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THE DEVELOPMENT OF MONETARY INSTITUTIONS IN AUSTRALIA FROM FEDERATION TO THE SECOND WORLD WAR

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SUMMARY

The development of monetary institutions and policy in Australia from Federation to the Second World War is summarized, and estimates of the revenue raised by seigniorage are presented. The amount of this revenue, net of the costs of operating the central bank and net of its contribution to the off-budget expenditures of the Commonwealth government, was small. Nevertheless, seigniorage made an important contribution to the Commonwealth government's liquidity in three crisis periods: the two World Wars and the years 1929-32. Subsequent unanticipated inflation helped to erode the real value of the bonds and Treasury bills issued by the Commonwealth government to finance the budget deficits which it ran during these crises.

Two types of evidence are presented in defence of the main claim of this paper, which is that the dominant influence on the changes to financial institutions was the continuing desire of the Commonwealth government to expand the revenue from seigniorage. First, all the important changes in the laws and regulations relating to monetary institutions in this period operated in the same direction: they helped to expand this revenue. Second, the biggest changes occurred in the periods of crisis, when the Commonwealth's need for revenue was most acute. The institutional changes which were induced by these crises survived long after the crises were over.

I. Introduction

In this paper it is argued that the important unifying feature, shared by all the main changes to monetary institutions in Australia between Federation, in 1901, and the end of the Second World War, is that they helped the government of the new Commonwealth to establish, and then to expand, seigniorage - the revenue from money creation.

In monetary systems based on the use of precious metals, the seigniorage derived by the government is equal to the excess of the premium which it charges for minting coins over the costs of operating the mint. This revenue can be greatly increased by switching from a metallic standard to paper money. By inflating the supply of its fiat money liabilities, on which the nominal interest rate is zero, a government is able to operate a form of taxation which differs only in appearances from more conventional taxes. The evidence from historical examples of free banking is consistent with the view that, in the absence of government restrictions, non-interest-bearing private money can coexist with interest-bearing bonds. However, since there are natural economies of scale in operating a monetary system, which arise from the inconvenience of using several units of account, it is not hard for a government to devise legal restrictions which give it a near monopoly over the supply of money.[1]

At the time of Federation, the money used in Australia was issued not by the Commonwealth government, but by the trading banks, the Queensland Treasury and the State mints.[2] The newly created Commonwealth government was therefore in a situation which no sovereign government could be expected to tolerate for long: it obtained no revenue from seigniorage. In order to establish a monopoly over the money supply, the Commonwealth government had first to create its own currency and then to drive out the competing private bank notes and the Queensland Treasury notes. This was relatively easy, and was achieved within the first decade after Federation. The next step in the process of monopolizing the money

supply was to eliminate private holdings of gold and sterling. This process was begun during the First World War and was largely, but not entirely, completed during the Great Depression.

Given the difficulties in establishing effective cartels in rapidly growing markets, it is not surprising that the private banks appear *not* to have derived supernormal profits from issuing notes in the period before the Commonwealth took over the note issue.[3] To derive substantial revenue gains, it was necessary for the Commonwealth government not merely to monopolize the money supply, but also to inflate it. However, inflation was not something Australia could adopt on its own, as long as it remained on the gold standard. Besides, the legislation of 1910-11, which controlled the issuing of Australian notes, contained an additional constraint which appeared to limit the government's ability to engage in inflationary finance: the authorities were required to maintain a gold reserve of at least 25 percent of the notes issued. Passing a law to reduce this legal requirement would have diminished the confidence of the public and of foreign creditors in the continuing stability of the currency.

Means were found to circumvent all the constraints on inflationary finance described above. To the extent that all the gold standard countries were able to devise ways - such as the development of central banking and the centralization of gold holdings - of economizing on gold, it was possible for them to inflate together, as they did in the period between 1914 and the restoration of the gold standard in 1925.

Section II below shows how the Commonwealth government was able, during the First World War, to participate in this inflationary process, despite the apparent constraint of having to hold a 25 percent gold reserve against notes issued: it effectively requisitioned most of the gold holdings of the non-bank private sector and some of those of the banks. Section III shows how the process was continued after the first World War; the development of central banking in Australia not only

provided the government with an agency for pursuing an active monetary policy, but also provided a second method of circumventing the requirement that notes be backed by gold: central bank deposit liabilities were part of the monetary base, but did not need to be backed by gold. Finally, the constraint of a permanently fixed exchange rate was abandoned in the 1930s: Australia devalued by 25 percent against the pound sterling, which had in turn depreciated from the its traditional gold standard value of $4.87, to around $3.40 in the late 1930s. The Australian price level (GDP deflator), which had fallen by about 15 percent in the half century before the Commonwealth took over the note issue, more than doubled in the next 35 years; this increase was itself very modest compared to the more than ten-fold inflation in the following 35 years, from 1946 to 1981.[4]

The effects of the events summarized above can be clearly seen in Figure 1, which plots the path of the monetary base, "BASE", and of that part of the monetary base which represents the liabilities of the Commonwealth, "CWGBASE".[5] The importance of the distinction between these variables is that it was only the expansion of the latter which provided a source of revenue for the Commonwealth government. Increases in Australian private sector holdings of gold and London funds, which were the main components of the base which were not liabilities of the Commonwealth government, resulted partly in seigniorage revenue for Britain, partly in capital gains for all owners of gold, and partly, perhaps, in increased monopoly profits for the London banks.

Between 1901 and 1945 there was a 15-fold expansion of the monetary base and the ratio of CWGBASE to BASE grew from zero to 97 percent. Figure 1 clearly reveals that both these large changes were concentrated in three crisis periods: the two World Wars and the onset of the Great Depression. Although Commonwealth governments did not consciously plan far ahead in the process by which their revenue from seigniorage was expanded, the process was not haphazard: most of the important changes

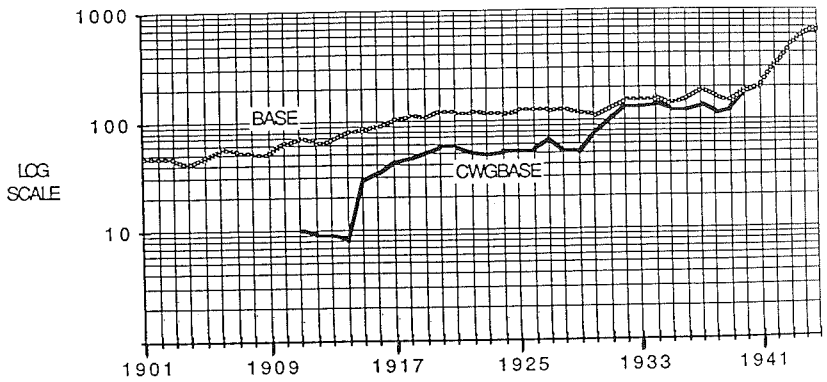

FIGURE 1: MONETARY GROWTH IN AUSTRALIA, 1901-45

Note: BASE is the monetary base; CWGBASE is the part of the monetary base which was a liability either of the Commonwealth government or of the Commonwealth Bank. Before 1911 CWGBASE was zero; after 1940 the differences between the two series are too small to depict in this figure.

Full definitions and sources are given in the Appendix.

occurred in periods of crisis, when the urgent short-term needs of the government to finance budget deficits and to acquire foreign exchange led to increased regulatory controls over the financial system.

It is argued here that the institutions and regulatory arrangements which were established in these periods of crisis added to the government's revenue and to its control over monetary policy only at the cost of reduced economic efficiency: the revenue actually raised through seigniorage was quite small, but the costs were large. Seigniorage did make important contributions to the Commonwealth's liquidity in the periods of crisis, and its costs might perhaps have been justified, if the institutional changes had been temporary: other ways of raising the large amounts of revenue needed during these crises would also have involved high rates of distorting taxes. But in fact, even when the initiating crises were long since over, governments proved reluctant to give up any existing source of revenue. An additional factor which operated in defence of the new institutions and bureaucracies was their instinct for self-preservation.[6]

The inefficiencies created by the Commonwealth's expansion of seigniorage took two forms: first, the money supply was inflated at a rate which was, on average, inefficiently fast.[7] Second, the financial system was forced into a straightjacket of direct controls from which it was not freed until the 1980s. In addition to establishing a monetary monopoly for the Commonwealth, these controls also forced the banks to hold more base money than they would otherwise have held.

This paper is organized as follows: the period from Federation to the end of the Second World War is split up into three sub-periods which are covered in sections II, III and IV. These sections summarize the main institutional changes[8] and analyze how these changes affected the revenue from seigniorage; section V provides estimates of the revenue derived from seigniorage. Concluding comments are given in section VI.

II. From Federation to the end of World War I

The International Gold Standard

S.51 (XII) and (XIII) of the Constitution gave the Commonwealth Parliament power to make laws with respect to currency, coinage, legal tender and banking, other than state banking. The potential seigniorage offered by these powers remained unused for the first eight years after Federation. During this period, the Australian monetary systen remained largely as it had been at the end of the colonial period: in addition to bank deposits, the money supply consisted of gold coins, the notes issued by the Queensland Treasury and the notes issued by the private trading banks. Mints had been established in Sydney, Melbourne and Perth during the nineteenth century. The sovereigns which they issued in exchange for gold bullion had the same gold content as the sovereigns issued by the Bank of England: each sovereign contained 113.1 grains of fine gold, or 123.27 grains of standard gold (11/12 fine).[9] Since the US dollar was defined to be 23.22 grains of fine gold, the parity rate of exchange was $4.87 per pound.

The first successful moves to transform the monetary system into a source of Commonwealth revenue were those of the Labour government of Andrew Fisher.[10] The first step, which was achieved by the Coinage Act of 1909, was to define Australian coins. However, since the Australian pound had the same gold content as the British pound, and since there were no limits in either country to the amount of gold which could be sold to a mint at £3/17/10½ per ounce standard, the two pounds were regarded as a single currency.[11]

The Fisher government's next major monetary reforms were the Australian Notes Act, 1910, the Bank Notes Tax Act, 1910, and the Commonwealth Bank Act, 1911. The first two of these acts provided for the issuing of notes by the Commonwealth Treasury, and the imposition of a prohibitive tax on new issues and re-issues of private bank notes. In effect, the Treasury

acquired a monopoly over the right to issue notes, subject to the restriction that it keep a gold reserve equal to 25 percent of the notes issued up to £7 millions, and 100 percent of the notes in excess of this amount. An amending act of 1911 removed the 100 percent gold requirement for notes in excess of £7 millions: after 1911 the required gold reserve was simply 25 percent of the note issue. The last of the acts listed above established the Commonwealth Bank as a nationalized trading and savings bank, which initially had no important central banking functions.

Monetary arrangements during World War I

The financial pressures of the First World War led to the abandonment of the gold standard: the right to export gold was withdrawn and notes were made inconvertible *de facto*, though not *de jure*. In addition, the gold holdings of the public and a large part of the gold holdings of the banks were requisitioned by the Treasury and notes replaced gold in interbank settlements. These developments increased the Australian government's revenue from seigniorage by increasing both the base and the rate of the inflation tax: by nationalizing most private gold holdings, the Treasury was able to undertake a sixfold expansion of the note issue between June 1914 and June 1919, without breaching the 25 percent gold reserve requirement.[12] The total expenditure on the war by the Australian government was £311 millions, of which only £46 millions were met from revenue, implying a deficit of £265 millions; of this amount, £194 millions were funded domestically and £92 millions were met by overseas borrowing.[13] The increase in the note issue between June 1914 and June 1919 was £46 millions, which is equal to the whole of the revenue raised by direct taxation. During this period, at least, the contribution of seigniorage to total revenue was substantial.

Technically, the public's legal right to convert Australian notes into gold was not removed until 1929. However, from 1914 onwards, the

government made it impossible for the public to exercise this right; or at least not possible without a legal challenge, which never occurred. The government was only legally required to convert notes at the Treasury in Melbourne. It closed the facilities for conversion at all other centres and simply refused to convert at the Treasury, saying that this was "by arrangement with the banks."[14] Non-bank private holdings of gold were either passed to the banks, in the normal course of circulation, or else disappeared into private hoarding. The banks were given a strong incentive, described below, to retain gold whenever it was paid to them by their customers and to refuse to give their customers gold in exchange for notes.

In June 1914 the note issue was £9.5 millions and the ratio of gold in the note issue reserve to notes was 43 percent. In September 1914 the government announced a "three-for-one" proposal: the banks were asked by the government to supply £10 million in sovereigns, which were to be obtained by using notes in place of gold in interbank settlements and by removing gold from circulation by refusing to convert notes into sovereigns for the public. The government offered to give the banks three pounds, in notes, for every sovereign which the banks surrendered; the resulting debt of two pounds per sovereign was to be repaid by the banks within one year of the end of the war.

The three-for-one issues provided the government with a mechanism for requisitioning part of the gold holdings of the banks, and for providing the banks with an incentive to withdraw from circulation and surrender to the government any gold which they received from the public in the course of their business. The interest rates on the debts which the banks incurred to the Treasury under these arrangements were set at about 1 percent per annum below the interest rates on government bonds; therefore, in the absence of any expected appreciation in the price of gold, it would have been in the interest of the banks to surrender their gold. It appears, however, that the anticipation of an increase in the

price of gold outweighed these interest rate incentives, and that the banks only surrendered their gold reluctantly: Blainey records that the chief manager of the National Bank of Australasia wrote that "we must make a virtue of necessity by offering the Government something, though reluctantly, with as good a grace as can be mustered, lest a worse thing befall us." Blainey suggests that the "worse thing" was compulsory acquisition of all bank gold.[15] Further evidence that the banks did not surrender their gold willingly is provided by the fact that the amounts of the gold to be provided to the government were divided up among the individual banks according to quotas based on the size of each bank's deposits.

The difference between the interest rates on bonds and on the debts which the banks incurred under the three-for-one issues, provides a minimum estimate of the incentive to the banks to collect gold from their customers: for every 100 sovereigns collected from their customers and surrendered to the Treasury, the banks could acquire £200 of matching assets and liabilities, with the assets paying about £2 per annum more than the interest on the liabilities. To the extent that the banks were constrained to hold less gold than they would have freely chosen, this calculation underestimates the true incentive to the banks not to surrender gold to their customers in exchange for notes at par.

The ultimate significance of the three-for-one issues is that, by helping to centralize the country's stock of gold in the hands of the Treasury, they enabled the government to finance expenditure by printing notes, without breaching the requirement that the Treasury hold a gold reserve equal to at least 25 percent of the notes on issue. Immediately after the banks had surrendered sovereigns worth £10 millions to the Treasury, they would have received £30 millions in notes and would have incurred a long-term debt of £20 millions. The Treasury could then issue bonds worth £20 millions, knowing that the banks, with their excess liquidity and increased long-term debts, had an incentive to purchase

them: by buying all £20 millions of the newly-issued bonds, the banks would have exactly restored their initial liquidity situation. This would have left the Treasury with an increase of £10 millions in both the note issue and the note reserve; in principle, it could then have financed an additional £30 millions of expenditure by printing notes, without breaching the 25 percent gold reserve requirement.

In the event, the Treasury maintained the ratio of gold reserves to notes well above the minimum legal requirement of 25 percent; it was presumably in order to keep the actual ratio safely above this minimum legal requirement, that the government's chosen scheme involved issuing three notes per sovereign, rather than four. When the banks complied with the government's demand for sovereigns, the Treasury initially expanded the note issue by only £18 millions, which was lent to the States. However, by June 1915, the note issue had been increased to £31.2 millions, from £9.6 millions in June 1914. But even in June 1915 the ratio of the Treasury's note issue reserve of gold to notes in circulation was 35 percent - well above the minimum legal requirement of 25 percent. In September 1916 the banks provided the Treasury with another £5 millions in sovereigns. As a result of its acquisition of the gold of the public and the trading banks, the Treasury was able to increase its Note Issue Reserve from £4 millions in June 1914, to £24 millions in 1919. The six-fold increase in the note issue over the period June 1914 to June 1919 was therefore achieved with no change in the ratio of the Note Issue Reserve to the note issue.

The expansion of the note issue led to domestic inflation. The effects of this inflation on the balance of payments were contained by the prohibition of gold exports, which came into force in July 1915. The official exchange rate between the dollar, which retained its traditional value in terms of gold throughout the war, and the Australian and British pounds fell from the pre-war parity of $4.87 per pound to $4.76 per pound.

III. Monetary institutions between the wars

The development of a Central Bank

The Commonwealth Bank Act of 1911 was amended in 1920 and again in 1924. These amendments helped to further the transformation, initiated by the financial pressures of the war, of the Commonwealth Bank from a nationalized trading and savings bank into a central bank.[16] The amendment of 1920 transferred the control of the note issue from the Treasury to an independent Notes Board, which, though nominally part of the Commonwealth Bank, was not under the control of the Bank, even though the Governor of the Commonwealth Bank was also Chairman of the Notes Board. The amendment of 1924 abolished the Notes Board and ended this separation of functions within the Bank: the control of the note issue was given to a newly created Note Issue Department of the Commonwealth Bank. The 1924 amendment also provided for the trading banks to settle among themselves using deposits at the Commonwealth Bank. Before this time the trading banks had only kept very small deposits at the Commonwealth Bank and had used gold in interbank settlements. Their deposits at the Commonwealth Bank rose from £A 21,000 in December 1924 to £A 20.8 millions in December 1930.[17]

As well as providing the government with an institution capable of operating an active monetary policy, the creation of a central bank also provided it with a way of circumventing the apparent constraint on inflationary finance, contained in the requirement that the note issue be backed by a 25 percent gold reserve. In this respect, the enlargement of the Commonwealth Bank's central banking functions resembled the system of three-for-one issues, described in section II. For every £1000 note surrendered by the trading banks, in exchange for deposits at the Commonwealth Bank, the Treasury was able to finance £1000 of expenditure, without an increase in the ratio of the note issue to the gold reserve, merely by selling bonds to the Commonwealth Bank.

The Floating Exchange Rate Period, 1919-25.

The ban on Australian gold exports, which had been imposed in July 1915, was reaffirmed in February 1922 and not revoked until April 1925. When British exchange controls were relaxed at the end of the war, sterling quickly depreciated from the wartime parity of $4.76 per pound to about $3.50. Between 1919 and 1925, when Britain went back onto the gold standard at the old parity, the sterling-dollar exchange rate fluctuated greatly; by comparison, the fluctuations between the Australian and British pounds were much smaller and the fluctuations between the Australian pound and the dollar were therefore correspondingly large.

On a day-to-day basis, the Australian exchange rate was set by the trading banks, acting as a cartel. The relative short-run stability of the £A in terms of sterling was due to the banks' implicit confidence that the authorities would keep the long-run rate of growth of the domestic cash base at a rate which was compatible with parity with sterling.

On two occasions, however, this system came under strains which forced the Australian exchange rate to move significantly away from parity with sterling. The first occasion was in 1920-21: there had been a poor season for wheat in 1919-20 and the current account deficit in that year was about £25 millions; the next season was a poor one for wool.[18] Tariffs were substantially increased in 1920-21, but this did little to cure the immediate problems in the exchange market. Under the pre-1915 arrangements the banks would have found it profitable to restore their liquidity in London by exporting gold, and the resulting drain on Australian liquidity would have tended to eliminate the trade deficit by depressing domestic prices and activity. With this automatic adjustment mechanism rendered inoperative by restrictions on gold exports, the trading banks had only two ways in which to protect their dwindling London funds: they rationed their customers' access to sterling and they depreciated the exchange rate: in March 1921 sterling was at a premium

of 6 percent.

The exchange market problems of 1920-21 were eventually resolved by the economy's response to the tariff increase of 1920-21, by the boost to exports of several good seasons and by a large increase in public borrowing overseas by the State governments. By 1924-25, these effects had produced a substantial balance of payments surplus, as a result of which the trading banks had excessive London funds, but inadequate domestic liquidity. In particular, the level of notes and coins in Australia was low in relation to the levels of deposits and national income. Attempts by the non-bank private sector to restore a normal level of notes to deposits resulted in a severe depletion of the trading banks' cash reserves in Australia.

Although exports of gold had been banned during the First World War, imports of gold had not been banned. Gold could not be imported from Britain, which had itself banned gold exports, but there were no legal impediments to importing gold from California. Since gold could still be minted into sovereigns, the gold-standard-ceiling on the dollar value of the Australian pound continued to exist long after the gold-standard-floor on its dollar value had been removed. In the immediate post-war years the dollar value of the floating Australian pound was well below this ceiling, but in 1924-25 the strength of the Australian balance of payments caused it to be approached, and eventually reached.

The events of 1924-25 illustrate how the earlier institutional changes had affected the operation of the Australian monetary system. Under the pre-1910 gold standard arrangements, the trading banks would have issued their own notes, while allowing their holdings of gold in Australia to be augmented, either by importing gold or by exporting a smaller proportion of the newly mined gold. This would have largely, but not entirely, eliminated the appreciation of the exchange rate and the amount of gold imported. However, this method of restoring stability had been closed off by monopolisation of the note issue by the Notes Board

and by the British ban on gold exports. As a result, the exchange rate appreciated against sterling by more in 1924-25 than it would have done under the same external circumstances if the trading banks had not lost the right to issue notes.

Despite requests from the trading banks to expand the note issue, the Notes Board actually sold securities in order to reduce it. By April 1925 these open market sales had amounted to £3.5 millions. Giblin attributed these policies to the fact that during the period 1922-24 the Notes Board contemplated restoring the pre-war parity against gold, even before the restoration of the gold parity of sterling.[19] South Africa did in fact go back on the gold standard before Britain. The appreciation of the Australian pound in late 1924, and the problems which the liquidity crisis created for financing exports, were extremely unpopular with wool growers and wheat farmers and led to a conflict between the governing coalition, which included the Country Party, and the Notes Board. This conflict contributed to the government's decision to abolish the Notes Board.

The consequence of the build-up of London funds and the depletion of domestic liquidity was that the cartel of trading banks quoted sterling at a substantial discount: the banks' buying rate, which had reached £A 101 per £Stg 100 in December 1920, fell to £A 100/15/- in December 1921. In November 1922 it was down to £A 98/15/- and by October 1924 it had fallen to £A 96/10/-. At these rates it was profitable to import gold bullion from South Africa and California and have it minted into sovereigns. Such gold imports did in fact take place in 1924. Partly as a result of these gold imports, and partly as a result of the appreciation of sterling relative to gold, the dilemma of whether to aim at parity with gold or with sterling disappeared. Britain, Australia and New Zealand all went back onto the gold standard at the end of April 1925.

The events of 1924-25 demonstrated the capacity of the monetary authorities, in this instance the Notes Board and the Commonwealth Bank,

to conduct monetary policies to strengthen the balance of payments. It provides strong evidence against the claim that an official monetary policy in Australia was not possible because of the small size of the Commonwealth Bank, relative to the trading banks, or because of the absence of a well organised short-term money market. It also confirms that, as long as gold could be imported and minted into sovereigns, the only lasting effects of contractionary monetary policies would be on the level of foreign exchange reserves, and not on domestic prices. This limitation on the power of monetary policy under the gold standard was imposed by the fixed exchange rate system itself, not by the small size of the Commonwealth Bank, or by the lack of a sophisticated market for bills.

The Gold Standard period, 1925-29

The stability of the gold standard before 1914 had depended in part on the fact that all gold standard countries held substantial reserves of gold, so that transitory payments deficits in any particular country did not pose an immediate threat to its ability to remain solvent during the period in which the system's automatic corrective forces were taking effect. The significant difference between this system and the version of the gold standard which briefly operated after 1925 was that the growth in prices and in real incomes in countries such as the United States, which remained on gold throughout the First World War, and Britain, South Africa, Australia and New Zealand, which returned to gold at the pre-war parity, meant that gold reserves, on average, were much lower in relation to the world money supply and to the value of world trade and output than they had been before 1914.[20]

To some extent, this problem was overcome by the development of central banking: it was possible for countries to economize on gold holdings by replacing non-bank holdings of gold coins by notes; by requiring interbank settlements to be made using notes or central bank deposits; and by centralizing national gold reserves in the vaults of the central

banks. The growth of central banking in Australia in the 1920s was therefore not an isolated phenomenon, but the local reflection of a much wider trend.[21] In effect, these policies held the price of gold, in terms of goods and notes, at artificially low levels by restricting the use and availability of gold. But such regulations were inadequate, both because the gold reserves, even when concentrated in the vaults of the central banks, were too small to provide adequate buffers against transitory payments imbalances, and because individuals - and countries - which realised that the price of gold was artificially low, had an incentive to try to build up their own holdings. France pursued policies of increasing its central bank holdings of gold to such an extent that by 1931 the Bank of France held nearly one fifth of the world's supply of monetary gold.[22] Any substantial shock to the post-1925 gold standard might have brought it down. The shock which it actually encountered was the Great Depression.

Australia's abandonment of the Gold Standard, 1929-31

Australia was in a particularly vulnerable situation in the late 1920s because its export earnings were heavily concentrated in a narrow range of primary products and because the States had built up large debts through overseas borrowings. Australian export prices, measured in sterling, fell by about 60 percent in the period 1928-31.[23] At the same time it became necessary to reduce, rather than to continue increasing, the level of government overseas indebtedness. The London funds of the major private trading banks, seasonally adjusted, which had reached a peak at over £A 40 millions in 1928, were down to a mere £A 9.5 millions by December 1929. The gold reserves of the trading banks also declined sharply in 1929, particularly in the second half of the year.

The Scullin Labour government, which took office in October 1929, was immediately faced with an acute problem in attempting to service Australia's foreign debts. The eventual solution to this problem involved the abandonment of the gold standard; devaluation against

sterling; the requisitioning of the gold holdings of the trading banks; and the partial requisitioning of their London funds. These changes increased the proportion of Commonwealth liabilities in the money base from 45 percent in June 1929 to 85 percent by June 1932.

Australia went off the gold standard in December 1929, when, at the urging of the Board of the Commonwealth Bank, the Commonwealth Bank Act, 1929 was passed into law. This Act, which copied similar British legislation, contained two main provisions, neither of which could become operative except with the concurrence of the Board of the Commonwealth Bank. First, it provided for the control of gold exports; second, it provided for the requisitioning of gold, in exchange for notes, which until this time had in theory, though not in practice, been convertible into gold. Confronted by these legislative powers, the trading banks agreed, in January 1930, to hand over two thirds of their gold reserves to the Commonwealth Bank. They were free to export, retain or sell the remaining third - which by this date amounted to only about £A 6 millions. For the most part they actually received deposits at the Commonwealth Bank, rather than notes; and they disposed of virtually all their gold holdings, which had fallen below £A 1 million in September 1930.

In August 1930, fearing that the alternative would be the introduction by the government of full exchange control, the trading banks agreed to supply the Commonwealth Bank with £Stg 3 millions per month, and not to undertake any overseas borrowing, except for conversion purposes. In principle, any bank was free to terminate this arrangement, which was known as the "Mobilization Agreement", at three months notice; some gave notice that they would terminate, but none did.

Although Australia went off the gold standard in 1929, while Britain remained on the gold standard until 1931, the official value of the Australian pound was maintained at a relatively small discount against sterling until January 1931. Given the balance of payments deficit, the

abandonment of the gold standard, and the loss of most of their foreign exchange reserves, the banks had only two options: to ration sterling or to raise its price. Both options were used and before the end of 1929 the premium on sterling had risen above the traditional gold export point, though gold exports were by now banned. By the end of 1929 the premium on sterling was about 1.6 percent in the official market - i.e. the market in which the cartel of trading banks supplied sterling to their regular customers. By March 1930 sterling was at a premium of 6.5 percent in the official market, where importers were now severely rationed. At this time the premium was 8 percent in the unofficial market, which had sprung up between those importers who were denied access to sterling by the rationing in the official market, and exporters who were attracted by the higher price of sterling in this unofficial market. Schedvin estimates that about 40 percent of all foreign exchange transactions were passing through the unofficial market in the period from August 1930 to January 1931.[24]

The banks were naturally reluctant to see their valuable exchange business eroded in this way. By October 1930 the premium in the official market had risen to 8 percent, but the unofficial rate was still higher. On 6 January 1931 the Bank of New South Wales unilaterally raised its rate to £A 115 per £Stg 100. The other trading banks followed suit, but the rate in the outside market rose still further. Not until the banks had raised the rate to 130, at the end of January 1931, did they regain their traditional share of the foreign exchange business - a share which Schedvin estimated to have been about 88 percent.

In September 1931 Britain was forced off the gold standard and sterling initially fell from US$ 4.86 to US$ 3.80, and then to US$ 3.23. For the remainder of the 1930s sterling fluctuated around US$ 3.40 - a devaluation of about 30 percent. The £A was strengthened by this depreciation relative to the dollar and in December 1931 the Commonwealth Bank, which had by now acquired most of Australia's foreign

exchange reserves, was able unilaterally to hold the exchange rate at £A 125 per £Stg 100. This rate, which became $A 250 per £Stg 100 in 1966, was maintained until the devaluation of sterling in 1967.

In addition to the problem of preserving external solvency, discussed above, Australian governments, both Commonwealth and State, were faced with sharply reduced tax revenues as incomes fell during the Great Depression. The solution to these internal problems involved an agreement in 1931, known as the Premiers' Plan, between the State and Federal governments, supported by the Commonwealth Bank and the trading banks: the governments promised to reduce expenditures, and the banks agreed to buy the Treasury bills, with which the remaining deficits would be largely financed. The cartel of trading banks agreed to reduce their rates on advances, and interest rates on outstanding domestically issued government bonds were compulsorily reduced. The regulated minimum wage had been cut by 10 percent in real terms in January 1931.

IV. The growth of financial controls during World War II

The performance of the banking system in the Great Depression became an important political issue in the 1930s and many members of the Labour Party blamed the banks for the severity of the depression and called for their nationalization. Soon after its election victory over Labour in 1935, the Lyons government responded to these complaints by setting up a Royal Commission on money and banking.

The Commonwealth Bank argued before the Royal Commission that it should be given the right to call upon the overseas funds of the trading banks and that the trading banks should be obliged to keep "fixed minimum deposits" with the Commonwealth Bank of not less than some given percentage of their liabilities to the public. However it was unable to specify exactly what legislation should be enacted in order to give it "access to the London funds of the trading banks", and it was also vague about what percentage of deposits should be held at the Commonwealth

Bank: the trading banks already held deposits in excess of those which would have been required if Australia had copied the reserve requirements of other comparable countries. The Bank was also anxious that the reserve requirements be applied at different rates to different banks, with a more stringent ratio applied to recalcitrants than to those which conformed to bank policy.

There was sufficient support among the members of the Royal Commission and the government to make further extensions of the power of the Commonwealth Bank, at the expense of the trading banks, inevitable. However, the introduction of further controls on the financial sector was delayed both by the lack of any precise idea of just what these new legislative powers should be, and by the opposition of some bankers. The arguments of the trading banks against even tighter regulation of the financial system were dismissed by Giblin as "effective but fallacious".[25] The debate on how to reform the financial system was finally overtaken by outside events: full exchange controls were introduced in two steps, one just before and one just after the declaration of war; comprehensive financial controls were introduced two years later.

The exchange controls of August and September 1939 superceded the Mobilization Agreement by setting up a system of export licensing which required all foreign exchange receipts to be surrendered to the Commonwealth Bank at the official exchange rate; access to foreign exchange was restricted to importers and travellers, and no foreign exchange could be sold without the approval of the Commonwealth Bank, for which the trading banks acted as agents. The prohibition of capital exports allowed the Commonwealth government to borrow at lower interest rates than would otherwise have been possible.

In November 1941, soon after taking office, the new Labour government introduced the National Security (Banking) Regulations, which required the banks to comply with the advances policy of the Commonwealth Bank;

not to purchase securities except with the approval of the Commonwealth Bank; and to provide all information which the Commonwealth Bank or the Treasurer might require. A bank which persistently breached the regulations risked losing its license. The banks were also required to lodge funds, as directed by the Commonwealth Bank, in Special Accounts at the Commonwealth Bank earning interest at a rate designed to ensure that the profits of the banks were not greater than in the average of the three years immediately preceding the outbreak of the war. The Board of the Commonwealth Bank subsequently decided to aim at profits for the trading banks equal to 95 percent of the average for the period 1937-39. To achieve this target, the interest rate on Special Accounts was set at .75 percent per annum. The level of the Special Accounts was initially set at £A 20 millions; six months later it had been increased to £A 37 millions and by June 1945 it was £A 240 millions. These stringent controls greatly increased both the money base and the Commonwealth's revenue from inflationary finance.

The National Security Regulations which controlled banking during wartime were only constitutionally valid under the defence power; but the banking legislation of 1945, which preserved the wartime regulations in a modified form, ensured the continuation of stringent regulatory controls over the financial system until the eventual reforms of the mid-1980s.

V. Estimates of the Commonwealth's revenue from seigniorage

Table 1 below presents estimates of the net and gross revenue derived from seigniorage in each five year period from Federation to 1945. To indicate orders of magnitude, the table also gives estimates of Commonwealth expenditure and revenue. The data on the gross revenue from seigniorage in column 3, are estimates of the value of the increase in CWGBASE, i.e., the part of the monetary base which is a liability either of the Commonwealth government or of the Commonwealth Bank. Two sets of estimates of the net revenue from seigniorage are presented: column 5

TABLE 1

Commonwealth Expenditure, Revenue and Seigniorage, 1901-45

	Expenditure (excl. debt charges)	Tax Rev.	Increase in CWGBASE		Profits of C'wealth Bnk.	
			Total	Share	Total	Remitted
	(£A m.) (1)	(£A m.) (2)	(£A m.) (3)	% (4)	(£A m.) (5)	(£A m.) (6)
1901-05	51.4	40.7	0.0	-	-	-
1906-10	70.0	52.6	0.0	-	-	-
1911-15	122.1	81.1	28.3	26	0.0	-
1916-20	398.7	147.3	31.3	18	2.8	-
1921-25	270.3	255.7	-5.7	-2	7.5	5.5
1926-30	297.0	284.5	22.4	7	8.8	5.7
1931-35	278.3	275.7	46.2	14	9.1	6.2
1936-40	407.5	359.4	55.5	13		5.2
1941-45	2567.4	1204.0	487.3	29		12.2
1901-40	1895.3	1497.0	178.0	11		22.6
1901-45	4462.7	2701.0	665.3	20		34.8

Sources and definitions, by columns:

(1): Australian Commonwealth Government Expenditure; Total expenditure minus expenditure on debt charges, p.258 of A. Barnard, "Government Finance", chapter 15 in W. Vlamplew ed., (n.4 above).

(2): Commonwealth Taxation Revenue (series B), pp.35-6 of A. Barnard "Some Government Financial Data, 1850 to 1982", *Source Paper No.13*, Department of Economic History, Research School of Social Sciences, Australian National University, August 1986.

(3): CWGBASE denotes the base money liabilities of the Commonwealth Bank and the Commonwealth Treasury. Full details are given in the Appendix. The £A 28.3 m. estimate in the row "1911-15" is the increase between June 1910 and June 1915; the precise dating of the other rows is exactly analogous.

(4): Col.(3) as a percentage of the sum of cols.(2) and (3).

(5): Total Appropriation of Profits of the Commonwealth Bank of Australia, Table 18A, p.562 in S.J. Butlin, *et al.*, (n.12 above).

(6): 1921-35: Appropriation of Profits of the Commonwealth Bank of Australia, "Appropriation to Treasury and National Debt Sinking Fund," Table 18A, p.562 in S.J. Butlin, *et al.*, (n.12 above).
1936-45: Annual Reports of the Commonwealth Bank of Australia.

gives the profits of the Commonwealth Bank and column 6 gives the profits which were remitted to the Treasury and the National Debt Sinking Fund. The excess of column 5 over column 6 is a measure of the increase in the profit reserves of the Commonwealth Bank.

The differences between the net and gross estimates are not only due to the direct costs of operating the monetary system; in part also, they arise because the Commonwealth Bank directly paid for some of the Commonwealth government's off-budget expenditures and subsidies, such as the provision of subsidized loans. Secondly, some components of the series CWGBASE were interest-bearing and some components were not even liabilities of the Commonwealth Bank; for example, profits from the note issue before 1920 accrued as revenue for the Treasury, without ever contributing to the Commonwealth Bank's profits; treasury bills have been included in CWGBASE, but were not liabilities of the Commonwealth Bank and were in any case interest-bearing; the Special Accounts of the trading banks at the Commonwealth Bank were liabilities of the Commonwealth Bank, but were interest-bearing, although the interest rate on these accounts was below market interest rates. Thirdly, and very importantly, the differences between the net and gross estimates presented here are also due to timing effects: an increase in the monetary base, in excess of operating costs, would initially result in an equal increase in the Commonwealth Bank's holdings of interest-bearing assets, rather than in an increase in profits. Only in subsequent periods would the holding of interest-bearing assets, matched by non-interest-bearing liabilities, result in profits for the Commonwealth Bank. In terms of *present values*, the profits of the Commonwealth Bank are equal to the value of the money created each period minus operating costs and other expenditures, but there may be substantial differences on a *period-by-period* basis, particularly in periods when the money base is growing rapidly.[26] This explains why the differences between the net and gross estimates were particularly large during the Second World War. It should also be noted that none of these

estimates captures the hidden contribution to Commonwealth revenue which occurs when the actual rate of inflation is faster than the rate anticipated by bond holders.

It is clear from Table 1 that the gross revenue from seigniorage was a significant part of the government's total revenue from all sources; however, the net revenue from seigniorage was only about 5 percent of the gross revenue, reflecting the fact that most of the gross revenue was used up in the operating costs of the monetary system.

VI. Conclusions.

Sections II, III and IV documented the development of Australian monetary institutions from Federation to the Second World War; section V presented estimates of the revenue obtained from seigniorage, which show that the net revenue from seigniorage, defined as profits remitted by the Commowealth Bank to the Treasury and the National Debt Sinking Fund, was only about 5 percent of the gross revenue from seigniorage, defined as the increases in the monetary liabilities of the Commonwealth (i.e. CWGBASE). The gross revenue, however, was quite substantial: it averaged about 12 percent of the revenue from explicit taxation (i.e. £A 178 millions, compared to £A 1497 millions) in the period 1901-40 and about 40 percent in the period 1941-45 (i.e. £A 487 millions, compared to £A 1204 millions). If these two periods are combined, without taking any account of inflation or discounting, then the average contribution of the gross revenue from seigniorage to Commonwealth revenue was about 25 percent of the revenue from explicit taxation (i.e. £A 665 millions, compared to £A 2701 millions).

Using the above definitions, the gross revenue seriously overstates the contribution of seigniorage to government finance, while the net revenue seriously understates it. The reasons for these over- and understatements were given in section V.

Despite the relatively small amount of net revenue actually raised by seigniorage, it has been argued here that the main influence on the changes to financial institutions, between Federation and the end of the Second World War, was the continuing desire of the Commonwealth government to expand this revenue. This claim is based on two types of evidence: first, that all the changes in the laws and regulations relating to monetary institutions in this period operated in the same direction: they helped to expand this source of revenue. Second, the biggest changes occurred in periods of crisis, when the Commonwealth's need for revenue was most acute. These crises were the two World Wars and the period 1929-32, when the fall in the terms of trade, together with the onset of the Great Depression, threatened the government's external solvency and created a large budget deficit. It was in these periods that the monetary base, and the share in the base of the Commonwealth's own liabilities, expanded most rapidly. The institutional changes which were introduced during these periods of crisis survived long after the crises were over.

A possible resolution of the apparent paradox involved in claiming that major institutional changes were driven by the need for relatively modest amounts of revenue is that, even though the profits actually remitted by the Commonwealth Bank to the Treasury were small, seigniorage made an important contribution to the Commonwealth government's liquidity in periods of crisis. The estimates of the net revenue from seigniorage do not capture either its contribution to liquidity during crises, or the contribution which subsequent unanticipated inflation made to eroding the real value of the bonds and Treasury bills issued by the Commonwealth government to finance the budget deficits which it ran during these periods. One example of these liquidity effects was the rapid build-up of Special Accounts during the Second World War; even though the profits actually remitted to Treasury were comparatively small, the growth of Special Accounts provided the Commonwealth Bank with ready cash with which to buy government bonds,

and thereby help to finance wartime expenditure. The nominal interest rates on these bonds were relatively low and their value after the war was substantially eroded by inflation. Similar effects were important in the two earlier crisis periods.

NOTES

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1. L.H. White presents evidence and analysis to rebut an overly strong version of the legal restrictions theory, according to which the difference between the rates of return to money and bonds is due *entirely* to legal restrictions. See: "Accounting for Non-interest-bearing Currency: A Critique of the Legal Restrictions Theory of Money," *Journal of Money, Credit and Banking* 19, no.4 (November 1987):448-56. However, the historical evidence assembled by White and others, and surveyed in G. A. Selgin and L.H. White, "The Evolution of a Free Banking System," *Economic Inquiry* 25, (July 1987):439-57, is consistent with the weaker version of the legal restrictions theory on which the present paper is based: that the near-monopoly of government fiat money is due to legal restrictions.

2. The development of the Australian monetary system before World War I is described in S.J. Butlin, *Foundations of the Australian Monetary System 1788-1851*, (Melbourne: Melbourne University Press, 1953) and S.J. Butlin, *The Australian Monetary System 1851-1914*, (Sydney: Reserve Bank of Australia, 1986).

3. D. Pope, "Free Banking in Australia Before World War I", Conference on: *Are There Solutions to Australia's Monetary Problems ?*, Institute of Public Affairs, Sydney, September 1989; A. Guild, *Money For Nothing*, Economic History Honours Sub-Thesis, Australian National Univesity, 1989. In particular, see Pope, p.14 and Guild pp.17-18 and 52. Guild

estimates that bank profits on notes were less than ½ percent per annum of the value of the notes issued.

4. P. Shergold, "Prices and Consumption", chapter 12 in W. Vlampew ed., *Australians: Historical Statistics*, (Sydney: Fairfax, Syme and Weldon, 1987). The gross domestic product deflator (Series PC 79) is 1182 in the calendar year 1860; in the years to end-June, 1911, 1946 and 1981, it equals 1000, 2199 and 22933, respectively.

5. Complete data sources and definitions are set out in the Appendix.

6. This paper illustrates the pressures which can lead to the gradual accretion of inefficient government regulations over long periods, in ways similar to those described by M. Olson, *The Rise and Decline of Nations*, (New Haven and London: Yale University Press, 1982), chapter 3.

7. This is not to deny that, with the benefit of hindsight, it is possible to find occasions - the Great Depression being the most clear-cut example - in which it would have been desirable if monetary policy had been more expansionary.

8. The main sources for the summaries of institutional changes are: L.F. Giblin, *The Growth of a Central Bank*, (Melbourne: Melbourne Univesity Press, 1951); Royal Commission on the Monetary and Banking Systems in Australia, *Report*, (Canberra: Australian Government Printer, 1937); and C.B. Schedvin, *Australia and the Great Depression*, (Sydney: Sydney University Press, 1970).

9. The Royal Commission (n.8 above), para.91, summarizes the regulations on the gold content of the Australian, British and U.S. currencies.

10. Guild (n.3 above) describes earlier attempts by Commonwealth governments to take over the note issue; one reason for their failure was the instability of the early Commonwealth governments; Guild also

emphasizes the opposition of the trading banks, while S.J. Butlin, *Australia and New Zealand Bank*, (London: Longmans, 1961), p.341, noted that "basic legislation to make a workable system of government must take priority over reformist economic policy."

11. Until the depreciation of the £A in October 1930, variations in what was effectively the £A/£Stg exchange rate were quoted as variations in the commissions charged by the trading banks for the service of transferring funds between Australia and London, rather than as variations in the exchange rate between two distinct currencies. In evidence before the 1936 Royal Commission (n.8 above), the General Manager of the Commercial Banking Company of Sydney stated that: "We had always listed [sterling] on a commission basis before, and then we found that we were only a sub-currency after all." Quoted by A.F.W. Plumtre, *Central Banking in the British Dominions*, p.335, (Toronto: University of Toronto Press, 1947).

12. The data on the gold reserves and the note issue are from S.J. Butlin, A.R. Hall and R.C. White, *Australian Banking and Monetary Statistics, 1817-1945*, Occasional Paper No.4A, (Sydney: Reserve Bank of Australia, 1971), table 42, p.454 and table 47, p.470.

13. D.B. Copland, "Australia in the World War - Economic", Chapter XIX - Part III, in J.H. Rose *et al.*, eds., *The Cambridge History of the British Empire, Volume VII, Part I: Australia*, (Cambridge: Cambridge University Press, 1933), pp.589-590.

14. S.J. Butlin, (n.10 above), p.357.

15. G. Blainey, *Gold and Paper, A History of the National Bank of Australasia*, (Melbourne: Georgian House, 1958), p.274. Butlin (n.10 above) states that legislation was threatened if the banks failed to comply with the government's request (p.358).

16. R. Gollan, *The Commonwealth Bank of Australia: Origins and Early History*, (Canberra: Australian National University Press, 1967),

chapters 9 and 10.

In addition to the changes actually implemented and described in the text, there was an attempt in 1930, by the Labour government, to separate the Commonwealth Bank's trading bank functions from its functions as the central bank. This legislation, which was defeated in the Senate, would have created a new Central Reserve Bank and left the Commonwealth Bank as a nationalized trading bank. This formal separation of the Commonwealth Bank's functions was not completed until the passage of the Reserve Bank Act of 1959.

17. The section of the 1924 amendment requiring trading banks to use deposits at the Commonwealth Bank for interbank settlements was never proclaimed: its existence was sufficient to make the banks comply, Giblin (n.8 above), p.15. The estimates of deposits at the Commowealth Bank are from S.J. Butlin *et al.* (n.12 above), table 29, p.375.

18. R. Wilson, "London Funds and the Australian Economy," *Economic Record* 11, (Supplement March 1935):S97-S121, p.S117, presents data on the relatively poor seasons for wool and wheat. R. Wilson, "Australian Monetary Policy Reviewed," *Economic Record* 7, (November 1931):195-215, presents balance of payments data; column A of Wilson's Table A, p.199 measures the current account surplus.

19. Giblin (n.8 above), p.11.

20. Charles O. Hardy, *Is There Enough Gold ?* (Washington D.C.: The Brookings Institution, 1936), calculated that: "For eleven leading countries the ratio of gold stock to note issue plus deposits of the central banks fell from 81.7 per cent in 1913 to 13.4 per cent in 1925. ... Including Russian data the ratios were 82.5 per cent in 1913 and 12.8 per cent for 1925." (n.13, p.25).

21. Plumtre (n.11 above) describes and analyzes the development of central banking in Australia, Canada, New Zealand and South Africa. His

conclusion (p.200), however, is that nationalism and imperialism were the two dominant influences on the formation of central banks.

22. R.G. Hawtrey, *The Art of Central Banking*, (London: Longmans, 1932), p.36.

23. S.J. Butlin (n.10 above), p.388.

24. C.B. Schedvin, (n.8 above), p.383.

25. Giblin (n.8 above), p.232. Giblin described the relative freedom of the trading banks before the Second World War, in comparison the "effective" controls which applied from 1941 onwards, as "the old anarchy." (p.260).

26. The revenue from seigniorage may be expressed in three equivalent ways: (1) in terms of the money created each period; (2) in terms of the profits remitted by the Central Bank to the Treasury; and (3) in terms of the nominal interest savings which arise from the Central Bank's ability to issue liabilities at a zero nominal interest rate. These three alternatives give the same present value of the revenue from seigniorage, but generally give different amounts for particular periods. The exact relationships between them are set out in Part 2 of the Appendix.

APPENDIX TO:

THE DEVELOPMENT OF MONETARY INSTITUTIONS IN AUSTRALIA

FROM FEDERATION TO THE SECOND WORLD WAR

PART 1: DATA SOURCES AND DEFINITIONS

The source for most of the variables is "RBA 4A(B)", which denotes Part B of Reserve Bank Occasional Paper No.4A, by S.J. Butlin, A.R. Hall and R.C. White (n.12 of the main text); other sources are "Giblin", "Schedvin" and "Butlin". "Butlin" refers to N.G. Butlin, *Australian National Accounts, 1788-1983*, Source Papers in Economic History, No.6, Research School of Social Sciences, Australian National University, Canberra, November 1985. The full references for Giblin and Schedvin are given in n.8 of the main text.

All the data used in this study are annual and stocks are measured at June 30. Where the sources listed below give quarterly data on stocks, the average for the two middle quarters of each calendar year has been taken as an estimate of the stock at June 30. Variables for which no primary source is given are defined by identities; the numbers in parentheses below the right-hand side variables in these identities indicate the number of the variable in the list below.

1. BASE = Total money base, defined as the notes, coin, gold and deposit liabilities of the Commonwealth Bank held by the private trading and savings banks and by the non-bank private sector.

   BASE = TOTNCPUB + TBRES + SBRES.
   (2) (3) (20)

2. TOTNCPUB = Total Notes and Coin Held by the public. RBA 4A(B), Table 42, pp.453-457. In addition to Australian notes and gold coin this series includes private bank notes, silver and bronze coins.

3. TBRES = Cash reserves of the trading banks, other than the Commonwealth Bank, plus the imputed cash reserves of the Commonwealth Bank, CWBRESXSA, in its role as a nationalized trading bank. These imputed reserves have been estimated and included in TBRES in an attempt to separate the trading bank role of the Commonwealth Bank from its role as the Central Bank.

TBRES = OTBRES + CWBRESXSA.
(4) (12)

4. OTBRES = Cash reserves of trading banks, excluding the Commonwealth Bank:

OTBRES = TBCASH + OTBSA + OTBTBLLS - CWBCASH.
(5) (6) (7) (8)

5. TBCASH = Cash Items; Assets of Trading Banks (including the Commonwealth Bank). RBA 4A(B) Table 2(ii), p.121.

6. OTBSA = Special Accounts with the Commonwealth Bank; Assets of Trading Banks. RBA 4A(B), Table 2(ii), p.121.

7. OTBTBLLS = Treasury bills held by the Trading Banks (excluding the Commonwealth Bank). Schedvin, Table C-2, pp.387-390.

8. CWBCASH = Actual cash reserves of the Commonwealth Bank (excluding the Note Issue Dept.):

CWBCASH = CWBCURR + CWBLF + CWBNOTES.
(9) (10) (11)

9. CWBCURR = Coin, Bullion and Cash Balances; Assets of the Commonwealth Bank (excluding Note Issue Dept.). RBA 4A(B), Table 11, pp.139.

10. CWBLF = Money at Short Call in London; Assets of the Commonwealth Bank (excluding Note Issue Dept.). RBA 4A(B), Table 11, pp.139.

11. CWBNOTES = Australian Notes; Assets of the Commonwealth Bank (excluding Note Issue Dept.). RBA 4A(B), Table 11, pp.139.

12. CWBRESXSA = Imputed cash reserves (excluding special accounts) of Commonwealth Bank, qua nationalised trading bank:

$$\underset{(4)}{CWBRESXSA} = (\underset{(6)}{OTBRES} - \underset{(6)}{OTBSA}) \times \underset{(13)}{DEPSHARECWB}$$

13. DEPSHARECWB = Share of Commonwealth Bank in total trading bank deposits:

$$\underset{(14)}{DEPSHARECWB} = \underset{(14)}{DEPTOTCWB} / (\underset{(17)}{DEPTOTATB} - \underset{(14)}{DEPTOTCWB})$$

14. DEPTOTCWB = Total deposits; Liabilities of the Commonwealth Bank of Australia:

$$DEPTOTCWB = \underset{(15)}{DEPINTCWB} + \underset{(16)}{DEPNBICWB}$$

15. DEPINTCWB = Deposits, Bearing Interest; Liabilities Within Australia of the Commonwealth Bank of Australia. RBA 4A(B), Table 29, pp.373-380.

16. DEPNBICWB = Deposits, Not Bearing Interest; Liabilities Within Australia of the Commonwealth Bank of Australia. RBA 4A(B), Table 29, pp.373-380.

17. DEPTOTATB = Total Deposits; Liabilities Within Australia of Trading Banks (including the Commonwealth Bank):

$$DEPTOTATB = \underset{(18)}{DEPINTATB} + \underset{(19)}{DEPNBIATB}.$$

18. DEPINTATB = Deposits, Bearing Interest; Liabilities Within Australia of Trading Banks (including the Commonwealth Bank). RBA 4A(B), Table 12, pp.148-159.

19. DEPNBIATB = Deposits, Not Bearing Interest; Liabilities Within Australia of Trading Banks (including the Commonwealth Bank). RBA 4A(B), Table 12, pp.148-159.

20. SBRES = Cash reserves of savings banks (including Commonwealth Savings Bank):

$$SBRES = \underset{(21)}{SBCASH} + \underset{(22)}{SBTBLLS} + \underset{(23)}{SBTRDEP} + \underset{(24)}{SBCWBDEP}.$$

21. SBCASH = Coin, Notes, Cash on Hand; Assets of Savings Banks (including Commonwealth Savings Bank) RBA 4A(B) Table 53(ii), p.504.

22. SBTBLLS = Treasury Bills; Assets of Savings Banks (including Commonwealth Savings Bank) RBA 4A(B) Table 53(ii), p.504.

23. SBTRDEP = Deposits with State Treasury; Assets of Savings Banks (including Commonwealth Savings Bank) RBA 4A(B) Table 53(ii), p.504.

24. SBCWBDEP = Deposits with Commonwealth Bank; Assets of Savings Banks (including Commonwealth Savings Bank) RBA 4A(B) Table 53(ii), p.504.

25. CWGBASE = The part of the money base which is a liability of the Commonwealth Government. In this study is measured residually by subtracting OTHBASE, STATEBASE and FRNBASE from BASE. Although CWGBASE is defined residually it nevertheless equals zero in the period 1901-11. This provides a check on the consistency of the definitions used.

CWGBASE = BASE - FRNBASE - OTHBASE - STATEBASE.
(1) (26) (36) (39)

26. FRNBASE = The foreign base, defined as bank and private gold holdings plus bank and private holdings of London funds, defined as money at short call in London. The actual London funds of the Commonwealth Bank, excluding the Note Issue Department, have been adjusted in an attempt to separate the part of the Commonwealth Bank's London funds which can be attributed to its functions as a nationalized trading bank, which are included in FRNBASE, from the remainder of its actual holdings of London funds, which, together with the gold holdings of the Note Issue Department of the Commonwealth Bank are treated as central bank reserves of foreign exchange. In the course of the 1930's the Commonwealth Bank's actual London funds grew rapidly, while the London funds of the other trading banks became negligible. The definitions adopted here reflect the fact that these divergencies were caused by the growing central banking role of the Commonwealth Bank.

FRNBASE = BNKGOLD + GOLDCNPUB + OTBLF + CWBLFADJ.
(27) (30) (31) (35)

27. BNKGOLD = Gold coin and bullion held by the trading banks, including the Commonwealth Bank (excluding the Note Issue Department):

BNKGOLD = C + GOLDCNBNK.
(28) (29)

28. C = Cash Balances, Bullion; Assets Within Australia of the Trading Banks (including the Commonwealth Bank of Australia). RBA 4A(B), Table 12, pp.149-159.

29. GOLDCNBNK = Gold Coin Held by the banks. RBA 4A(B), Table 42, pp.453-457.

30. GOLDCNPUB = Gold Coin Held by the public. RBA 4A(B), Table 42, pp.453-457.

31. OTBLF = London funds of the trading banks, other than the Commonwealth Bank. For the period 1926-38 this variable is taken from *Schedvin*, Table C-2, column (4), as the average of the June and September figures. For the period 1939-45 it is estimated from Giblin, Table E, p.318 as the implied excess of "Liquid assets in Australia plus Overseas Funds o/a Aust. business" over "Liquid assets in Australia". Giblin presents these two variables as percentages of deposits and also gives the level of deposits. For the period 1901-25, OTBLF is defined as the excess of the indirect estimate of the London funds of the whole Australian banking system, excluding the Note Issue Department of the Commonwealth Bank, LFAUS, over the London funds of the Commonwealth Funds of the Commonwealth Bank, excluding the Note Issue Department, CWBLF:

$$\underset{(32)}{OTBLF} = \underset{(32)}{LFAUS} - \underset{(10)}{CWBLF}.$$

32. LFAUS = Indirect estimate of the liquid London funds of the whole Australian banking system, excluding the Note Issue Department of the Commonwealth Bank. This indirect estimate is obtained by subtracting the cash assets within Australia of the whole system, E, from the total cash assets of the system, TBCASH:

$$\underset{(5)}{LFAUS} = \underset{(5)}{TBCASH} - (\underset{(33)}{B} + \underset{(28)}{C} + \underset{(34)}{D}).$$

33. B = Cash Balances, Coin; Assets Within Australia of the Trading Banks (including the Commonwealth Bank of Australia). RBA 4A(B), Table 12, pp.149-159.

34. D = Cash Balances, Australian Notes; Assets Within Australia of the Trading Banks (including the Commonwealth Bank of Australia). RBA 4A(B), Table 12, pp.149-159.

35. CWBLFADJ = Imputed London funds of the Commonwealth Bank, in its role as nationalised trading bank:

$$\underset{}{\text{CWBLFADJ}} = \underset{(31)}{\text{OTBLF}} \times \frac{\underset{(13)}{\text{DEPSHARECWB}}}{}.$$

36. OTHBASE = Other Base. For the period 1901-10 it is measured as non-gold coins plus private bank notes:

$$\underset{}{\text{OTHBASE}} = \underset{(2)}{\text{TOTNCPUB}} + \underset{(21)}{\text{SBCASH}} + \underset{(33)}{\text{B}} + \underset{(34)}{\text{D}} - \underset{(37)}{\text{ANOTESBNK}} - \underset{(38)}{\text{ANOTESPUB}}.$$

For 1911 and subsequent years OTHBASE is set equal to £4.3 million = £ 8.0 million minus £ 3.7 million. This is an estimate of the part of the non-gold coinage which is not a liability of the Commonwealth Government.

37. ANOTESBNK = Australian Notes Held by the banks. RBA 4A(B), Table 42, pp.453-457. In the period 1901-1910 the series measures Queensland Treasury Notes - see RBA 4A(B) p.458; for 1911-45 it measures notes issued by the Commonwealth Government.

38. ANOTESPUB = Australian Notes Held by the public. RBA 4A(B), Table 42, pp.453-457. In the period 1901-1910 the series measures Queensland Treasury Notes - see RBA 4A(B) p.458; for 1914-45 it measures notes issued by the Commonwealth Government. In the period 1911-13 the series is the sum of Queensland and Commonwealth Notes; however the share of Queensland Notes in the total is negligible - see RBA 4A(B), Table 43, p.458.

39. STATEBASE = The monetary liabilities of the State Governments. These comprised the notes issued by the Queensland Government before 1910 and the reserves of the savings banks at the State Treasuries, some of which continued to be held until the collapse of the Government Savings Bank of NSW in 1931.

STATEBASE = SBTRDEP + QLDNOTES.
(23) (40)

40. QLDNOTES = Queensland Treasury Notes, Total Issued. RBA 4A(B), Table 43, p.458.

41. P = Implicit gross domestic product deflator. Butlin, series J, Table 24, pp. 48-49. Butlin's series J is equal to unity in 1967 and to .225 in 1931; P is series J divided by .225 and is therefore unity in 1931. The figure for each year is for the 12 months ending on June 30 of that year.

TABLE A-1: ASSET COMPOSITION OF THE MONETARY BASE 1901-1945 (£A M.)

	TOTNCPUB	OTBRES	CWBRESXSA	SBRES	BASE	BASE/P
1901	10.5	28.1	0.0	8.2	46.8	79.2
1902	10.5	28.1	0.0	7.9	46.5	81.7
1903	10.5	29.5	0.0	6.1	46.1	78.6
1904	10.4	26.3	0.0	6.0	42.7	77.5
1905	10.4	32.1	0.0	5.5	48.0	86.4
1906	10.7	40.1	0.0	5.5	56.3	98.2
1907	11.3	38.3	0.0	3.8	53.4	94.6
1908	11.5	36.8	0.0	3.3	51.6	84.7
1909	11.7	37.4	0.0	3.3	52.4	83.6
1910	12.2	48.0	0.0	3.8	64.0	99.3
1911	13.9	53.4	0.0	3.9	71.2	109.7
1912	13.0	47.0	0.0	4.5	64.5	91.3
1913	13.0	49.8	0.5	4.9	68.2	97.1
1914	13.1	60.4	1.1	5.4	80.0	106.5
1915	11.1	64.1	2.1	5.9	83.2	100.6
1916	16.5	60.3	9.4	5.8	92.0	107.2
1917	20.2	66.3	11.7	8.5	106.7	114.3
1918	22.8	66.6	14.5	8.3	112.2	113.7
1919	25.7	60.3	11.4	10.2	107.6	103.5
1920	26.2	76.8	10.8	9.1	122.9	102.1
1921	28.6	71.3	9.3	10.7	119.9	102.6
1922	28.0	74.5	10.1	10.2	122.7	110.9
1923	28.0	70.5	10.1	9.0	117.6	100.3
1924	27.2	68.9	8.2	11.3	115.6	98.5
1925	27.6	76.5	9.9	12.8	126.8	104.9
1926	28.5	73.9	8.0	14.9	125.3	104.4
1927	29.9	72.1	7.7	13.1	122.8	102.4
1928	30.2	74.4	7.4	15.8	127.7	104.9
1929	29.6	64.2	6.4	17.9	118.1	96.6
1930	27.2	63.1	6.0	13.8	110.1	99.9
1931	30.8	76.0	8.1	14.7	129.6	129.6
1932	30.4	94.8	13.5	15.5	154.2	166.9
1933	30.0	94.0	14.6	17.1	155.7	170.9
1934	31.1	93.8	14.1	22.4	161.4	171.3
1935	33.2	74.9	11.8	20.4	140.2	144.1
1936	35.3	81.5	14.2	20.5	151.5	148.8
1937	36.3	102.6	19.6	24.7	183.2	170.3
1938	38.6	77.1	16.2	29.3	161.2	147.4
1939	40.2	73.4	14.5	18.0	146.1	130.9
1940	55.4	97.4	23.0	12.7	188.4	163.7
1941	63.2	97.5	22.7	26.3	209.7	180.8
1942	98.3	162.3	30.6	29.4	320.6	272.2
1943	138.9	236.0	39.4	70.7	485.0	391.1
1944	193.6	315.3	39.3	83.1	631.3	494.9
1945	191.6	363.8	40.8	92.5	688.6	519.9

TABLE A-2: COMPOSITION OF THE MONEY BASE BY ISSUING SECTOR, (£A M.)

	OTHBASE	STATEBASE	FRNBASE	CWGBASE	BASE
1901	5.9	9.1	31.8	0.0	46.8
1902	6.2	8.8	31.5	0.0	46.5
1903	5.5	6.8	33.8	0.0	46.1
1904	5.6	6.7	30.4	0.0	42.7
1905	6.5	6.3	35.1	0.0	48.0
1906	5.9	6.3	44.1	0.0	56.3
1907	6.8	4.7	41.9	0.0	53.4
1908	6.3	4.3	41.1	0.0	51.6
1909	6.8	4.3	41.3	0.0	52.4
1910	8.0	4.7	51.3	0.0	64.0
1911	4.3	3.4	53.3	10.2	71.2
1912	4.3	3.7	47.2	9.3	64.5
1913	4.3	3.8	51.0	9.1	68.2
1914	4.3	4.0	63.6	8.2	80.0
1915	4.3	3.9	46.7	28.3	83.2
1916	4.3	4.0	50.3	33.4	92.0
1917	4.3	5.8	54.6	42.0	106.7
1918	4.3	5.4	56.9	45.5	112.2
1919	4.3	5.6	46.2	51.5	107.6
1920	4.3	5.7	53.4	59.6	122.9
1921	4.3	4.9	52.6	58.1	119.9
1922	4.3	4.9	61.7	51.8	122.7
1923	4.3	4.4	59.9	49.1	117.6
1924	4.3	5.8	53.4	52.1	115.6
1925	4.3	5.8	62.8	53.9	126.8
1926	4.3	6.8	59.5	54.8	125.3
1927	4.3	6.2	45.2	67.1	122.8
1928	4.3	8.4	62.0	53.0	127.7
1929	4.3	9.4	53.0	51.4	118.1
1930	4.3	8.5	21.1	76.3	110.1
1931	4.3	7.4	18.1	99.8	129.6
1932	4.3	0.0	19.5	130.5	154.2
1933	4.3	0.0	17.5	133.9	155.7
1934	4.3	0.0	15.7	141.5	161.4
1935	4.3	0.0	13.4	122.5	140.2
1936	4.3	0.0	26.9	120.3	151.5
1937	4.3	0.0	43.9	135.0	183.2
1938	4.3	0.0	43.3	113.6	161.2
1939	4.3	0.0	16.8	125.0	146.1
1940	4.3	0.0	6.1	178.0	188.4
1941	4.3	0.0	-0.5	205.9	209.7
1942	4.3	0.0	0.7	315.6	320.6
1943	4.3	0.0	3.5	477.2	485.0
1944	4.3	0.0	15.0	612.0	631.3
1945	4.3	0.0	19.0	665.3	688.6

PART 2: THE REVENUE FROM SEIGNIORAGE

The revenue from seigniorage may be expressed in terms of the excess, over the costs of operating the Central Bank, of the value of the fiat money issued each period; or in terms of the profits remitted by the Central Bank to the Treasury; or in terms of the nominal interest savings which arise from the Central Bank's ability to issue liabilities at a zero nominal interest rate. The equivalences between these three alternative approaches are set out. The Central Bank's balance sheet may be written as:

$$M_t = B_t + A_t, \qquad (1)$$

where:

M_t = money base in period t

B_t = bonds held by the Central Bank in period t

A_t = accumulated profit reserves of the Central Bank in period t

The identity for the Central Bank's sources and uses of funds is:

$$B_{t-1}.[1 + r_{t-1}] + M_t - M_{t-1} = R_t + C_t + B_t, \qquad (2)$$

where:

r_t = the nominal interest rate between periods t and t+1,

C_t = operating and other expenses of Central Bank in period t

R_t = revenue remitted to the Treasury in period t.

Given that money does not bear interest, the opportunity cost in period t of holding non-interest bearing money from t to t+1 is the nominal discount rate, η_t, where $\eta_t = r_t/[1 + r_t]$. In a continuous time model η_t is the nominal interest rate at time t. The rate of tax on money holdings at time t is the excess of η_t over the marginal cost of operating the monetary system.

The above identity may be used to derive the following three expressions for the present value in period 1 of the seigniorage obtained in periods 1 to T, inclusive.

$$PVS_{1,T} = \sum_{t=1}^{T} [M_t - M_{t-1} - C_t].\delta_t, \qquad (3)$$

$$= \sum_{t=1}^{T} R_t.\delta_t + \delta_T.B_T - (1 + r_0).B_0, \qquad (4)$$

$$= \sum_{t=1}^{T} [\eta_t.M_t - C_t].\delta_t + \delta_{T+1}.M_{T+1} - M_0. \qquad (5)$$

where:

$PVS_{1,T}$ = present value in period 1 of the revenue from money creation in periods 1, 2, ..., T.

δ_t = present value in 1 of \$1 in t = $\delta_{t-1}/(1 + r_t)$, where r_t is the nominal interest rate between periods t and t+1. N.b. $\delta_1 = 1$.

η_t = $r_t/(1 + r_t)$ = the cost per dollar in period t of holding money between period t and period t+1; i.e. the one-period ahead discount rate in period t.

B_t = bonds held by the Central Bank in period t.

It is usually assumed that the nominal stocks of money and bonds grow more slowly than the nominal discount factor, so that the limits of $\delta_T.M_T$ and $\delta_T.B_T$, as T tends to infinity, are both zero. Given these transversality conditions, it follows from the three preceding equations that, starting from the formation of a Central Bank, with $B_0 = M_0 = 0$, the present value of the entire revenue from seigniorage, $PVS_{1,\infty}$, is equal to the present value of the nominal money created in every period, minus the costs of operating the Central Bank (eq. 3); and to the present value of the revenue remitted to the Treasury in every period (eq. 4); and to the present value of the net tax on money holdings in every period (eq. 5).

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