
Articles

The modernisation of New Zealand's currency and cash distribution

Alan Boaden, Currency and Building Services Department

This article discusses the various changes to the currency and cash distribution procedures that have occurred in recent years, together with the more recent decisions to modernise the 'silver' coins. Polymer notes, which were introduced in 1999, are found to have proven very durable and cost-effective compared with the older paper notes. The Reserve Bank's move to become a wholesale supplier of currency (ie no longer participating in the daily distribution of cash to the registered banks) has significantly reduced costs in this area. The article explains the recent decision to opt for smaller and lighter 'silver' coins and to withdraw the 5 cent coin from circulation, noting that the new coins are expected to bring significant benefits for the public.

1 Introduction

The Reserve Bank of New Zealand Act (1989) provides the Bank with the sole right to issue bank notes and coins. In undertaking this role, the Reserve Bank manages the design and manufacturing of New Zealand's currency, and controls the issuance of notes and coins to the registered banks. The Bank also withdraws damaged or unusable currency from circulation.

In recent years, the Bank has implemented a number of measures to modernise New Zealand's currency and has made some important changes to the process by which cash is distributed to banks. Polymer bank notes were introduced in 1999, replacing the previous paper notes. In 2000 the Bank withdrew from its role in the daily distribution cycle of bank notes, with this function now performed by the registered banks and security companies. In March 2005, following a review of the country's silver coinage, the Bank announced a decision to remove the 5 cent coin from circulation and to make the remaining silver coins smaller and lighter. Collectively, these changes should help to ensure that New Zealand's currency (and the process by which it is provided to the public) continues to meet or lead international best practice.

The purpose of this article is to review the various changes to the currency and cash distribution procedures that have occurred in recent years, together with the more recent decisions to modernise the silver coins. In what follows, these topics are covered in sequence, starting with the polymer

notes and cash distribution procedures, and finishing with the recent decisions around changes to the silver coins.

2 Polymer bank notes

Introduction

In May 1999 the Reserve Bank first introduced bank notes printed on polymer; until that date all notes were printed on traditional cotton-based paper. Polymer is a relatively new technology developed by the Reserve Bank of Australia with technical input from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia. The first polymer bank note was issued into circulation in Australia in 1988.

The polymer substrate is exclusively provided by Innovia Films Limited under a joint venture with the Reserve Bank of Australia. The substrate is manufactured using the 'bubble' process, which produces a film that is based on a specialised form of Biaxially Orientated Polypropylene. The film used for bank notes differs significantly from other polymers and is not available commercially. In addition, the advantages of a polymer substrate for bank note printing are significant:

- Polymer is non-porous and non-fibrous and is resistant to attack from water, oils, beverages, sweat and most common household chemicals.
- Polymer is more robust than paper, and being non-fibrous, it does not break down physically with repeated folding.

- Polymer has a high resistance to tearing, especially compared to paper.
- Polymer bank notes are given a protective overcoat of two layers of clear lacquer on each side of the note, which enhances protection from ink wear and extends the life of the note.
- Polymer allows for greater security to be incorporated into the bank note through the interaction of the substrate, print and add-on features – for example, the ability to provide a clear window incorporating a security feature.

Since May 1999 the Bank has issued 165 million polymer bank notes into circulation. The key expectations for polymer were for the notes to:

- reduce the risk of counterfeits;
- have improved structural durability and cleanliness; and
- be more cost-effective to issue.

Counterfeits

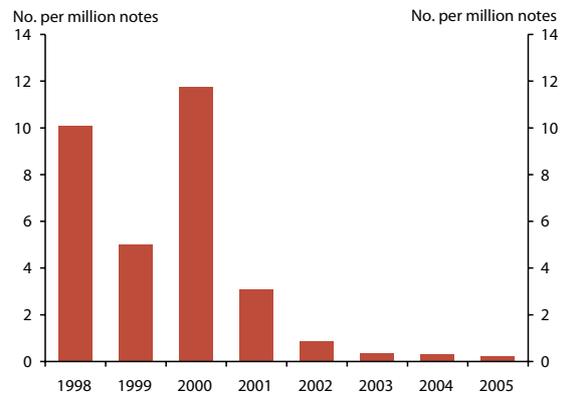
In the past four years, with most notes in circulation being polymer, the number of counterfeits detected per million notes in circulation has dropped dramatically. Figure 1 illustrates this.

To date, nearly six years since the first polymer note was issued into circulation, there have been no counterfeit notes printed on plastic. All forgeries have been printed on ordinary paper and have been relatively easy to detect.

Bank notes incorporate quite sophisticated anti-counterfeiting features. There are three levels of verification. First, the 'general public features' need to be difficult to counterfeit but easy to find. For polymer notes the key public security feature is the transparent 'window' which is unique to the polymer substrate. New Zealand bank notes contain two transparent windows, one incorporating the denomination numeral embossed in it, and the other in the shape of a fern leaf.

For the cash handler, such as a bank teller, a genuine note can reliably be verified by the use of an ultraviolet light. Most commercial papers glow under such light; however, polymer

Figure 1
Counterfeit notes detected
(March years)



note substrate is UV dull and will not glow. In addition, special inks used in the note will appear only under an ultraviolet light. New Zealand notes will display the denomination numeral, as illustrated in figure 2 for a \$5 note.

Figure 2
Ultraviolet security feature

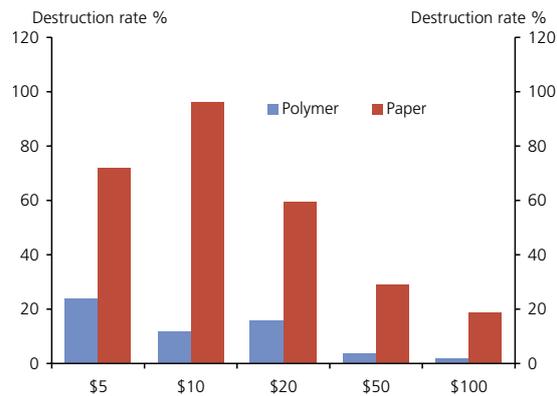


There are a number of hidden security features that can only be verified by a note processing machine. These machines are typically located in central banks and are used to check unfit notes before they are destroyed.

Durability

Experience in New Zealand to date confirms that polymer bank notes retain their structure and cleanliness over a much

Figure 3
Note destruction rates¹



longer period than paper notes. In the March year 1997/98, when all bank notes in circulation were paper notes, the Bank destroyed 57 per cent (40 million notes) as unfit for circulation. In the year to 31 March 2005 the Bank has destroyed just 15 per cent (17 million notes).

In addition, before being destroyed as unfit, the polymer notes are currently lasting 82 months on average. This is more than four times the life of a typical paper note.

Polymer bank notes are generally removed from circulation due to 'mechanical' faults, such as physical damage (holes or tears or parts of the note missing), tape attachment, defacement, and adherence of any substance that causes the notes to stick together. The detectors on the processing machines at the Reserve Bank are designed to recognise these faults and destroy the note (by shredding).

Some security companies also use note processing machines that check notes for authenticity and quality. If a machine in a security company meets Reserve Bank specifications, unfit currency detected by the machine may be sent to the Bank for destruction at the Bank's cost.

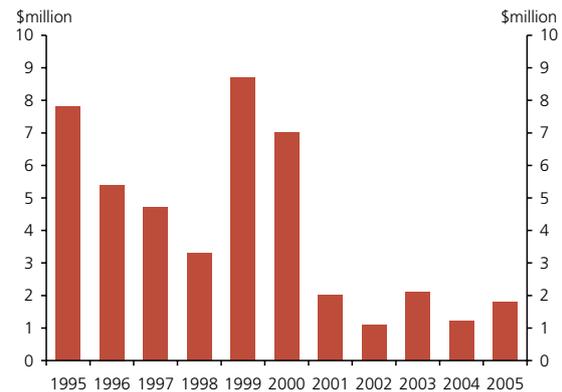
In the situation where a person has a portion of a bank note in their possession, the Reserve Bank guideline is that if there is at least two-thirds of a note in a single piece then it is worth full value. If there is less than two-thirds but more than one-third of the note in a single piece then it is worth half the face value. If there is less than or equal to one-third of the note then it has no value.

¹ Destruction rates are for the 2004/05 March year (polymer), and for the 1997/98 March year (paper).

Cost-effectiveness

Polymer notes have also proved very cost-effective. In the four years prior to the introduction of polymer notes, note issue expenses averaged \$3.4 million per annum or 5.2 cents per note in circulation. In the year to 31 March 2005, note issue expenses were \$2 million or 1.8 cents per note.

Figure 4
Note issue expenses²



The future

In recent years the number of countries that have introduced at least one polymer bank note into circulation has risen significantly. Countries to recently introduce polymer notes include Mexico, Malaysia, Chile, Zambia, Vietnam and Singapore. The polymer substrate is also proving very adaptable to new and enhanced security features. It is now possible to incorporate quite sophisticated features into the clear window, such as a diffractive optical element which will produce an image when a light source is targeted on the window.

At present, the Bank is not considering changing the bank notes as the designs and sizes are well accepted, note life is meeting expectations, and counterfeiting is very low. However, it is desirable to keep ahead of the counterfeiter and it is likely that the Bank will take advantage of advances in technology to upgrade the security feature in the transparent window, probably within the next five years or so.

² The spikes in this chart in 1999 and 2000 coincide with the introduction of polymer notes and removal of paper notes from circulation.

3 Cash distribution procedures

Prior to the year 2000 the Reserve Bank played an integral role in the cash distribution process, with all surplus notes held by individual registered banks being deposited with the Reserve Bank on a daily basis and re-issued to other banks requiring cash. In 1998, 540 million notes were deposited with the Reserve Bank and 544 million were issued. At that time the Bank operated from three sites. These were in Wellington, Auckland and Christchurch.

The introduction of polymer notes provided the catalyst to change the role of the central bank from a retail processor of notes to predominantly a wholesale supplier. In 2004, 72 million notes were issued by the Bank and 67 million deposited from one site. About half of the annual note flow occurred around the seasonal peak times of Christmas and Easter.

As wholesale supplier, the Bank ensures that a sufficient stock of notes (and coins) is held securely to meet the needs of the community. This includes holding a sufficient supply of currency to meet a possible 'flight to cash' scenario that might occur following a natural disaster or some other large event. Also, the Bank encourages and facilitates the withdrawal and return of unfit currency, where it is checked for authenticity and destroyed.

The daily distribution of currency in the community is undertaken by the registered banks and security companies and generally appears to work very effectively; to date we have received no indications of shortages of either notes or coin anywhere in the country.

The withdrawal of the Bank from the daily distribution cycle has reduced expenditure considerably. For the currency function (note and coin issue and cash operations), average expenditure from 1996 to 1998 was \$16.4 million per annum, accounting for about 40 per cent of the total expenditure of the Bank. In the year ended June 2004 total currency functional expenditure was \$8.8 million or 24 per cent of the Bank's total expenditure.

With the change to the lower value coins it is expected that expenditure on the currency function will reduce to just 17 per cent of total Bank expenditure by 2007/08.

4 Modernisation of 'silver' coinage

On 31 March 2005, the Reserve Bank announced decisions regarding the modernisation of New Zealand's silver coinage. This will involve replacing the current 10, 20 and 50 cent coins with smaller, lighter coins and withdrawing the 5 cent coin from circulation.

This section of the article describes:

- the process of consultation and analysis that was undertaken;
- the nature of the decisions and their rationale;
- the demonetisation of current coins; and
- the future timetable.

Consultation and analysis

The Bank undertook an extensive exercise in gathering and evaluating information before making decisions on the modernisation of the coinage. Bank staff held meetings with representatives of banks, security companies, vending machine suppliers, retailers and various organisations representing the general public. Information was collected about these organisations' views on the merits of possible changes, and how any changes would affect them and their members.

The Bank commissioned a private research company, AC Nielsen Ltd, to undertake representative surveys of large retailers, small retailers and the general public. These surveys asked how coins were used by retailers and the general public, and whether there was support for possible changes.

On 11 November 2004 the Bank announced proposals and invited public submissions on them. The proposals included the introduction of new, smaller 10, 20 and 50 cent coins, and the withdrawal of the 5 cent coin from circulation. The Bank received 2,050 submissions. These comprised 456 email messages, 124 individual letters, 186 submissions from school students, and 1,284 form letters (photocopied letters distributed by a third party). Bank staff read and replied to all of them. The Bank contracted AC Nielsen to analyse the

feedback received from the general public in order to have an independent assessment.

The main purpose of the Bank's public consultations was to test its proposals through public scrutiny and to find out if any important issues had been overlooked. The Bank found that no major surprises emerged from public submissions. Bank staff had already considered all serious suggestions made and they were already aware of the main issues raised.

The decisions

The Bank carefully evaluated public submissions, together with the information that had earlier been collected directly from interested parties and the general public. On 31 March 2005 the Bank announced its decisions that:

- The 10, 20 and 50 cent coins will be made smaller and their composition will be changed to plated steel;
- The new 20 and 50 cent coins will be nickel-plated to give a silver appearance and the 10 cent coin will be copper-plated;
- The 20 cent coins will have a 'Spanish flower' edging, and the 10 and 50 cent coins will be unmilled; and
- The 5 cent coin will be withdrawn from circulation.

The new coins are illustrated in box 1. The reasons for these changes are as described below.

a. The size of coins

A majority of the general public favour smaller 20 and 50 cent coins. The most common reason is that the current coins are too bulky or heavy to carry around. New Zealand's 50 cent coin is one of the largest coins in circulation anywhere in the world. It is, for example, 75 per cent heavier than the modern 50 eurocent coin. There is considerable anecdotal evidence that many people have large collections of coins at home in jars or drawers.

Most major business users of coins (retailers, banks, security firms and the vending industry) expect short-term transition costs but important longer-term benefits from changing the coins. Banks and security firms have said that smaller coins

will be easier to handle, with benefits to transport, storage, and occupational health and safety. FINSEC, the major financial sector employees' union, has strongly supported downsizing on health and safety grounds.

Retailers have reported that staff would find smaller coins easier to carry in floats and tills. Smaller coins would also be easier to store and would leave more space in tills. A smaller 50 cent coin could be used more widely in vending machines.

b. The composition of the 10, 20 and 50 cent coins

New Zealand's existing 'silver' coins are manufactured from cupro-nickel (75 per cent copper and 25 per cent nickel). These are relatively expensive metals and their prices are subject to significant variability. In the past two years both metals have risen in price by around 100 per cent.

In recent years a new technology has become established, using steel, plated with either nickel (to give a silver appearance) or copper (to give a reddish appearance). Europe, the United Kingdom, Canada and South Africa have issued plated steel coins. Plated steel coins are considerably cheaper, with nickel-plated steel costing about 25 per cent less than cupro-nickel, and copper-plated steel being 33 per cent cheaper. The plating comprises about 3 per cent of the coin.

The physical characteristics of plated steel coins are the same as the existing coins. They will 'feel the same', but they will be lighter. The average expected life of a plated steel coin is less than that of a cupro-nickel coin, but only marginally so. In the year to June 2004 it cost the Bank \$3.5 million to meet demand for 5, 10, 20 and 50 cent coins. When the size of these coins is reduced and they are manufactured in plated steel, the Bank, and thus the taxpayer, will save approximately \$2 million per annum.

c. Edge treatments

Bank staff have spoken with the Royal New Zealand Foundation of the Blind (RNZFB) and the New Zealand Association of Blind Citizens regarding the proposed new coins during the consultation phase. The edge treatments of

coins, as well as their weight and diameter, are very important for helping blind and visually impaired people to distinguish between coins. Unmilled edges on the 10 and 50 cent coins, and the 'Spanish flower' edging on the 20 cent coin will give the new coins 'a whole new feel', making it easier for blind people to differentiate the new coins from the current ones in the transition phase. RNZFB representatives said that New Zealand's current coins are good by international standards but the new coins would be superior. It was likely that blind people would not need to compare coins but would be able to identify any coin by simply holding it alone. If blind people can distinguish between the new coins in this way, then sighted people should be able to do so easily too.

d. The 5 cent coin

Today, the 5 cent coin is worth less than half a cent was worth in 1967 when decimal currency was introduced. Surveys show that most people favour dropping the coin. This percentage has steadily risen from 19 per cent in 1987 to 68 per cent (with another 4 per cent neutral) in 2004. Reported comments indicate that most people regard the coins as a nuisance. One reason for this is the increased availability and use of EFTPOS which makes coins less necessary to make transactions.

The Bank has issued almost 600 million 5 cent coins since their introduction in 1967. This is about 150 for each man, woman and child in New Zealand. Each year the Bank issues a further 20 to 30 million 5 cent coins. They appear to be mainly used by shops to give change in cash transactions. They are not used in many vending machines because of their low value and because their small size often causes the machines to jam.

The AC Nielsen survey of the general public asked people what they did with 5 cent coins. Answers revealed that after almost half of transactions involving a 5 cent coin the person receiving the coin removes it from circulation. Some people do recirculate 5 cent coins. However, over time the predominant trend is for the coins to be issued by the Reserve Bank to trading banks, then to shops and then to be removed from circulation. They have increasingly become a 'one transaction coin' rather than a circulating coin.

The most common reason why some people favoured retaining the 5 cent coin was that they thought prices would rise if it was withdrawn. They thought shopkeepers would increase prices or would round up totals ending in 5 cents. In contrast, some retailers were concerned that competition would force them to lower prices, or round them down, and that this would reduce margins to unacceptable levels.

In reality it is very likely that some prices ending in 5 cents will be increased to end in 9 or 10 cents; some will be reduced; and many will be unchanged. The Consumers Institute undertook a survey after the 1 and 2 cent coins were withdrawn and found that prices actually fell slightly. It is again likely that competition in the retail sector will restrain widespread price increases. The overall impact on the cost of living and on retailers' sales and profitability is likely to be very small.

The Bank's Economics Department has undertaken some analysis of the potential impact of the removal of the 5 cent coin. This work, which has been posted on the Bank's website (www.rbnz.govt.nz), concluded that the effect on prices faced by most households would be negligible. Statistics New Zealand has checked this analysis and has found it to be sound.

The Bank concluded that the balance of arguments favoured withdrawal of the 5 cent coin. One important consideration is that this is a major review of our coinage. The Bank should make decisions that will not need to be reviewed for 30 years or longer. As time passes the 5 cent coin would become less valuable and more of a 'nuisance'.

e. Industry transition costs

The introduction of the new coins will bring major ongoing benefits to businesses involved in handling cash, and to their staff. As noted above, banks, security companies and retailers have said that smaller, lighter coins will bring significant benefits, particularly in terms of the cost and ease of handling, and from alleviating OSH issues.

However, there will be transition costs for many businesses that handle coins. The largest costs will be for the recalibration of coin 'changer' vending machines, and coin

Box 1

Existing and new coins

Existing 'silver' coins		New coins <i>10 cent colour simulated.</i>	
	5 cent (19.43mm)		
	10 cent (23.62mm)		10 cent (20.5mm)
<i>Minted pre-1990</i> 	20 cent (28.58mm)		20 cent (21.75mm)
<i>Minted post-1990</i> 			
	50 cent (31.75mm)		50 cent (24.75mm)

The existing \$1 and \$2 coins will not change.

counting and sorting equipment. The adjustments required will vary from full machine replacement to a 15 second reprogramming for parking 'pay and display' machines. It will be relatively simple to reprogramme many modern coin vending machines that have been used in New Zealand since about 1992.

The Bank will assist those in the coin-handling business by:

- providing sample coins for inspection as early as possible;

- distributing production coins for testing and for the calibration of machines six months before the first issue day;
- facilitating the transfer of new coins to retailers; and
- facilitating the return of old coins to main centres.

f. The number of coins

The Bank is a monopoly supplier of currency. It is therefore very important that it orders sufficient coins to satisfy the demand for the new coinage. There would be significant costs and inconvenience for businesses and households if there was a shortage. On the other hand, if the Bank purchased an excessive number of coins then it would pay additional holding costs for a number of years. On balance it seems prudent for the Bank, when deciding how many coins to have struck, to be prepared to pay a reasonable 'insurance premium' to avoid the risk of having insufficient coins.

The Bank plans to order 140 million 10 cent coins, 50 million 20 cent coins and 40 million 50 cent coins, ie 230 million coins altogether. The Bank estimates that this would be sufficient to replace the active balances of businesses and households, and for the Bank to hold stocks equal to three years' normal net issues of coins. This is a large volume of coins. The total weight will be about 860 metric tonnes and will require about 35 shipping containers to transport them to New Zealand.

g. Other issues

The \$1 and \$2 coins were not included in this review for several reasons.

- They are comparatively new coins, having been introduced in 1991.
- They are not overly large like the current 20 and 50 cent coins.
- They appear to circulate well rather than be hoarded or lost like the lower value coins.

The Bank decided in October to leave the designs of the coins unchanged because:

- The current designs are seen as good images; and
- To do otherwise would generate considerable public debate and would distract attention from more important priorities.

Demonetisation

The Bank proposes to 'demonetise' the current coins with effect from about three months after the new coins are issued. The Bank will declare early in 2006 that the old coins will not be legal tender after a specified date, yet to be determined. From that date they need no longer be accepted as payment for goods and services. However, the Bank itself, or its agents, will always redeem them at face value.

It is important that the old coins be demonetised and withdrawn from circulation for several reasons.

- Banks, shops and other large cash-handlers would face considerable staff costs in handling and sorting two sets of coins.
- Many bulk coin handling and sorting machines would not be able to process the higher number of coin sizes. Coin weighing machines would be rendered ineffective unless coins of the same value were continually separated by size.
- Businesses operating vending machines, including parking meters, would like to see a fast changeover so that they can quickly convert their machines to accept the new coins.
- Many of the general public would probably find it confusing and annoying having coins of two different sizes for the same denominations.

Demonetising is a normal procedure following a currency change. In the recent past the Bank has demonetised 1 and 2 cent coins and \$1 and \$2 notes. The Bank will sell the old coins that are recovered for scrap.

Future timetable

The Bank invited several overseas mints to submit tenders for the supply of new coins. These are currently under consideration and a decision will be made by 31 July. Later this year the Bank will invite tenders for the sale for scrap of old coins that will be recovered after the changeover in 2006.

A group has been formed, chaired by the NZ Bankers' Association, to plan arrangements for the distribution of the new coins and the recovery of old coins. It includes representatives of individual registered banks, security companies and the Reserve Bank.

Later this year the successful mint will prepare sample coins and production coins for testing by the vending industry and by some other organisations, including the Royal NZ Foundation of the Blind.

In early 2006 the Bank will launch a public awareness programme to explain what will happen when the new coins are issued and what people should do with their old coins.

The Bank expects to issue the new coins around July 2006 and the current coins will be demonetised about three months later. Experience from the introduction of the euro in Europe suggests that four to six weeks after the first issue of the new coins they will have largely replaced the existing coins.

The introduction of the new coins will affect everyone in New Zealand to a greater or lesser extent. They will bring major benefits to businesses involved in handling cash, to their staff, and to the general public. It is expected that the Bank will not need to make any other changes to these

coins, unless it decides to change the designs, for at least 20 or 30 years.

5 Conclusion

The Reserve Bank issues currency, notes and coins to meet the transaction needs of the New Zealand public, both businesses and households. The Bank continually reviews the currency that it issues and its distribution arrangements in order to ensure that it achieves its objectives efficiently and effectively.

In recent years the Bank has significantly improved the quality of notes in circulation and reduced their cost by converting them from paper to polymer. It has also lowered costs by focusing on its role as a 'wholesale' supplier of currency to banks rather than providing free daily 'retail' services. The introduction of new, smaller 10, 20 and 50 cent coins will bring further benefits to cash-handling businesses and the general public.

These changes all represent the progressive modernisation of the nation's notes and coins, and should help ensure that New Zealand's currency remains at the leading edge of international best practice.