that is, absence of exchange controls for domestic payments. In centrally planned economies, though, even internal convertibility is lacking, especially for enterprise-to-enterprise payments. Another wrinkle in convertibility is the existence of payments areas—zones in which member countries allow greater convertibility than they do for countries outside the zone. During World War II and for some years afterward, for instance, payments of all types could be made with few restrictions within the sterling area, which comprised Britain, many of its colonies, and some independent countries. For countries outside the sterling area, the pound sterling was not necessarily convertible even for current account transactions.

With those factors in mind, Schuler distinguishes among five degrees of convertibility:

- 0 = Repressed (inconvertible). All foreign payments are controlled, as in centrally planned economies, or in many belligerents and occupied countries during the world wars.
- 1 = Restricted. A limited group of foreign payments, typically connected with immediate payment for merchandise, has few restrictions.
- 2 = Payments area. Payments face few restrictions within the payments area, but significant restrictions on current and capital account outside the area. Whether a country belonging to a payments area is classified in this category rather than the "restricted" category depends on how significant the payments area is to its economy. If a large country and a small country are joined in a payments area, the area may be

significant to the small country but not to the large one, in which case convertibility in the large country is still listed as restricted.

- 3 = Liberal. The currency is convertible on current account or (much less often) capital account, but not both for transactions with all foreign countries.
- 4 = Full. The currency is convertible on current account and capital account, though some restrictions on payments may exist connected with money laundering, international economic sanctions, and the like. The exchange rate is unified, whereas in the lesser degrees of convertibility multiple exchange rates may exist, such as a black market where the exchange rate differs significantly from the official rate.

Currency Convertibility (from 0, Lowest, to 4, Highest)		
Years	Currency Board	Non-Currency Board
Years of Data	1255	3354
Years Equal to 4 (% of Total)	328 (26.1%)	797 (23.7%)
Years Equal to 3 (% of Total)	73 (5.8%)	826 (24.6%)
Years Equal to 2 (% of Total)	833 (66.4%)	693 (20.6%)
Years Equal to 1 (% of Total)	21 (1.6%)	877 (26.1%)
Years Equal to 0 (% of Total)	0 (0%)	161 (4.8%)

The above data reveal that the currency board countries never experienced years with fully repressed currency convertibility. Currency boards have much fewer years with years equal to 1 and 0, and slightly more years with full convertibility. While non-currency board data outnumbers that of the currency board by about three to one, the years equal to 0 or 1 are revealing. Over 30 percent of the non-currency board countries experienced repressed and restricted convertibility for their existence, compared to just 1.6 percent of currency board countries.

Conclusion

After surveying these 57 countries, the data show that by the criteria evaluated here, the majority of countries performed better during the currency board era than in the non-currency board periods. The most striking data are for inflation, where the average rates are significantly lower for currency boards. Currency boards have proved to be extremely effective for countering excessive inflation, as evidenced by Bulgaria, Estonia, Lithuania, and Argentina's bouts with inflation in the 1990s. Further, the currency board limits the potential for bouts of hyperinflation unlike central banks, where there were 13 years with inflation above 1,000 percent, compared with the currency board's single year of inflation above that level, which was simply a result of the transition to a currency board for Bulgaria in 1997.

Other data results indicate better economic measures during the currency board period as well. The majority of countries that replaced their currency board experienced periods of exchange rate depreciation. Some reached factors of depreciation in the tens of thousands, figures that were never found in the currency board periods. Currency boards experienced a higher percentage of government budget surpluses, likely a result of the 100 percent foreign reserve

requirement imposing greater budgetary discipline because the currency boards could not finance government spending. While the GDP per person results were similar for currency boards and non-currency boards, there were slightly fewer periods with negative growth in currency board eras. The data on foreign reserves as a percentage of the monetary base revealed that African countries suffering from excessive inflation and depreciating exchange rates also experienced low reserves, sometimes dipping into negative figure territory. Finally, financial crises occurred almost twice as frequently in non-currency board eras, as some countries having experienced over 50 years of crises in their non-currency board episodes. Per the data analyzed in this paper, the currency board leads to more positive economic outcomes that the central bank could likely cause.

Appendix. Exchange Rate Appreciations and Depreciations by Currency Boards

Country / Date	Old Rate / New Rate	Effect	Remarks
Argentina 1914.08.09	1 peso = 0.63870849 gram gold Floating	Depreciation	Abandoned fixed exchange rate soon after World War I began
Argentina 1929.12.16	1 peso = 0.63870849 gram gold Floating	Depreciation	Abandoned fixed exchange rate soon after Great Depression began
Argentina 1992.01.01	10,000 australes = US$1 1 peso = US$1	Neutral redenomination	Redenomination, 10,000 australes = 1 peso
Argentina 2002.01.09	1 peso = US$1 Floating	Depreciation	Abandoned exchange rate during a financial crisis
Bahamas 1966.05.25	Bahamas £1 = £1 stg Bahamas $1 = £0.35	Neutral redenomination	Redenomination connected with introducing a decimalized currency almost equal to the US dollar
Bahamas 1967.11.18	Bahamas $1 = £0.35 stg Bahamian $2.44898 = £1 stg	Appreciation to preserve value	Revalued against sterling after it devalued against the US dollar; preserved previous cross rate with US dollar
Bahrain 1967.11.18	1 Bahrain dinar = £0.75 stg 1 Bahrain dinar = £0.875 stg	Appreciation to preserve value	Did not follow devaluation of pound sterling against US dollar and gold
Bahrain 1972.06.26	1 Bahrain dinar = £0.875 stg 1 Bahrain dinar = US$2.28	Appreciation and anchor switch to preserve value	After UK floated the pound sterling, switched to US dollar at the anchor at the pre-floating sterling/dollar rate
Bahrain 1973.02.13	1 Bahrain dinar = US$2.28 1 Bahrain dinar = US$2.53	Appreciation to preserve value	Did not follow US devaluation against gold
Belize 1949.12.31	Belize $1 = US$1 Belize $4 = £1 stg	Neutral anchor switch	Switched anchor to pound sterling at approximately the prevailing sterling/dollar cross rate
Belize 1976.05.11	Belize $4 = £1 stg Belize $2 = US$1	Appreciation and anchor switch	Switched anchor to US dollar and revalued about 10% during a period when sterling was weak
Bosnia 2002.01.01	1 marka = 1 German mark 1.95583 marka = 1 euro	Neutral anchor switch	With the final replacement of the German mark by the euro, switched to the euro as anchor currency at the fixed mark-euro rate
Bulgaria 1999.01.01	1,000 leva = 1 German mark 1.99583 leva = 1 euro	Neutral redenomination	With the initial replacement of the German mark by the euro, switched to the euro as anchor currency at the fixed mark-euro rate
Estonia 1999.01.01	8 kroons = 1 German mark 15.6466 = 1 euro	Neutral anchor switch	With the initial replacement of the German mark by the euro, switched to the euro as anchor currency at the fixed mark-euro rate
Fiji 1929.12.18	Fijian £1 = £1 stg Fijian £1 = £1 stg; see Remarks	Depreciation	De facto floating though still officially fixed
Fiji 1932.09.09	Fijian £1 = £1 stg Fijian £1 = £1 stg; see Remarks	Neutral	Returned to parity with sterling
Fiji 1932.12.14	Fijian £1 = £1 stg Fijian £1 = New Zealand £1	Depreciation	Temporarily switched to New Zealand pound as anchor currency during the Great Depression; market rate was New Zealand £1.11 = £1 sterling

Fiji 1933.03.29	Fijian £1 = New Zealand £1 Fijian £1.11 = £1 stg	Appreciation to preserve value	Switched back to pound sterling as anchor currency
Fiji 1967.11.27	Fijian £1.045 = £1 stg Fijian £1.045 = £1 stg	Appreciation to preserve value	Did not fully follow pound sterling's devaluation against gold and the US dollar
Fiji 1969.01.13	Fijian £1.11 = £1 stg Fijian $2.09 = £1 stg	Neutral redenomination	Adopted a new, decimalized currency unit at Fijian $1 = Fijian £1
Fiji 1972.10.25	Fijian $2.09 = £1 stg Fijian $1.98 = £1 stg	Appreciation to preserve value	Revalued to offset the depreciation of the pound sterling against the US dollar
Hong Kong 1972.10.25	Hong Kong $16 = £1 stg Hong Kong $14.5545 = £1 stg	Appreciation to preserve value	Did not fully follow pound sterling's devaluation against gold and the US dollar
Hong Kong 1972.07.06	Hong Kong $14.5545 = £1 stg Floating	Appreciation	Abandoned fixed rate during a period of turmoil for the pound sterling
India 1893.06.26	1 rupee = 10.6918 grams silver Floating	Neutral in intent, depreciation in fact	Floated the exchange rate in transition to a sterling/gold standard
India 1916.12.20	15 rupees = £1 stg 15 rupees = £1; see Remarks	Appreciation in fact	Introduced exchange controls during World War I that in effect ended the currency board system
Kenya 1916.12.20	10 East African rupees = £1 stg 20 East African shillings = £1 stg	Neutral redenomination	Replaced local currency board with regional East African Currency Board and changed currency unit at 1 East African rupee = 2 East African shillings
Lithuania 2002.02.01	4 litai = US$1 3.4538 litai =1 euro	Neutral anchor switch	Switched to euro as anchor currency at prevailing euro/dollar cross rate
Mauritius 1877.01.01	Mauritian $5 = £1 stg 1 local rupee = 1 Indian rupee	Neutral redenomination & anchor switch	Changed currency units; 2 Mauritian rupees = Mauritian $1; rate with Indian rupee was market rate
Mauritius 1934.08.23	1 local rupee = 1 Indian rupee 13.33 local rupees = £1 stg	Neutral anchor switch	Switched to the pound sterling as the anchor at the sterling-rupee cross rate
Oman 1972.06.26	1 rial Omani = £1 stg 1 rial Omani = US$ 2.60571	Appreciation and anchor switch to preserve value	After the pound sterling floated, switched to a US dollar anchor at pre-floating dollar-sterling cross-rate
Oman 1973.02.20	1 rial Omani = US$ 2.60571 1 rial Omani = US$ 2.89524	Appreciation to preserve value	Did not follow the devaluation of the US dollar against gold
Philippines 1916.06.20	2 Philippine pesos = US$1 Floating	Depreciation	In a deviation from currency board orthodoxy, the board lost foreign exchange reserves and floated
Qatar 1967.11.19	1 Qatar riyal = £0.075 stg 1 Qatar riyal = £0.0875 stg	Appreciation to preserve value	Did not follow the devaluation of the pound sterling against the US dollar
Qatar 1967.11.19	1 Qatar riyal = £0.0875 stg 1 Qatar riyal = US$0.228	Appreciation and anchor switch to preserve value	Switched to the US dollar as the anchor currency after pound sterling began to float and depreciate
Seychelles 1936.01.31	13.33 local rupees = £1 stg 1 local rupee = 1 Indian rupee	Neutral anchor switch	Switched to pound sterling at the rupee-sterling cross-rate
Singapore 1903.10.03	Straits $1 = 1 silver dollar Floating	Neutral in intent	Floated as part of a transition to a gold standard
Singapore 1967.11.19	Singapore $1 = £0.11667 stg Singapore $ 1 = £0.13336 stg	Appreciation to preserve value	Did not devalue with pound sterling
Tonga 1966.02.14	Tonga £1 = Australian £1 1 pa'anga = Australian $1	Neutral redenomination	Introduced new, decimalized currency at 2 pa'anga = £1

Notes: stg = sterling. Table excludes some currency board episodes that are not covered in the paper. Those cases are listed in the Excel workbook.

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