

Volume 32

Journal of the Numismatic Association of Australia



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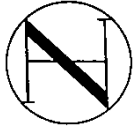
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Front cover: Photo of Mr. Billing's Gold Medal for Law (see article Figure 2 page 88).

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NUMISMATIC ASSOCIATION OF AUSTRALIA INC

President's Report

You are looking at Volume 32 of the *Journal of the Numismatic Association of Australia* (JNAA). It is a result of authors who have been sufficiently excited about a numismatic topic to carry out original research and put 'pen to paper', reviewers who have been willing to offer constructive criticisms to make the manuscripts the best they can be and the efforts of the editor who shepherds all the articles through the whole process and adds a 'final polish'. I acknowledge everyone involved, with special thanks to Managing Editor Gil Davis and Production Editor Barrie Newman for their continued efforts at maintaining a high-quality journal.

Much has happened since the last president's report published in Volume 31. The opening up of COVID-19 restrictions saw a welcome return to the NAA conference (NAAC2023), which was held in Adelaide at the Naval, Military & Air Force Club on the weekend of 19 – 20th October 2023, and hosted by the Numismatic Society of South Australia (NSSA). The conference was preceded by the 1000th meeting of the NSSA on the evening of Friday 18th October 2023. I would like to congratulate the NSSA for reaching this impressive milestone and for their major efforts in hosting the 9th NAA conference. The conference was an outstanding success, with attendees from every state of Australia and New Zealand. The conference program consisted of an opening talk by Ms Lainie Anderson (author of the *Long Flight Home*), two plenary lectures, 12 regular talks and a short talk. All talks were of a high standard and highlighted the diverse interests of the Australian and New Zealand numismatic community.

One of the highlights of the conference was the dinner, during which the Ray Jewell Silver Medal was awarded to the JNAA Managing Editor, Associate Professor Gillan Davis. This important award for 'outstanding contribution to Australian numismatics and the Numismatic Association of Australia' recognises Gil for his services to the NAA, and his numismatic research in Australia and overseas for which he is internationally renowned. Given that Gil is only the 8th recipient since the award was first presented in 1998, I have asked Walter Bloom to prepare a separate short report based on his presentation speech, which can be found in this volume.

The AGM, held at the conference, saw a ‘changing of the guard’, with Walter Bloom and Lyn Bloom handing over the reins as president and treasurer respectively. I personally want to thank Walter and Lyn for their tireless efforts in maintaining the local and international profile of the NAA over many years, including during the difficult COVID-19 period.

The following Office Bearers were elected at the 2023 AGM:

Treasurer – Rachel Mansfield

Secretary – Bridget McClean

President – Richard O’Hair

Vice President – Walter Bloom

Managing Editor – Gil Davis

I would like to thank our sponsors for their continued support of the NAA: Noble Numismatics (Gold), Coinworks, Downies (Silver), Drake Sterling, Mowbray Collectables and Sterling & Currency.

Finally, a valuable part of NAAC2023 was a round table discussion on the future of the Numismatic Association of Australia. Prior to the conference, clubs and societies were asked to send their feedback on the following:

- Any views of the Society/Club about the NAA, especially its activities and how these serve Australian numismatics.
- What would the Society/Club like to see from the NAA in the future?

The feedback received and the discussions had at the conference were valuable and the Council will work through the issues raised. The most important issue which was identified is one with which many societies are grappling: how to maintain an active membership that is willing and able to volunteer to help out with the various activities required to maintain the society. So, I would encourage all of you to think about how you might contribute to your local club or society and the NAA. We welcome your submissions to the JNAA and hope to see you at the NAAC2025 (details to appear in 2024)!

Professor Richard A. J. O’Hair

President, NAA

27 November 2023

Report on the Silver Ray Jewell Award to Associate Professor Gillan Davis

We acknowledge the important work that Associate Professor Gillan Davis, as Managing Editor of the *Journal of the Numismatic Association of Australia (JNAA)*, has undertaken for the NAA over the past 11 years. Gil has been Managing Editor of each of the Journals consecutively since 2011 – Volume 22 through to Volume 31 in 2023, and has almost completed finalising the articles for JNAA32, 2023. His contribution for all these Journals has been outstanding.

The Journal is now recognised internationally, and Gil has been instrumental in sourcing contributors and assessing their input. His attention to detail and editorial work is unsurpassed and we believe Gil should be recognised by the NAA for his support and services to the Association by being awarded the silver Ray Jewell Award.

Gil has included an Editor's Letter or Note in all the NAA Journals issued since the 2012 edition (No 23) in which he has highlighted the Journal as the showcase of the NAA, the peak body for numismatics in Australia.

He strongly promotes the NAA through each Journal and through his involvement with Macquarie University and its Australian Centre for Ancient Numismatic Studies (ACANS) and students.

Gil has sourced many of the unique articles from highly qualified Australian and international numismatic authors and supported Australian PhD students in their numismatic research in digs in Israel and the Middle East. He has ensured that there is a good mix of modern and ancients coverage throughout each Journal.

Gil was instrumental in introducing the Journal electronically in 2015 and it is now readily available to members and the public alike on our website. Through his efforts the Journal has now become a major teaching aid in subjects such as history and humanities, as he has highlighted in Journal No 30, 'teaching with numismatics – coins are useful teaching tools'.

Gil has truly supported the NAA in all his endeavours and is most deserving of the Ray Jewell silver award.

Gillan (Gil) Davis has given me (in my previous role as President) excellent advice on many issues arising in the NAA outside of his editorial expertise. I always value his input, and indeed continue to do so.

After Gil moved to the Australian Catholic University, where he is the Director of the Ancient Israel Program at the Australian Catholic University which offers a full major and minor in Archaeology to students in Arts, Education, Theology and the Ramsay Centre for Western Civilisation together with an annual dig in Israel and school outreach, he faced establishing a new degree programme, supervising students and liaising with ACANS, continuing with his Middle Eastern digs, and being an important member of the European Research Council (ERC) Advanced Grant titled ‘Silver Isotopes and the Rise of Money’, based in Lyon, which is geolocating and isotopically identifying ancient silver ore sources and matching them with coins and silver artefacts.

Gil is a personal friend and we are in frequent contact, but still I continue to be impressed about how he has managed to fit in all of these activities after a change mid-life from Real Estate to academia.



Figure 1: Presentation of the silver Ray Jewell Award by Professor Walter Bloom to Associate Professor Gillan Davis at the dinner of the NAA Conference 2023 in Adelaide, 19th August 2023.

Professor Walter Bloom
12 December 2023

Editor's note

This is an eclectic volume covering a wide range of interesting topics. The concentration is on modern material while the 'ancients' deal with Roman coins and medals. Many of the papers were also given as presentations at the highly successful Numismatic Association of Australia conference held in Adelaide earlier in the year. As always, it is a pleasure to see domestic scholarship supplemented by overseas contributors from the United States, the UK, Italy and New Zealand.

Paul Holland gives us interesting information about that perennial Australian favourite – the 1930 penny, providing details of the mint records and earliest numismatic literature. Mint records are used in another way by Eric Frazer in his analysis of the patterns of coin circulation in Australia over the last two decades. He quantifies the decline in the number of coins in circulation per person speculating on the probable phasing out of 5 and 10 cents coins. Eric provides a second and complementary article analysing the circulation of foreign coins among Australian decimal coinage and their sources of origin; the list may surprise you.

A topic that intrigues ancient through to early modern numismatists is estimating the production rate of mints. This is essential for quantification studies and it is fair to state that opinions are greatly divided. So, it is with interest that we present a detailed study by Pierluigi Debernardi on the production of denarii of Crepusius, an otherwise unknown moneyer in the Roman Republic dated to 82 BCE. The software that he has developed provides a mintage model which successfully matches the coin evidence.

While in the Roman period, we have an article by Bruce Marshall on the so-called 'Restoration' coins of the CE first century emperors Vespasian and Titus which, he argues, by reviving Augustan types, served as propaganda to justify their seizure of power. Andrew Chugg takes us into the second century with a short note updating his earlier article (*JNAA* 31) on the authenticity of some of the specimens of the medallion struck by the emperor Hadrian to commemorate his lover and favourite, the youth Antinous, who drowned in the Nile in CE 130.

Vaughn Humberstone usefully provides a comprehensive and fully referenced listing of the 45 New Zealand trade tokens issued between 1857 and 1875 together with background on the circumstances which led to them being struck despite never being legal tender and interesting details on the merchants and the dies they employed. Across the ditch and almost exactly contemporaneously, NAA President Richard O'Hair has contributed a study of the gold medal for law awarded by Mr Billing at the University of Melbourne. The research was prompted by the discovery of one of the 15 medals awarded between 1858 and 1874.

Finally we have a pair of articles dealing with remembrance by two stalwarts of the NAA. Barrie Newman, our Production Editor, shares a lovely story of his proposal to sell commemorative ingots to the United Arab Emirates for his company, The Adelaide Mint. Sadly, it did not end well. Channelling Marcel Proust à la recherche du temps perdu, Walter Bloom, President of the NAA for many years, narrates the story of his numismatic life. It is like walking through a wonderful antiquarian bookshop with a friend. Along the way, he tells the story of numismatics and coin dealers and medallists in this country, as well as his personal, often quirky, research and collecting interests.

As always, I sincerely thank the many anonymous reviewers who have reviewed the papers with special thanks to Barrie Newman for his careful attention to the role of Production Editor and John Melville-Jones for proofreading many of the articles.

On a personal note, I thank the selection committee of the NAA for awarding me the Ray Jewell silver medal which I shall always treasure.

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Articles must comprise original research on numismatic material including but not limited to Australasian numismatics (coins, tokens, medals, banknotes) or ancient or mediaeval numismatics. Manuscripts can be emailed to any member of the Editorial Board in your area of research, along with a copy to the Managing Editor.

Some Observations on Australia's Circulating Coin Behaviour, 2005-2021

Eric J Frazer

Abstract

The behaviour of Australia's circulating coinage over the past 15 years was analysed using data published in the Royal Australian Mint's 2021-22 Annual Report. The number and total value of coins purchased from the Mint have steadily declined from 2005 to 2021, dropping 65% and 60%, respectively, with a faster drop-off in demand for the smaller denominations of 5c, 10c & 20c. Also, allowing for the coin attrition rate and the growth in Australia's population, the number of coins in circulation per person has declined by almost 20% in the past 12 years. Calculation of the Usage Ratio indicated the present underutilisation of the 5c and 10c coins and the enhanced usage of the 50c, \$1 & \$2 relative to the total numbers of each denomination in circulation. The increase in total value of coins purchased each year does not bear a close relationship to the GDP growth rate despite their continuing use for a percentage of cash transactions. However, the Australian monetary system continues to behave as a self-organising hierarchical modular system, at least for values from 5c to \$20. Finally, we speculate on the effect the declining use of coins might have on designing a new Australian coin set.

Keywords

[circulating coins] [Royal Australian Mint] [attrition rate] [cash] [Usage Ratio] [GDP]

Introduction

The declining use of cash for payments over the past several years, driven by increasing use of credit/debit cards and electronic bank transfers, has been accelerated by the Covid-19 pandemic. Indeed, 'it is expected that the pandemic will have had a lasting effect on cash usage, with a survey of households conducted in late 2021 by the Reserve Bank suggesting around one-quarter of respondents have permanently reduced their preference for cash use as a result of the pandemic.¹ Sustained changes in behaviour will become apparent as further data are collected over the next several years.

Likewise, The Royal Australian Mint (the Mint) has experienced a continuing decline in Australian circulating coin purchases over the last 15 years. The Mint's Annual Reports present *Circulating coin purchases from the Mint by external parties* as Appendix A. These tables provide detailed yearly data for all denominations from 2005-06 onwards.

1 Reserve Bank of Australia, 2022 Annual Report, p. 104.

The latest available data, which is reported in the 2021-22 Annual Report, included corrections for the 2018-19, 2019-20 and 2020-21 financial years.² This provided an opportunity to make some observations on Australia's circulating coin behaviour over the past decade and a half.

Number of coins and total value purchased per year

Figure 1 shows the total number of coins purchased each year and their total value. There has been a steady decline in the total number of coins purchased each year over a 15-year period of about 65% and a corresponding decline in their total value of about 60%. The decline in value is even more significant when one considers that the average inflation rate over the period was 2.3%.³ The higher slope of the total coins per year relationship is driven by a faster drop-off in demand for the smaller denominations of 5c, 10c & 20c (see Figure 2).

The raw data shown in Figure 1 could be influenced by cyclical trends in the economy and the slope could be affected if very different economic conditions prevailed at the beginning and end of the period analysed. (GDP growth rate is considered later in this article.) If one simplistically follows the linear regression relationships shown in Figure 1, this would predict the sale of zero coins in about the year 2024 and zero value in about 2030. Obviously, this is unrealistic, and one would expect an asymptotic approach to zero assuming the use of cash continues to decline steadily. Of course, step changes such as the withdrawal of the 5c coin or introducing a new (smaller) coin set could alter the slope of both of these relationships.

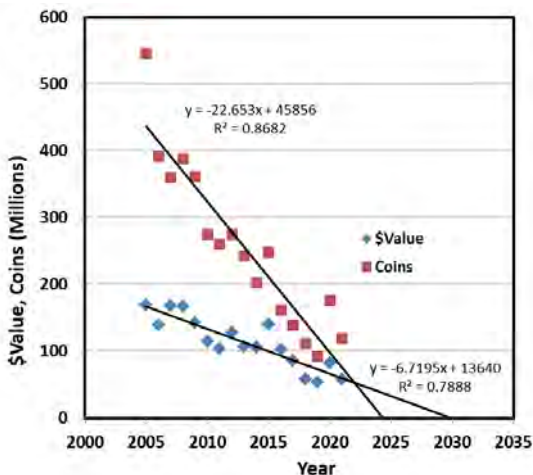


Figure 1: The total number of coins and total value purchased each year over the period 2005-2021 (■ coins; ◆ \$Value).

2 Royal Australian Mint, Annual Report 2021-22, pp. 34, 99.

3 Reserve Bank of Australia, Inflation Calculator, <https://www.rba.gov.au/calculator/annualDecimal.html>. Accessed 21 Aug 2023.

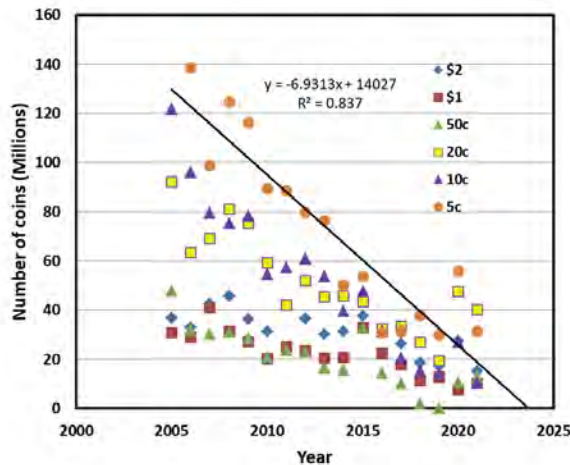


Figure 2: The number of coins of each denomination purchased each year over the period 2005-2021. Line of best fit drawn for 5 cent coin.

Number of coins in circulation per person in Australia

Figure 3 shows the number of coins in circulation per person in Australia from 2005 to 2021, allowing for the increase in population over that time (Macrotrends LLC data⁴). The upper curve uses the Mint's raw data (Appendix A), which does not allow for coin attrition; it exhibits a plateau of about 480 total coins per person from 2015. The lower curve shows the number of coins per person allowing for a weighted average coin attrition rate⁵ of 3.3% (calculated from data for each denomination collected in 2019/20⁶). The number of coins in circulation per person reached a peak of about 268 in 2009, gradually decreasing to 219 in 2021, a drop of 18% in 12 years. Assuming that circulating coin demand was essentially being met during this period, this result suggests that a declining number of coins were actually required each year (as the trend away from cash transactions continued).

Interestingly, a quadric relationship fitted to the lower curve (Figure 3) would intersect the x-axis (i.e., zero coins per person) at about the year 2034. Of course, there is no reason to think that such a relationship reflects an underlying model of behaviour and that a 'hard landing' would occur. As inflation reduces the relative usefulness of coins in everyday transactions, one could anticipate accumulation of residual coins in the home rather than being returned to circulation; thus, the decrease in the use of coins would be gradual.

4 Australia Population 1950-2023, <https://www.macrotrends.net/countries/AUS/australia/population>. Accessed 19 Jan 2023.

5 The attrition rate is the percentage of coins permanently lost from circulation per year. It does not take into account hoarding.

6 2019/20 attrition rate data unpublished. Data for surveys conducted in 2008 and 2012 are available at: Frazer, E.J. and van der Touw, J., 'The Attrition Rate, Lifetime and Hoarding of Australian Decimal Coins', *The Australian Economic Review*, Vol 49, No. 3, 2016, pp. 290-303.

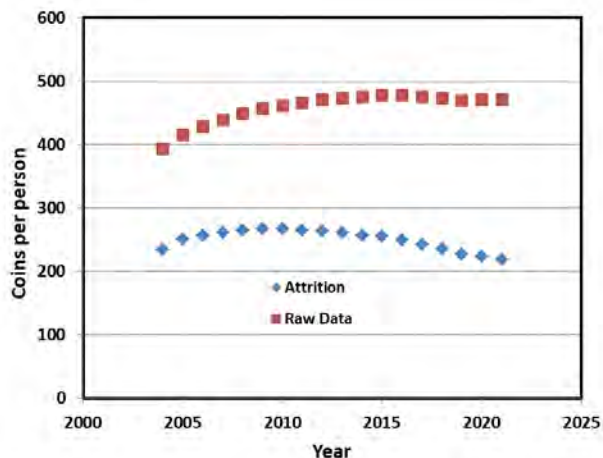


Figure 3: The number of coins in circulation per person in Australia (allowing for population growth) over the period 2005-2021 (■ raw data; ◆ allowing for coin attrition).

Calculation of the Usage Ratio of each denomination

The decreasing usefulness of the lower denomination coins due to inflation has become apparent over the past few years. Indeed, some Australians are literally throwing away loose change. A 2017 survey of 1000 Australians found that 93% admitted to throwing away 5 cent coins and 29% have thrown away 10 cent coins.⁷ There have certainly been a number of calls for the withdrawal of the 5 cent coin over the years. On the 50th anniversary of decimal currency in 2016, the Mint's CEO signalled the 'natural death' of the five cent coin.⁸

In order to judge the relative usage of the current six denominations, throughput data was collected from a major currency processing centre in Melbourne which takes feed coin from several Victorian cities. This is assumed to be representative of Australia as a whole given that Victoria's population is ~25% of the total. Specifically, the percentages of the various denominations processed from January to March 2021 (a total of 75.6 million coins) were recorded and compared with the percentages in circulation calculated from data available in 2018 (i.e., allowing for attrition); with such a huge pool of coins, the proportions of the denominations in circulation are not expected to have changed substantially over three years.

Table 1 shows the 'Usage Ratio' which is defined here as the ratio of the percentage processed to the percentage in circulation for each denomination. The Usage Ratio increased with denomination from 0.47 for the 5c to 1.85 for the \$2. These results

7 Banney, Alison, We hate coins so much we're throwing them away, Finder AU, 3 October 2017, <https://www.finder.com.au/we-hate-coins-so-much-were-throwing-them-away>. Accessed 22 Feb 2023.

8 Five cent coin on chopping block as Australia marks 50th anniversary of decimal currency, ABC News, 14 Feb 2016, <https://www.abc.net.au/news/2016-02-14/australia-marks-50th-anniversary-of-decimal-currency/7166624>. Accessed 20 Jan 2023.

indicate that, at present, the 5c and 10c coins are being underutilised compared to the numbers in circulation, while the 50c, \$1 & \$2 coins are carrying an increasing load as prices have risen due to inflation. With a Usage Ratio of near 1, the 20c coin appears to be at an equilibrium with the numbers in circulation.

Table 1: The Usage Ratio of Australia's current coin denominations based on a sample of 75.6 million coins processed

Denomination	Processed 2021 (%)	In circulation 2018 (%)	Usage ratio
5c	13.15	27.69	0.47
10c	16.26	20.59	0.79
20c	22.42	20.51	1.09
50c	12.60	9.75	1.29
\$1	15.78	10.77	1.46
\$2	19.79	10.70	1.85
Totals	100	100	

Change in cumulative value versus GDP growth rate

Since coins are used for some fraction of cash transactions (i.e., involving coins and/or banknotes), one might anticipate a loose relationship between the volume (value) needed and GDP. However, one would also anticipate that any correlation would be moderated with time because of inflation and the gradually decreasing use of cash, particularly for retail transactions. The total value of coins minted is equivalent to only about 4% of the value of banknotes on issue, which the RBA reported as reaching \$102.3 billion at the end of June 2022, equivalent to around 4½% of nominal GDP.⁹

Figure 4 shows the percentage increase in the cumulative value of coins purchased per year (calculated from the Mint data) versus the yearly GDP growth rate (Macrotrends LLC data¹⁰). A linear fit would suggest that a GDP growth rate of 2.5% requires a change in cumulative coin value of about 3.4%, but the correlation is very weak ($R^2 = 0.3$). Introducing a one or two year lag between value and GDP growth did not improve the fit. The average increase in the cumulative value of coins over the 17 year period (2005-2021) of 3.4% is essentially equivalent to the weighted average attrition rate of 3.3% for coins, suggesting that replacement is significant in determining coin sales rather than some indirect response to GDP or other factors. Of course, caution is needed when comparing percentages calculated on slightly different bases (value and number, respectively), but there is a close relationship between the total value and total number of coins.

⁹ Reserve Bank of Australia, 2022 Annual Report, p. 103.

¹⁰ Australia GDP Growth Rate 1961-2023, <https://www.macrotrends.net/countries/AUS/australia/gdp-growth-rate>. Accessed 22 Jan 2023.

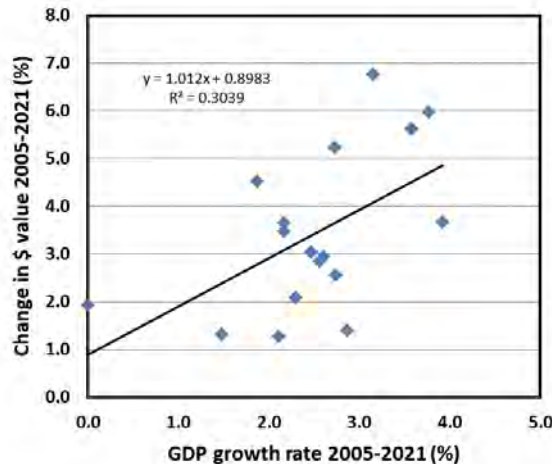


Figure 4: The percentage change in the total value of coins in circulation (allowing for attrition) versus the GDP growth rate over the period 2005-2021.

Money as a self-organising hierarchical modular system

Caianiello et al., have developed a theory showing that ‘money’ can be considered as a self-organising hierarchical modular system.¹¹ The theory is based on the principle that the average value in a monetary system must remain invariant regardless of alteration (for example, losing lower levels due to inflation). A plot of the logarithm of the level value versus the logarithm of the total value of money in circulation at that level should be linear with slope of 0.5. This relationship, which takes into account both coins and banknotes, was demonstrated for ten different countries.

Previously, data for the 5 cent - \$2 series of coins in circulation (2010/2011) was combined with the value of banknotes on issue for the \$5-\$100 series (RBA, 2013). The relationship was shown to hold for the 5 cent - \$20 series, with a slope very close to 0.5.¹² In the present case, the plot (see Figure 5) was made using the 2021 Mint cumulative data (i.e., without an allowance for attrition) and the RBA data for 2022 (which makes no allowance for notes stored, lost or held abroad).¹³ The correlation for the 5 cent - \$20 series was slightly stronger ($R^2 = 0.96$ vs 0.93) but the slope was higher at 0.59. Again, the \$50 and \$100 notes did not conform because they are being used for purposes other than transactions, basically being held for precautionary or store-of-wealth purposes. One factor which might influence the present result is an increase in the relative supply of banknotes versus coins over the past decade, perhaps due to inflation and hoarding during the pandemic.

11 Caianiello, E.R., Scarpetta, G. and Simoncelli, G., ‘A systemic study of monetary systems’, *International Journal of General Systems*, vol 8, 1982, pp. 81-92.

12 Frazer, E.J. and van der Touw, J., ‘The Attrition Rate ... Australian Decimal Coins’, see footnote no. 6.

13 Reserve Bank of Australia, Statistical Tables: Banknotes on Issue by Denomination – A6, <https://www.rba.gov.au/statistics/tables/>. Accessed 26 Aug 2023.

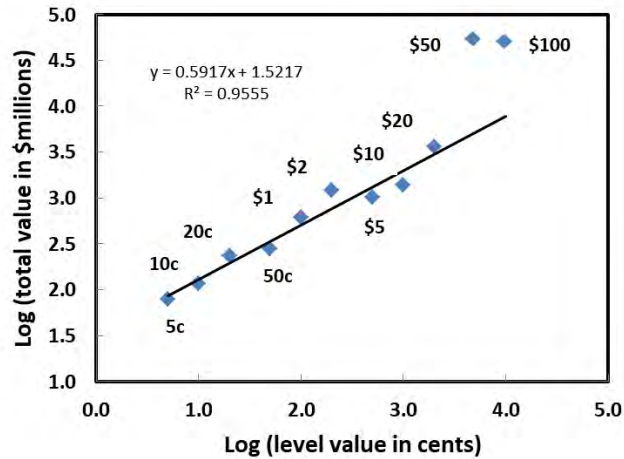


Figure 5: Plot of logarithm of total value of money in circulation at each denomination level versus logarithm of level value for Australian coins and banknotes. Line of best fit drawn for 5 cent – \$20 series.

Concluding remarks

This analysis of Australia's circulating coin behaviour was conducted against the general background of declining cash usage (both coins and banknotes) in favour of credit/debit cards and other forms of cashless payment. The observations discussed here use the latest data published in the Royal Australian Mint's 2021-22 Annual Report, principally Appendix A: *Circulating coin purchases from the Mint by external parties*.

The number and total value of coins purchased from the Mint has steadily declined over the past 15 years consistent with the declining use of cash and accelerated by the Covid-19 pandemic. It seems unlikely that this trend will change, particularly as the perceived usefulness and acceptance of the lowest denominations (5c & 10c) decline. Indeed, allowing for the attrition rate and the growth in population, the number of coins in circulation per person has declined by almost 20% in the past 12 years.

The actual shape of the downward trend in coin demand is difficult to predict, but one can speculate that the use of the lower denominations such as 5c, 10c & 20c will gradually be replaced by the higher denominations, consistent with the present Usage Ratio results. (Perhaps coincidentally, the Mint's just released 2022-23 Annual Report highlights a 10% increase in the value of coin sales from 2021-22 driven by demand for the \$1 & \$2 coins.)¹⁴

On a more general note, the value of coins purchased each year does not bear a close relationship to GDP despite their continuing use for a percentage of cash transactions. However, given that coins represent only about 4% of the value of banknotes on issue, which themselves represent only 4½% of nominal GDP, perhaps the lack of close

¹⁴ Royal Australian Mint, Annual Report 2022-23, pp. 9, 95.

relationship is not too surprising. It may be that any need for extra coins each year is essentially being offset by the gradual decline in the use of cash. It appears that the Australian monetary system continues to behave as a self-organising hierarchical modular system, at least for values from 5c to \$20.

Finally, one might speculate on the fate and future production of Australian circulating coins. In 2006, our close neighbour, New Zealand, replaced their existing 5c, 10c, 20c & 50c cupronickel coins with new and smaller 10c (copper-plated steel), 20c and 50c (nickel-plated steel) coins. The 5c denomination was discontinued and the existing \$1 and \$2 coins (aluminium bronze) were retained. If Australia were to follow a similar path, perhaps stimulated by the recent Covid-19 pandemic and present period of high inflation, it would be difficult to imagine the continued production of either the 5c or 10c coins. The resulting limited coin set could be augmented by a \$5 coin – perhaps produced in a bimetallic to minimise its size and distinguish it from the \$1 coin. Interestingly, Switzerland continues to produce a 5 franc piece with a diameter very similar to our 50c piece; it is presently equivalent to about A\$7.50.

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Author

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