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ESTIMATING PERCENTAGE CHANGES IN NOMINAL GDP FOR SELECT CURRENCY BOARD EPISODES, 1929-1950

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The *Studies in Applied Economics* series is under the general direction of Professor Steve H. Hanke, Co-Director of the Institute of Applied Economics, Global Health and Study of Business Enterprise (hanke@jhu.edu).

This working paper is one in a series on currency boards for the Currency Board Project. The currency board working papers will fill gaps in the history, statistics, and scholarship of the subject. The authors are mainly students at The Johns Hopkins University in Baltimore who have conducted their work at the Institute as undergraduate researchers.

About the Author

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Summary

It is easy to find data on nominal national income for most countries since about 1950. However, data are scarce for numerous countries that had currency boards during the period before the late 1940s. Using monetary data for select currency board episodes and the equation summarizing the quantity theory of money, MV = PT, this study estimates year-over-year percentage changes in nominal gross domestic product for currency board episodes from 1929 to 1950. The period is to be divided into two separate time frames, the first covering the years 1929-1938, or the Great Depression and the pre-World War II era, and the second covering the years 1939-1950, or World War II and after.

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JEL codes: E10, N10.

Introduction

It is relatively easy to find data on national income, or gross domestic product, for most countries since about 1950. The leading databases for doing so are the International Monetary Fund's *International Financial Statistics,* the Penn World Table (PWT 7.1), the Maddison Project (building on the work of the late Angus Maddison) and Brian R. Mitchell's *International Historical Statistics* volumes. These databases, however, omit a large amount of data on national income for numerous currency board episodes, especially during the period before the late 1940s. In this paper, I will attempt to address the currency board episodes for the years from 1929 to 1950. (Because I calculate changes starting with 1929, 1928 is the base year.) To keep my approach simple and direct, I will not be calculating figures for the level of *real* national income, but instead the estimates of year-over-year percentage changes in *nominal* gross domestic product.

Other scholars in the past have touched on the issue of using monetary data to calculate national income for various economies. This paper integrates their arguments, further applying their methods to the monetary data set I have collected. Milton Friedman argued that monetary data could be used to calculate the gross domestic product of a country assuming a constant income velocity. Friedman (1961) acknowledged that income velocity is never perfectly stable, but argued that it generally changes little from year to year. Bordo and Jonung (1990) extended Friedman's argument to assert that the income velocities of industrialized countries failed to vary much during the 20th century. Bordo and Jonung (1990: 1-5) noted that the income velocities of those countries were particularly stable during the years of the Great Depression.[1] In an apparently pioneering contribution, Doblin (1951) argued that economic indicators such as foreign trade, in addition to monetary data, could be used to indirectly estimate the gross domestic product of a country or region as well, assuming a stable velocity. Leff (1972) asserted that the rate of real income growth of a country is equal to the rate of monetary expansion plus the change in velocity minus the rate of price inflation, and to calculate the rate of nominal growth, inflation can simply be subtracted from the equation. While Bordo and Jonung focused largely on industrialized nations, Leff covered lesser-developed economies as well. Furthermore, Hanke (2015) argued that the growth of broad money and nominal gross domestic product in a country are closely linked. To wrap everything up, Greasley and Oxley (2000) used the quantity equation, MV = PT, to calculate the gross domestic product of New Zealand. (M is the money supply, V is velocity, P is price, and T is the number of transactions within an economy.) Their logic was that price multiplied by the number of transactions within the economy would roughly equal national income, and assuming a constant velocity, the yearly values in gross domestic product would be captured entirely by fluctuations in the money supply.

Given the arguments for a stable income velocity, especially during the Great Depression, I will by analogy argue that the income velocities for my list of currency board episodes during the years 1929-1950 were relatively stable as well. Continuing in the same vein as Greasley and

[1] These are arguments about empirical regularities for particular periods, not about theoretical certainties for all

Oxley, I will use the quantity theory of money, MV = PT, assuming a constant velocity, to estimate the yearly changes in the nominal gross domestic products of my list of currency boards. To back my calculations, I run statistical correlations for the years that I do have national income data on with monetary data to understand the extent of how well the two variables correspond. Furthermore, I analyze existing data on the balance of trade[2] for the currency board episodes as well. The intuition for doing so is that for an expanding economy, imports and exports should expand, with the amount of imports generally outweighing the number of exports. Countries tend to import more during an expansion to provide price competition, which limits inflation, while increasing supply to meet a surging domestic demand. For a shrinking economy, imports should shrink and if the balance of trade had been in deficit, it should turn to surplus or at least show less of a deficit. If the economy of the rest of the world is also shrinking or if the price of a major commodity export is falling, though, exports may also shrink as well. Although this use of trade data may seem rather subjective, it is not central to my analysis and will simply be used as a confirming piece of evidence.

Ideally, the money supply in the quantity equation should be a broad measure—M2 or M3. Many currency board systems did not publish information on bank deposits. One reason was that macroeconomic statistics were still in their infancy, and the statistics were not as highly prized as they are today. Another reason was that banks in many currency board systems were branches of banks with their headquarters in London. For supervisory purposes it was considered adequate that the banks should publish their global results, without giving country-by-country details. Rather than M2 or M3, all that we have for most currency board systems is the monetary base, M0. With that being said, even it is not available for all years in all currency board episodes. Given the experimental nature of the research here, it is a caveat, not a fatal flaw.

Methodology

Correlations

I used online database resources to gather existing data on national income for my list of currency board episodes. The databases containing the relevant data were Mitchell's *International Historical Statistics,* the Penn World Table, and the World Bank database.

I then ran a correlation function between the existing national income values found within the databases and the currency in circulation for the currency boards. Although currency in circulation in this case is the narrowest measure of money supply in regards to the quantity theory of money, it is possible to use it nonetheless for my calculations assuming a stable relation between narrow and broader measures, which is made possible through a constant income velocity. Where the databases gave conflicting values, priority was given to the Penn World Table because it contained continuous data for the greatest number of years, allowing for greater consistency. *International Historical Statistics* was used if the Penn World Table

[2] The original data for both currency in circulation and balance of trade can be found in the appendix.

lacked data and the World Bank database was used if both other databases lacked data. In addition, gross domestic product values from each of the different databases were never run in conjunction with one another due to the different methods and criteria employed in calculating the values for national income. It is important to take note that these databases contained national income data for individual countries rather than regional currency boards, although countries and national currency boards tend to overlap in most cases. I have summarized the results below:

Table 1. Correlation Between Existing National Income Data and Currency Board Money (M0)

Country (Former Name, If Any)	Years	Correlation
Bahamas	1960 –1968	0.93249
Bermuda period 1	1976 – 1979	0.97603
Bermuda period 2	1990 – 2011	0.95777
Ghana	1950 – 1957	0.96381
Hong Kong	1990 – 2011	0.97052
Jamaica period 1	1931 – 1934	-0.40776
Jamaica period 2	1953 – 1959	0.97911
Jordan (Transjordan)	1954 – 1964	0.91886
Kenya	1950 – 1966	0.76638
Malawi (Nyasaland)	1954 – 1964	0.95496
Mauritius	1950 – 1967	0.91979
Myanmar (Burma)	1948 – 1952	0.94718
Nigeria	1950 – 1959	0.61343
Sierra Leone	1961 – 1964	-0.96174
Singapore	1967 – 1970	0.99848
Seychelles period 1	1960 – 1970	0.84111
Seychelles period 2	1972 – 1974	0.99314
Zambia (Northern Rhodesia)	1955 – 1958	1
Zimbabwe (Southern Rhodesia)	1954 – 1956	0.98473

Notes: Countries above within the West African Currency Board included Ghana, Nigeria, and Sierra Leone; the East African Currency Board included Kenya; the Palestine Currency Board included Jordan; and the Southern Rhodesian Currency Board included Malawi, Zambia, and Zimbabwe.

National income data from the Penn World Table include the years 1967-1970 for Singapore, 1950-1967 for Mauritius, 1953-1959 for Jamaica, 1950-1966 for Kenya, 1990-2011 for Hong Kong, 1976-1979 and 1990-2011 for Bermuda, 1954-1964 for Jordan, 1954-1956 for Malawi, 1955-1958 for Zambia, 1954-1956 for Zimbabwe, 1950-1959 for Nigeria, and 1961-1964 for Sierra Leone; national income data from Mitchell's *International Historical Statistics* include the years 1948-1952 for Myanmar, 1931-1934 for Jamaica, and 1950-1957 for Ghana; national income data from the World Bank include the years 1960-1968 for the Bahamas, and 1960-1970 and 1972-1974 for Seychelles.

Because these databases contain national income measures for individual countries rather than regional currency boards, some of the values for the nations that were affiliated within a larger

currency board region may show skewed correlations. Nevertheless, judging from the overall calculations, the national income data and currency in circulation for the currency board episodes correlate well, with the minor exceptions being Jamaica from 1931-1934 and Sierra Leone from 1961-1964. These exceptions, however, are relatively few, and as a result, a relatively stable income velocity for the currency board episodes can be implied. With these arguments for a fairly stable velocity, I now continue to the calculations.

I use existing monetary data to calculate the year-over-year changes in national income for my list of currency boards. Furthermore, I break up the period 1929-1950 into two separate time frames, the first covering the years 1929-1938, or the Great Depression and the pre-World War II era, and the second covering the years 1939-1950, or World War II and after. The reason for the separate time frames is to recognize the possibility that velocity may have been more stable during the Great Depression era than during the wartime era.

1929-1938

The years 1929-1938 covered significant world events such as the Great Depression, while also serving as the prelude to World War II. As mentioned earlier, analyzing the timeframe separately makes sense due to these unique events. I now proceed to calculate the year-over-year percentage changes in national income for my list of currency board episodes for the period. The quantity equation is

$$MV = PT$$

Where M represents money supply, or in our case, the amount of currency in circulation within a region, V the velocity of circulation, P the price level, and T the volume of transactions taking place within an economy. Multiplying P, the price level with T, the volume of transactions within the regional economy will give us Y, or national income. Assuming a constant velocity, the yearly percent changes in velocity equals zero, effectively canceling out. What we are then left with is the year-over-year percent change of the money supply M, which in our case is the currency in circulation, which we can then equate to equal the year-over-year change in gross domestic product.

$$MV = Y$$
$$\Delta V = 0$$
$$\Delta M = \Delta Y$$

A table summarizing the year-over-year changes in national income during the period, along with an index using a base value of 100 for the year 1928, is shown below.

Table 2. Year-over-Year Changes in Nominal GDP, 1929-1938, Estimated from Currency Board Money (M0) (%)

Currency Board	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Bahamas	0.0	0.0	0.0	0.0	0.0	-33.3	0.0	0.0	0.0	8.2
Bermuda	107.5	58.1	68.6	-12.0	-11.7	-8.7	6.5	22.2	-6.4	5.2
British Guiana	0.0	0.0	0.0	0.0	0.0	0.0	5.0	9.5	8.3	7.7
Burma										
East African	-4.4	0.6	-8.1	-14.4	-10.6	7.1	8.6	2.8	19.7	17.6
Hong Kong									19.5	4.5
Iraq						37.2	16.9	4.3	29.5	-0.6
Jamaica	-6.9	NA	NA	20.0*	-14.5	6.3	10.1	3.7	14.1	7.5
Mauritius	4.5	-0.2	-49.2	-2.7	7.8	0.9	3.3	12.8	2.1	-9.2
Palestine	-5.3	22.9	7.8	1.6	17.1	44.2	30.9	17.1	-9.8	-11.0
Seychelles									26.8	
Singapore	-7.4	-17.4	-22.7	7.6	-2.0	7.4	3.9	4.0	23.2	
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Southern Rhodesian										
West African	-2.4	-8.1	-30.8	-4.1	5.5	-15.1	23.0	25.5	53.7	-6.3

Notes: The currency boards of Burma and Southern Rhodesia did not yet exist in this period. Hong Kong's currency board began so late in 1935 that its first representative year is 1936. The first annual data for Iraq's currency board are for 1933. The last full year of operation for the Solomon Islands currency board was 1936. Jamaica's 1932 figure is for the whole period 1930-1932. Data are as of the end of the financial year, which for some currency boards differed from the calendar year.

Table 3. Index of Estimated Nominal GDP, 1928-1938 (1928 or first available year = 100)

Currency Board	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Bahamas	100.0	100.0	100.0	100.0	100.0	100.0	66.7	66.7	66.7	66.7	72.2
Bermuda	100.0	207.5	328.1	553.2	486.7	429.5	392.0	417.4	509.9	477.4	502.4
British Guiana	100.0	100.0	100.0	100.0	100.0	100.0	100.0	105.0	115.0	124.6	134.2
Burma											
East African	100.0	95.6	96.2	88.4	75.7	67.7	72.5	78.7	80.9	96.8	113.9
Hong Kong									100.0	119.5	124.8
Iraq						100.0	137.2	160.3	167.3	216.5	215.2
Jamaica	100.0	93.1	NA	NA	105.2	89.9	95.6	105.3	109.2	124.6	133.9
Mauritius	100.0	104.5	104.3	53.0	51.6	55.6	56.1	57.9	65.3	66.6	60.5
Palestine	100.0	94.7	116.4	125.6	127.6	149.5	215.6	282.2	330.4	298.1	265.4
Seychelles									100.0	126.8	
Singapore	100.0	92.6	76.5	59.2	63.6	62.3	66.9	69.5	72.3	89.1	
Solomon Islands	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
Southern Rhodesian											
West African	100.0	97.6	89.0	61.6	59.1	62.4	53.0	65.1	81.7	125.6	117.7

It is important to note that some of the smaller currency boards held their currency in circulation constant for years at a time, notably the Bahamas from 1928-1933 and 1934-1937, British Guiana from 1928-1934, and Solomon Islands from 1928-1936. For these smaller episodes, using year-over-year changes in the circulation of currency to approximate the yearly changes in nominal gross domestic product is almost certainly not reliable. Having addressed these possibilities, I will now move on to analyze the balance of trade for the currency boards to confirm the validity of my calculations. To briefly recap, for an expanding economy, imports and exports should expand, with the amount of imports generally outweighing the number of exports. This is because countries tend to import more during an expansion to provide price competition and to increase supply to meet higher internal demands. For a shrinking economy, imports should generally shrink and if the balance of trade was in deficit it should turn to a surplus or at least less of a deficit. If the rest of the world is shrinking as well or if the price of a major export is falling however, exports may also shrink. A table summarizing the year-over-year changes in balance of trade for the currency boards followed by a table comparing the increase and decrease in both the balance of trade and yearly changes in currency in circulation are shown below. I have color-coded the results for greater clarity.

1929-1938

See the next pages for the tables.

Table 3. Year-over-Year Changes in Balance of Trade, 1929-1938 (%)

Currency Board	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Bahamas	-11.9	15.9	26.4	31.1	-5.7	21.0	2.4	-39.3	-44.0	6.2
Bermuda	-8.5	-16.1	88.7	-777.6	25.8	3.4	-6.0	-34.8	-16.9	13.2
British Guiana										
Burma										
East African										
Hong Kong										
Iraq										
Jamaica	-8.4	14.8	19.6	2.6	-21.9	13.8	22.3	-4.2	4.1	-13.6
Mauritius	181.7	-507.6	35.0	93.1	372.5	-393.5	52.0	138.8	10.5	-213.1
Palestine										
Seychelles	-5833.3	28.0	-90.6	733.3	-84.0	200.0	-33.3	312.5	-45.5	-177.8
Singapore										
Solomon Islands										
Southern Rhodesian										
West African	1563.5	-204.5	137.1	-186.6	112.0	751.0	-214.9	261.4	-102.5	-8524.1

Note: Data were not readily available in many cases.

Table 4. Comparison of Year-over-Year Changes in Currency Board Money (M0) and Balance of Trade, 1929-1938

Currency Board	1929		1930		1931		1932		1933		1934		1935		1936		1937		1938	
	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B
Bahamas											-	+							+	+
Bermuda	+	-	+	-	+	+	-	-	-	+	-	+	+	-	+	-	-	-	+	+
British Guiana																				
Burma																				
East African																				
Hong Kong																				
Iraq																				
Jamaica	-	-					+	+	-	-	+	+	+	+	+	-	+	+	+	-
Mauritius	+	+	-	-	-	+	-	+	+	+	+	-	+	+	+	+	+	+	-	-
Palestine																				
Seychelles																	+	-		
Singapore																				
Solomon Islands																				
Southern Rhodesian																				
West African	-	+	-	-	-	+	-	-	+	+	-	+	+	-	+	+	+	-	-	-

Note: The column "C" represents figures for the year-over-year changes in currency in circulation, while the column "B" represents figures for the year-over-year changes in balance of trade.

In general, we can observe that for most currency boards the currency in circulation, the proxy here for national income, fell from around 1929-1932, then in most cases rose from around 1933-1938. Judging from the common trend of growth and decline in national incomes that we see for the majority of the currency boards, and given the history of the global economy during the period, we can infer that common macroeconomic shocks hit these economies. The common trend is reassuring. The exception to this trend is Bermuda, which saw growth in the circulation of its currency from 1929-1931 and a fluctuation between growth and decline for the years thereafter. Narrative evidence such as the annual reports that British colonies issued confirms that the decline in national income for the majority of currency board systems from 1929-1932 was linked to the Great Depression and its global effects.

From 1933-1938, we see growth in currency in circulation, and by extension for national income, in currency board systems. The United Kingdom abandoned the gold standard in September 1931 and its economy began growing again soon afterwards. Most British colonial currency boards used the pound sterling as their anchor currency. In the United States the depression deepened until hitting bottom in 1933. In the currency board systems here, examining the trends in currency in circulation and the balance of trade, we can observe healthy fluctuations and adjustments in trade deficits and the economies overall.

After calculating the year-over-year percent changes in nominal gross domestic product for the currency board episodes and looking at the annual fluctuations in the balance of trades as well, it can be concluded that my calculations make much sense in light of the quantity theory of money and the assumption of a stable income velocity. I will now proceed to calculate and analyze the yearly percent changes in national income for the remaining years 1939-1950.

1939-1950

The years 1939-1950 cover the onset of World War II and its aftermath, and once again due to its distinct characteristics, treating it as a separate period makes for a clearer analysis. I will employ the same techniques I used before to calculate the year-over-year percent changes in national income.

A table summarizing the yearly percentage changes in national income during this period, along with an index continuing on from the previous period with the year 1928 serving as the base year with a value of 100 are shown below. Also shown is a table summarizing the year-over-year changes in the balance of trade along with a table comparing the increase and decrease in both the balance of trade and yearly changes in currency in circulation. Results are color-coded for greater clarity.

Table 5. Year-over-Year Changes in Nominal GDP, 1939-1950, Estimated from Currency Board Money (M0) (%)

Currency Board	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Bahamas	15.9	48.1	29.7	42.7	39.0	7.0	-5.3	35.9	23.6	1.4	5.4	4.1
Bermuda	-100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.3	20.4	-3.1	2.5
British Guiana												
Burma											48.3	-14.1
East African	8.2	0.0	6.6	18.7	70.9	50.3	15.5	14.3	-15.8	2.4	-6.6	15.4
Hong Kong	-6.5	3.4						67.7*	51.0	19.2	3.0	0.4
Iraq	-1.3	29.5	7.1	92.7	106.0	48.2	7.5	-1.0	-5.7	-10.8	1.7	
Jamaica	32.9		70.6*	257.4	45.1	40.6	26.6	19.5	-3.1	-0.5	1.2	10.2
Mauritius	0.0	0.0	0.0	0.0	0.0	0.0	14.7	3.5	3.6	5.6	2.6	11.2
Palestine	31.2	29.9	29.3	28.8	86.3	39.8	19.6	4.3	1.5	12.5		
Seychelles									7.1	-0.7	0.6	
Singapore											0.6	
Solomon Islands												
Southern Rhodesian			57.8	26.2	25.0	23.1	10.0	14.0	20.6	5.2	1.7	10.0
West African	-35.2	8.1	6.6	31.7	34.9	10.2	12.5	13.9	23.5	14.4	42.1	-2.4

Notes: Data for British Guiana exist but have not yet been digitized for this period; Burma's currency board did not begin until 1947; Hong Kong's currency board was in suspension during Japanese occupation from 1941 to 1945, so the 1946 figure is for the whole period 1940-1946; Iraq's currency board ended in 1949; the Solomon Islands currency board ended in 1937; and the Southern Rhodesian currency board did not begin until 1940. The Palestine Currency Board ceased to include Israel after 1948, so its 1949 and 1950 figures are excluded because they do not accurately reflect conditions in its remaining area of operation on account of redemptions from Israel. Jamaica's figure for 1941 is for the period 1940-1941. Data are as of the end of the financial year, which for some currency boards differed from the calendar year.

6. Index of Estimated Nominal GDP, 1939-1950 (1928 or first available year = 100)

Currency Board	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Bahamas	83.6	123.8	160.6	229.1	318.5	340.9	322.9	438.9	542.3	550.0	579.5	603.5
Bermuda	0.0							1958.6	1893.4	2280.2	2210.2	2264.6
British Guiana												
Burma										100.0	148.3	127.4
East African	123.2	123.2	131.3	155.9	266.4	400.3	462.3	528.3	444.6	455.3	425.2	490.9
Hong Kong	116.8	120.8					157.7	264.4	399.3	475.8	489.9	491.9
Iraq	212.3	275.0	294.6	567.6	1169.4	1733.2	1864.0	1846.2	1741.2	1552.3	1578.1	
Jamaica	177.9		303.5	1084.9	1574.6	2213.9	2802.9	3348.4	3244.0	3226.1	3265.3	3598.8
Mauritius						165.8	190.2	196.9	204.0	215.3	221.0	245.7
Palestine	348.3	452.6	585.0	753.3	1403.4	1962.5	2346.5	2447.3	2484.3	2793.9		
Seychelles								581.5	622.8	618.1	621.6	
Singapore										325.2	327.1	
Solomon Islands												
Southern Rhodesian		100.0	157.8	199.1	248.8	306.4	336.9	384.1	463.1	487.3	495.5	544.9
West African	76.3	82.5	87.9	115.7	156.1	172.1	193.5	220.5	272.4	311.5	442.7	432.0

Table 7. Year-over-Year Changes in Balance of Trade, 1939-1950 (%)

Currency Board	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Bahamas	6.8	-20.5	-17.4	11.7	-15.1	-13.8	-4.0				0.0	-26.8
Bermuda	10.2	13.9	-64.8	-82.9	41.6	4.3	1.1				-3.0	-14.7
British Guiana												
Burma												
East African												
Hong Kong											14.4	87.0
Iraq												
Jamaica	-23.9	-67.0	14.8	39.8	-99.2	-46.0	-3.8				13.1	-4.1
Mauritius	353.7	-343.2	295.6	-85.3	-50.9	-1947.0	-58.6				16.7	171.4
Palestine												
Seychelles	171.4	-30.0	-357.1	272.2	-193.5	69.0	-177.8					
Singapore												
Solomon Islands												
Southern Rhodesian												
West African	162.0	-115.6	418.2	-583.5	85.5	46.0	1689.9					237.0

Table 8. Comparison of Year-over-Year Changes in Currency Board Money (M0) and Balance of Trade, 1939-1950

Currency Board	1939		1940		1941		1942		1943		1944		1945		1946		1947		1948		1949		1950	
	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B
Bahamas	+	+	+	-	+	-	+	+	+	-	+	-	-	-									+	-
Bermuda	-	+																			-	-	+	-
Brit. Guiana																								
Burma																								
E. African																								
Hong Kong																					+	+	+	+
Iraq																								
Palestine																								
Jamaica	+	-					+	+	+	-	+	-	+	-	+	+					+	+	+	-
Mauritius													+	-	+	+					+	+	+	+
Seychelles																								
Singapore																								
Solomon Is.																								
S. Rhodesian																								
W. African	-	+	+	-	+	+	+	-	+	+	+	+	+	+									-	+

Note: The column "C" represents figures for the year-over-year changes in currency in circulation, while the column "B" represents figures for the year-over-year changes in balance of trade

For the most part, currency in circulation, or national income, grew year-over-year for all currency board episodes during this period. The common trend is once again reassuring, serving to greater validate my data and approach. The minor exceptions to the trend of positive year-over-year growth are the Bahamas in 1945, Bermuda in 1939 and 1949, and the West African Currency Board in 1939 and 1950. Overall, the trend of positive year-over-year growth in national income for the currency boards can be interpreted as a sign of economic recovery since the onset of the Great Depression that began in the early 1930s. For the years where we can observe a positive growth in both national income and balance of trade, heavily concentrated from around 1945 onwards, a positive growth in both regional and the global economy as a whole can be seen. For the rest of the years, we can observe a healthy leveling of the balance of trade deficits for both positive and negative year-over-year changes in national income coupled with both positive and negative year-over-year changes in the balance of trades. The only outliers where the data can seem questionable are the Bahamas in 1945 and Bermuda in 1949 where a negative year-over-year change in national income coupled with a negative year-over-year change in the balance of trade can be seen. Although the negative changes in both national income and the balance of trade may seem out of place in a period marked with such economic prosperity, it is worth noting that the actual percentage declines during these years for both variables are relatively small. In addition, following years of continued economic expansion and prosperity, it may not be too surprising to see a momentary stall in the growth of the economies as well.

Judging from the data during this period, overall, a relatively stable income velocity can be observed – and in light of a stable income velocity, my calculations for the timeframe seem to be comparably valid as well.

Conclusion

Using the quantity theory of money as inspiration, I attempted to produce rough estimates of year-over-year changes in national income for currency board episodes that neither the Maddison Project, Mitchell's *International Historical Statistics,* Penn World Table, nor the International Monetary Fund's *International Financial Statistics* covered for the years 1929-1950. According to my data and calculations, it is reasonably safe to conclude that monetary data showed a correspondence to gross domestic product, and that currency in circulation could be used to roughly estimate year-over-year percentage changes in national income. Judging from the correlation between currency in circulation and gross domestic product and year-over-year percent changes in national income and balance of trade, a stable velocity can be hypothesized for the currency boards for the periods 1929-1938 and 1939-1950 as well.

The numbers from this exercise should be taken with a large grain of salt. They rest on simplifying assumptions that seem plausible but may be disproved by deeper research. They are valuable, though, as "top-down" first estimates of nominal GDP growth for cases where the data necessary for building "bottom-up" estimates sector by sector are missing or have not yet been mined from archives.

Appendix

Table A1. Monetary Base, 1928-1938 (local currency units, typically equal to pounds sterling)

Currency Board	1928	1929	1930	1931	1932	1933
Bahamas	110,000	110,000	110,000	110,000	110,000	110,000
Bermuda	40,000	83,000	131,223	221,289	194,690	171,817
British Guiana	104,166	104,166	104,166	104,166	104,166	104,166
Burma						
East African	5,275,063	5,043,041	5,073,937	4,664,405	3,993,274	3,569,171
Hong Kong (millions)						
Iraq						2,248,185
Jamaica	87,042	81,044	NA	76,293	91,572	78,294
Mauritius	14,132,970	14,770,750	14,747,250	7,489,290	7,287,300	7,854,365
Palestine	1,887,348	1,787,664	2,197,664	2,369,664	2,408,664	2,821,664
Seychelles						
Singapore	136,050,161	126,012,323	104,044,756	80,477,188	86,564,993	84,790,745
Solomon Islands	4,637	4,637	4,637	4,637	4,637	4,637
Southern Rhodesian						
West African	15,228,639	14,862,137	13,661,864	9,456,456	9,072,037	9,572,014

Currency Board	1934	1935	1936	1937	1938
Bahamas	73,400	73,400	73,400	73,400	79,400
Bermuda	156,816	166,943	203,943	190,943	200,943
British Guiana	104,166	109,375	119,792	129,791	139,791
Burma					
East African	3,822,433	4,151,668	4,265,914	5,107,126	6,005,930
Hong Kong (millions)			149	178	186
Iraq	3,084,365	3,604,321	3,760,313	4,868,312	4,838,301
Jamaica	83,214	91,643	95,014	108,458	116,550
Mauritius	7,922,045	8,182,500	9,227,500	9,417,485	8,547,485
Palestine	4,069,664	5,326,228	6,236,135	5,626,134	5,009,134
Seychelles			392,602	497,976	
Singapore	91,048,841	94,614,029	98,375,227	121,236,424	
Solomon Islands	4,637	4,637	4,637		
Southern Rhodesian					
West African	8,128,380	9,995,246	12,540,159	19,269,111	18,056,741

Notes: The currency boards of Burma and Southern Rhodesia did not yet exist in this period. Hong Kong's currency board began so late in 1935 that the first representative year is 1936. The first annual data for Iraq's currency board are for 1933. The last full year of operations for the Solomon Islands currency board was 1936.

Sources (also Table A2): Mainly data from Krus and Schuler (2014), which at the time this paper was being written was still unissued and missing certain data. Krus and Schuler take their data from currency board annual reports. Data are as of the end of the financial year, which for some currency boards differed from the calendar year.

Table A2. Monetary Base, 1939-1950 (local currency units, typically equal to pounds sterling)

Currency Board	1939	1940	1941	1942	1943	1944
Bahamas	92,000	136,220	176,620	252,020	350,370	374,970
Bermuda	NA	NA	NA	NA	NA	NA
British Guiana						
Burma						
East African	6,500,377	6,499,776	6,927,203	8,223,676	14,055,375	21,118,518
Hong Kong (millions)	174	180	NA	NA	NA	NA
Iraq	4,773,297	6,183,293	6,623,291	12,760,789	26,290,808	38,965,831
Jamaica	154,843	NA	264,193	944,338	1,370,581	1,927,000
Mauritius						23,437,180
Palestine	6,574,134	8,541,635	11,040,635	14,216,635	26,487,675	37,038,700
Seychelles						
Singapore						
Solomon Islands						
Southern Rhodesian		1,820,401	2,871,901	3,624,449	4,530,008	5,578,319
West African	11,705,395	12,651,418	13,483,382	17,753,438	23,950,869	26,401,717

Currency Board	1945	1946	1947	1948	1949	1950
Bahamas	355,150	482,800	596,500	605,000	637,400	663,800
Bermuda	NA	783,422	757,346	912,096	884,096	905,846
British Guiana				1,874,166	1,909,583	1,964,791
Burma				16,210,333	24,038,001	20,644,894
East African	24,384,463	27,869,680	23,455,417	24,016,043	22,431,984	25,895,474
Hong Kong (millions)	235	394	595	709	730	733
Iraq	41,905,602	41,505,588	39,145,722	34,899,272	35,478,035	
Jamaica	2,439,702	2,914,505	2,823,608	2,808,099	2,842,163	3,132,457
Mauritius	26,887,180	27,827,063	28,826,835	30,426,835	31,226,835	34,726,235
Palestine	44,287,193	46,188,142	46,887,894	52,730,105	25,954,034	16,360,573
Seychelles		2,282,796	2,444,931	2,426,696	2,440,297	
Singapore				442,450,647	445,066,615	
Solomon Islands						
Southern Rhodesian	6,133,539	6,991,257	8,430,147	8,870,147	9,020,147	9,920,183
West African	29,692,788	33,825,406	41,787,243	47,786,412	67,927,141	66,276,841

Notes: Data for British Guiana for this period exist but have not yet been digitized for this period, and similarly for Jamaica in 1941. The first annual data are from 1940 for Southern Rhodesia's currency board and 1948 for Burma's. Hong Kong's currency board was in suspension during Japanese occupation from 1941 to 1945, so the 1946 figure is for the whole period 1940-1946. Iraq's currency board ended in 1949. The last full year of operation for the Solomon Islands currency board was 1936. The Palestine Currency Board ceased to include Israel after 1948, so its 1949 and 1950 figures are excluded because they do not accurately reflect conditions in its remaining area of operation on account of redemptions from Israel.

Table A3. Balance of Trade, 1928-1938 (typically pounds sterling)

Currency Board	1928	1929	1930	1931	1932	1933
Bahamas	-1,557,000	-1,743,000	-1,465,000	-1,078,000	-743,000	-785,000
Bermuda	-1,440,000	-1,563,000	-1,815,000	-205,000	-1,799,000	-1,334,000
British Guiana						
Burma						
East African						
Hong Kong						
Iraq						
Jamaica	-2,231,000	-2,418,000	-2,060,000	-1,657,000	-1,614,000	-1,968,000
Mauritius	-339,000	277,000	-1,129,000	-734,000	-51,000	139,000
Palestine						
Seychelles	60,000	25,000	32,000	3,000	25,000	4,000
Singapore						
Solomon Islands						
Southern Rhodesian						
West African	219,000	3,643,000	-3,808,000	1,413,000	-1,224,000	147,000

Currency Board	1934	1935	1936	1937	1938
Bahamas	-620,000	-605,000	-843,000	-1,214,000	-1,139,000
Bermuda	-1,288,000	-1,365,000	-1,840,000	-2,151,000	-1,868,000
British Guiana					
Burma					
East African					
Hong Kong					
Iraq					
Jamaica	-1,697,000	-1,318,000	-1,374,000	-1,318,000	-1,497,000
Mauritius	-408,000	-196,000	76,000	84,000	-95,000
Palestine					
Seychelles	12,000	8,000	33,000	18,000	-14,000
Singapore					
Solomon Islands					
Southern Rhodesian					
West African	1,251,000	-1,438,000	2,321,000	-58,000	-5,002,000

Sources (also Table A4): Mainly Haimann and Yasin (2012), who take data from the British Board of Trade's annual statistical abstract for the British Empire / Commonwealth.

Table A4. Balance of Trade, 1939-1950 (typically pounds sterling)

Currency Board	1939	1940	1941	1942	1943	1944
Bahamas	-1,061,000	-1,278,000	-1,501,000	-1,326,000	-1,526,000	-1,736,000
Bermuda	-1,677,000	-1,444,000	-2,379,000	-4,352,000	-2,542,000	-2,432,000
British Guiana						
Burma						
East African						
Hong Kong						
Iraq						
Jamaica	-1,855,000	-3,098,000	-2,641,000	-1,591,000	-3,169,000	-4,626,000
Mauritius	241,000	-586,000	1,146,000	169,000	83,000	-1,533,000
Palestine						
Seychelles	10,000	7,000	-18,000	31,000	-29,000	-9,000
Singapore						
Solomon Islands						
Southern Rhodesian						
West African	3,103,000	-483,000	1,537,000	-7,432,000	-1,079,000	-583,000

Currency Board	1945	1946	1947	1948	1949	1950
Bahamas	-1,806,000	NA	NA	-4,100,000	-4,100,000	-5,200,000
Bermuda	-2,405,000	NA	NA	-6,600,000	-6,800,000	-7,800,000
British Guiana						
Burma						
East African						
Hong Kong				-30,600,000	-26,200,000	-3,400,000
Iraq						
Jamaica	-4,800,000	NA	NA	-8,400,000	-7,300,000	-7,600,000
Mauritius	-2,432,000	NA	NA	600,000	700,000	1,900,000
Palestine						
Seychelles	-25,000	NA	NA			200,000
Singapore						
Solomon Islands						
Southern Rhodesian						
West African	9,269,000				-18,100,000	24,800,000

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