

Recent trends and developments in currency – 2009

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1 Introduction

The Reserve Bank has the sole right to issue New Zealand's currency; that is, the bank notes and coins we use every day. Maintaining the supply, quality, and integrity of the currency is one of the Reserve Bank's core functions. To do this, the Reserve Bank closely monitors trends in the demand for notes and coins. We undertake banknote processing both to maintain the quality and to check the authenticity of notes in circulation. This article describes the recent trends and developments in New Zealand's currency.

In particular, the article reports on trends in the use of currency in connection with the Reserve Bank's currency function and goals. Section 2 shows that currency in circulation has been steadily growing. Section 3 reports on the Reserve Bank's note processing activity and bank note quality while section 4 takes an in-depth look at counterfeiting activity in New Zealand and the different ways of measuring counterfeiting. Coin issuance and the return of obsolete currency held by the New Zealand public are discussed in section 5, and summarising comments are made in section 6. The appendix at the end of the article describes New Zealand's out-dated currency.

2 Our notes and coins in circulation

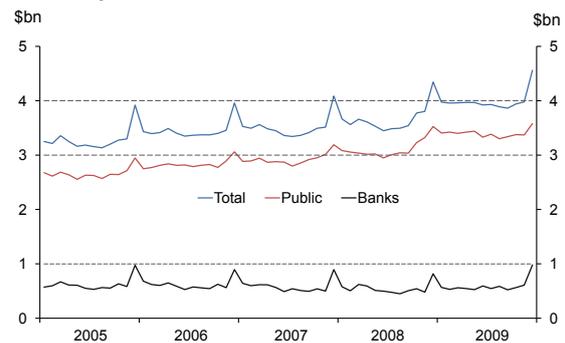
To understand the quality and quantity of currency in circulation it is important to know the goals the Reserve Bank sets for its currency function. The first goal is to meet the public's currency demand in a timely manner such that private households, retailers, other businesses, and banks are always able to hold and use desired quantities of currency for transactions. As the sole issuing authority of legal tender, it is the Reserve Bank's objective to supply currency when demanded.

Figure 1 shows that currency held by the general public is steadily growing. Within this trend, the chart shows clear spikes each year during the Christmas holidays. Currency held by households and retailers had risen to be around \$3.2

billion by December 2007. However, towards the end of 2008, currency held by the public lifted to \$3.5 billion. This was due to the global crisis damaging some New Zealanders' confidence. Some of the cash that was demanded in the last quarter of 2008 was repatriated during 2009. However, the level of currency held by the public is still significantly higher in 2009 than in 2008. With real interest rates lower in 2009 than 2008, the opportunity cost of holding currency was lower and the public held more currency both for transaction purposes and as a store of value.

Table 1 shows that during 2009, total currency in circulation increased by almost 5 percent. During the last five years, total currency in circulation increased by an annual average of 4 percent. The value of currency held by banks had generally decreased over time, but actually increased significantly during the past year. While total currency in circulation rose by 24 percent during the last five years, currency held by banks and other financial institutions only grew by 6 percent. Currency held by the public increased by 31 percent between the end of 2004 and the end of 2009.

Figure 1
Currency in circulation



Source: RBNZ.

In terms of bank notes, at the end of 2009 there were 149 million notes worth \$4.3 billion in circulation, whereas in 2008 there were 146 million notes worth \$4.1 billion in circulation. This is a difference of 3 million bank notes or \$200 million. The value of coins in circulation has also increased from December 2008 to December 2009. It grew from \$276 million to \$293 million.

Table 1

Value of currency in circulation (\$m) and annual growth

	General public	Banks	Total	Annual growth
Dec 2004	2,737	930	3,666	
Dec 2005	2,946	974	3,920	6.5%
Dec 2006	3,061	896	3,958	1.0%
Dec 2007	3,190	896	4,087	3.2%
Dec 2008	3,525	819	4,345	5.9%
Dec 2009	3,579	981	4,560	4.7%
5 year growth	31%	5%	24%	4.3%

Source: RBNZ.

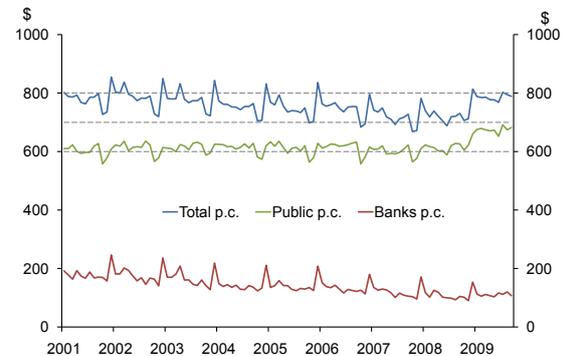
Currency in the hands of the public – adjusted for inflation and real growth

Currency held by the public has doubled in the last ten years. It grew from an annual average of \$1.7 billion in 1999 to an annual average of \$3.4 billion in 2009. The growth can be attributed to both inflation and economic growth. With higher prices, people need more currency to purchase the same amount of goods. With economic growth comes higher income and increased consumption. People demand more goods and hence demand more currency to purchase these goods.

Correcting for these factors gives insight into the payment behaviour of the public. People hold cash for transaction and hoarding purposes. Are people demanding currency today in the same proportion to their purchasing power as they did ten years ago? In last year's *Bulletin* article (Boaden and Langwasser 2009), we showed that currency in circulation corrected for inflation and real GDP growth was more or less constant between 2000 and 2008. In this article, I choose to look at per capita holdings of currency corrected for inflation and real per capita GDP growth. In 2001, on average, every New Zealander (including retailers) held \$600. Had no inflation or economic growth occurred until now, people would roughly hold the same amount of currency. In fact, due to the increased demand for currency as value storage last year (in combination with low inflation and low economic growth), per capita currency held by the public was, on average, about \$80 larger in 2009 than in 2008.

Figure 2

Currency in circulation, per capita, corrected for inflation and economic growth



Source: RBNZ.

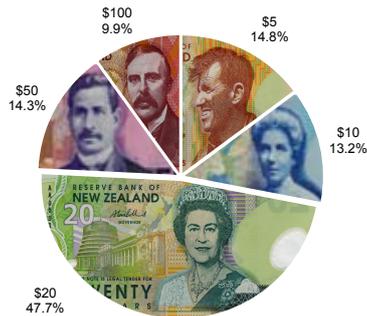
Figure 2 also shows that, per capita, currency holdings expressed in growth-adjusted real values were relatively constant until the last quarter of 2008. Bank holdings of growth-adjusted real currency per capita fell to half its level during the considered period. New Zealanders used constant amounts of currency in proportion to their purchasing power and their income until late 2008. People then decided to hold larger sums of currency, primarily as a store of value given decreases in real interest rates and increased uncertainty.

Composition of currency in circulation

Table 2 and figure 3 show the denominational composition of bank notes in New Zealand. Twenty dollar notes make up the largest share of notes in circulation with 48 percent. Interestingly, \$50 notes are becoming increasingly popular. During 2009, the number of \$50 notes in circulation rose by 23.7 percent and \$50 notes currently account for 14.3 percent of all notes in circulation. At the end of December

2008, the share of \$50 notes in circulation was only 11.8 percent. This development is due to a wider use of \$50 notes rather than \$20 notes in ATMs. At the end of 2008, the share of \$20 notes in circulation was exactly 50 percent. Over the year 2009, its use shrank by 2.5 percentage points.

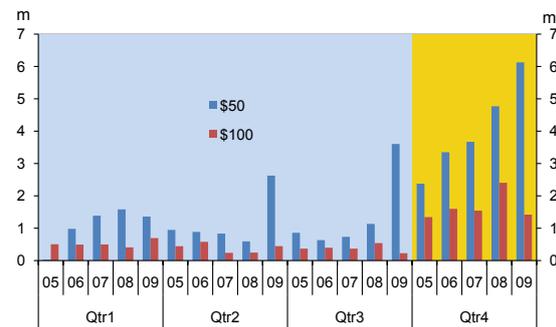
Figure 3
Number of banknotes in circulation – December 2009 as percent of total



Source: RBNZ.

Figure 4 shows the issues of \$50 and \$100 notes for each quarter of the years 2005 to 2009. Each year, the last quarter shows greater issues as the public demands more currency for the Christmas holidays. In 2008, there were exceptional issues of \$100 notes due to people hoarding more currency. In 2009, issues of \$100 notes reverted to their previous levels. The \$50 notes, however, were issued in larger amounts from the second quarter 2009 onward. Again, this is mainly due to \$50 notes being dispensed from ATMs more widely throughout New Zealand.

Figure 4
\$50 and \$100 notes issued (2005 to 2009)



Source: RBNZ.

3. Banknote processing and quality of bank notes

Another objective of the Reserve Bank's currency function is to maintain a high-quality standard of bank notes in circulation. This is important for the practical reason of protecting against the threat of counterfeiting. If bank notes are generally of poor quality, counterfeits are less easily detected by the public. This could lead to an increase in counterfeiting activity. Apart from practical reasons, I believe the New Zealand public prefers good-quality notes. Therefore, bank note processing is not just assuring that low-quality bank notes are filtered out; but by maintaining high note quality, the risk of a counterfeiting attack is also reduced.

Note processing

The Reserve Bank received 67.7 million bank notes in repatriations in 2009. Of these notes, 23 million were

Table 2
Bank notes in circulation as at 31 December 2009

Bank notes	Number (000)	Value \$(000)	Annual growth in value over 2009
\$5	22,029	110,147	5.1%
\$10	19,704	197,042	-2.3%
\$20	71,092	1,421,845	-2.5%
\$50	21,304	1,065,215	23.7%
\$100	14,761	1,476,070	2.1%
Total	148,891	4,270,319	4.9%

Source: RBNZ.

Table 3

Destruction of polymer notes in 2009, and paper notes in 1998

(000)	\$5	\$10	\$20	\$50	\$100	Total
Polymer notes destroyed	2,395	3,494	6,656	800	358	13,702
Average Polymer notes in circulation	16,441	15,165	58,112	16,439	13,726	119,883
Notes destroyed as % in circulation	14.6%	23.0%	11.5%	4.9%	2.6%	11.4%
Paper notes destroyed (1998)	7,871	12,599	18,024	1,951	870	41,315
Average paper notes in circulation	11,592	12,300	32,092	7,275	4,575	67,834
Notes destroyed as % in circulation	67.9%	102.4%	56.2%	26.8%	19.0%	60.9%

Source: RBNZ.

processed by the Reserve Bank’s note-processing machine. Machine processing identifies low-quality bank notes and destroys them. The note-processing machine also verifies the bank notes’ authenticity. Hence, machine processing is an important instrument for the Reserve Bank to maintain high note quality as well as checking for counterfeits. Altogether, the Reserve Bank destroyed 13.7 million bank notes that were below the Reserve Bank’s quality standard in 2009.

Bank notes are destroyed when they show signs of ink wear, staining, soiling, graffiti, or structural damage such as tears, holes, heat damage or missing corners. Notes made out of Polymer last a lot longer than paper notes. Table 3 shows that the Reserve Bank used to destroy over 60 percent of notes in circulation each year; while in 2009, the Reserve Bank destroyed only 11.4 percent of notes in circulation.

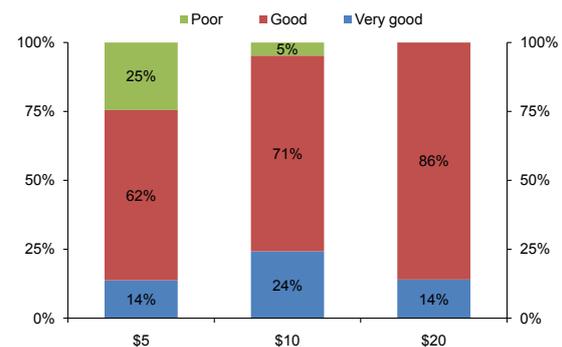
Only 2.6 percent of \$100 notes in circulation are destroyed, which makes them the least destroyed note. The \$100 note is mainly used for storing value rather than for transactions and hence its quality does not deteriorate as quickly. The \$10 notes are destroyed the most (23 percent of notes in circulation) as they are circulated frequently. That means they are passing through many hands and cash registers, which causes their quality to deteriorate. The \$5 note is the lowest denomination note in New Zealand and is the second most-destroyed note. In 2009, 14.6 percent of \$5 notes in circulation were destroyed. Typical of international experience, being the lowest-denomination note, the \$5 note shows the lowest quality (see figure 5) and should represent the largest number of notes destroyed. However, as the lowest-denomination note, it circulates between members of the public and retailers, who do not return them to their banks but keep them as change. This means that

they are not repatriated to the Reserve Bank as often as they should be. Thus, they are not destroyed accordingly. Some low-quality \$5 notes keep circulating. Furthermore, some currency takes a long time to be returned to the Reserve Bank, and New Zealand’s out-dated currency is described in the Appendix.

Quality of bank notes

In 2008 and 2009, the Reserve Bank conducted quality surveys of circulating bank notes. In 2008, 400 \$10 notes were collected from various places around New Zealand while in 2009, 400 \$5 and an equal number of \$20 notes were collected. All notes were scientifically examined with regard to security features (eg, windows, embossing and shadow image), structural damage (eg, holes, tears, and heat), tactility and ink wear. The quality of a bank note is largely determined by wearing of the ink. Paper notes are porous and therefore are stained very easily. Polymer notes, on the other hand, are not porous and are a lot more durable. However, the ink printed onto polymer notes

Figure 5
\$5, \$10, and \$20 quality by ink wear



Source: RBNZ.

tends to wear off with use and circulation. Hence, the most relevant property and the best indication of the quality of bank notes in circulation is ink wear.

Figure 5 shows the quality of the examined notes by ink wear. There were no poor-quality notes found among the sample of 400 \$20 notes. Only 5 percent of the \$10 notes were found to be of poor quality and a large proportion of 24 percent was found to be of very good quality, indicating poor-quality \$10 notes are being filtered out and replaced by new notes frequently. The \$5 note shows that a large fraction of the circulating notes is of poor quality. As explained above, the \$5 note is the so-called 'change-note' that is not very frequently repatriated to the Reserve Bank. Hence, the notes stay in circulation and their quality deteriorates further. This is a common phenomenon, experienced internationally with the lowest-denomination banknote.

In order to address this quality problem in the \$5 notes, the Reserve Bank undertook a note-swapping project. Brand-new notes were introduced into circulation in exchange for circulating \$5 notes. The physical act of exchanging the notes was completed by Armourguard (ADT) and Armaguard Cash Management (ACM), the two cash in transit (CIT) companies operating in New Zealand. Altogether, \$13.8 million or 2.76 million \$5 bank notes were swapped in the last quarter of 2009. This is equivalent to 12.2 percent of \$5 notes in circulation. An equal number of banknotes were repatriated to the Reserve Bank for processing.

The repatriated \$5 notes were generally not quality sorted by the CITs. At the time this article was written, the Reserve Bank had machine processed some of the 2.76 million \$5 notes and destroyed 52 percent of the processed notes, which were found to be of inadequate quality. If the destruction rate is constant throughout the entire batch, 1.44 million notes will be destroyed. The amount of destroyed notes would equate to 8.7 percent of \$5 notes in circulation and 35 percent of poor quality \$5 notes in circulation. Under the assumption that the note quality survey reflects the real proportion of poor quality \$5 notes in circulation, this share should have dropped from 25 percent to 16 percent. The Reserve Bank considers this as a success of the project. Another quality survey for the \$5 notes will be held in due course to check the long-term effects of the note swap.

4 Counterfeiting

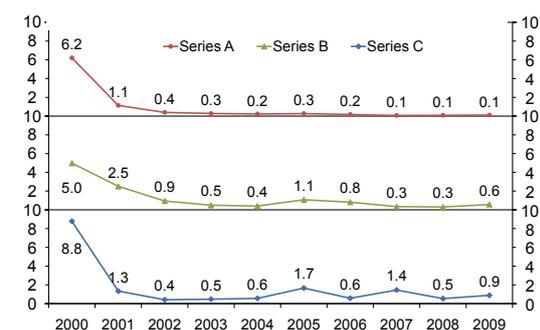
The third objective of the Reserve Bank's currency function is to maintain the integrity of the currency. An accepted international way to measure the level of counterfeiting is to report on counterfeits found per million notes in circulation (series C below). Our target is to ensure counterfeiting is kept below ten notes per million notes in circulation. This is a low number of forgeries by international standards. Fortunately, counterfeiting has been below that number by a large margin for the last ten years.

Counterfeits are found by three different sources. Counterfeits are detected by the CITs during their note processing. The Reserve Bank also finds counterfeits during note processing. The third source is the Police who either retrieve counterfeits in the scope of their responsibilities or are given them by members of the public.

Retrieving reliable data proves difficult sometimes, as counterfeits are not always passed on to the Reserve Bank or the Police's headquarters. Hence, various ways of reporting are useful as a reference. Those other measures are counterfeits found by the Reserve Bank per million notes in circulation (series A) or per million notes processed (series B). These three series provide informative alternative views of counterfeiting activity in New Zealand. They are depicted in figure 6 below.

Figure 6 shows that, regardless of the measures examined, counterfeiting is very low in New Zealand. It is also worth noting that measures of counterfeits found by the Reserve Bank probably understate the true counterfeiting rate. Currency processed by the Reserve Bank is mostly pre-sorted

Figure 6
Counterfeits per million notes processed/in circulation



Source: RBNZ.

by the CITs and trading banks and counterfeits are often detected and taken out before they arrive at the Reserve Bank.

Series C (blue line in figure 6) is the most comprehensive measure as it contains all information available and it is the series used by the Reserve Bank to monitor the rate of counterfeiting in New Zealand. It is also used for international comparison. However, series A and B are faster to compile and serve as a reference and monitoring tool.

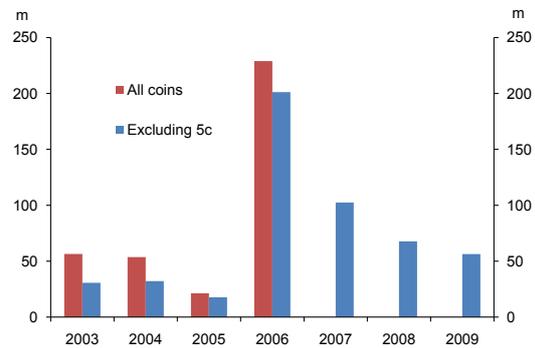
Although the counterfeiting rate is very low in New Zealand, the Reserve Bank recommends a visual inspection if a person is presented with a suspicious note. This is especially true when accepting higher-denomination notes. An indication of authenticity is the embossed window, which is easy to verify. If the note is genuine, the window should contain an embossed number of the denomination of the bank note.¹

5 Coins

The number and face value of coins in circulation at the end of December 2009 are shown in table 4. On the 31st of December 2009, there was \$293 million of coins in circulation. This represents about 6.4 percent of currency in circulation on the same day.

Since the introduction of the new copper- and nickel-plated 10, 20 and 50 cent coins in July 2006, the demand for coins has been significantly above past levels. Before the introduction of the new coins, a large proportion of coin issues was made up of 5 cent pieces. In figure 7, this is

Figure 7
Number of coins issued



Source: RBNZ

shown by the red bars substantially exceeding the blue bars. In 2003 and 2004 for instance, there were almost as many 5 cent pieces issued as all other denomination coins.

The strong demand for coins experienced in 2006 was expected because banks, retailer, and the vending industry needed to replace their stocks of coins in shop tills etc. New coin issues in 2007 were still very high compared to the period from 2003 to 2005, especially considering that stock replacement by banks and shops was completed in 2006. Since 2007, issues have remained at an elevated level but show a decreasing trend.

In 2009, 56 million coins were issued. This is as high as the number of issues in 2003 and 2004, including the 5 cent coins. One reason for an extended period of higher issues is the tendency of households to hoard large amounts of coins in jars, cars or other locations.²

Table 4
Coins in circulation

	Number of coins (000)	Face value (\$000)
10 cent	150,507	15,051
20 cent	136,553	27,311
50 cent	62,659	31,329
\$1	77,944	77,944
\$2	70,436	140,872

¹ For more information on the security features of New Zealand banknotes, see www.rbnz.co.nz/currency

² Boaden and Langwasser (2009) provide a more detailed insight into the phenomenon of hoarding coins. Boaden (2008) gives a detailed discussion of issuance of new coins and repatriation of old ones.

6 Conclusion

Banknotes and coins remain an important means for making transactions in New Zealand. From a per capita perspective, demand for real currency adjusted for economic growth does not appear to be declining. It even increased through the global recession. The Reserve Bank has satisfied all demand for currency, and note quality proves generally satisfactory. New Zealand experiences very low levels of counterfeiting. The introduction of the new coins in 2006 still causes high volumes of coin issues.

The Reserve Bank ensures that the needs for New Zealand's legal tender are met by supplying good-quality banknotes and coins and maintaining the currency's integrity.

References

Boaden A (2008), "Recent trends and developments in currency", Reserve Bank of New Zealand *Bulletin*, 71 (1), pp 16 – 24.

Boaden A and K Langwasser (2009), "Recent trends and developments in currency", Reserve Bank of New Zealand *Bulletin*, 72 (1), pp. 23–30.

Appendix

New Zealand's out-dated currency

The Reserve Bank issues New Zealand banknotes and coins to satisfy the public's demand for currency. The Reserve Bank regularly updates the design and security features of the notes and coins. The latest change was in 2006, when new coins were introduced for the denominations 10 cent, 20 cent and 50 cent. During that change, the 5 cent coins were withdrawn.

Banknotes were last updated in 1999 and 2000, when the Reserve Bank introduced the currently circulating polymer banknotes.

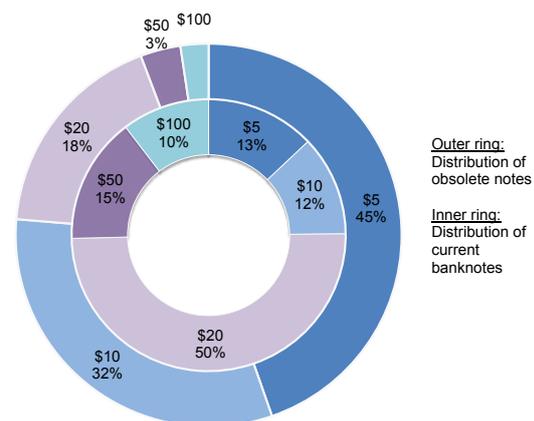
Outdated currency will always be accepted by the Reserve Bank – regardless of the date of issuance – providing that the currency was issued as legal tender in New Zealand. The Reserve Bank will always pay face value for outdated notes and coins.

Currency that has become obsolete has not been returned to the Reserve Bank in full after the demonetisation of the notes and coins as legal tender. Large amounts of outdated currency have never found their way back to the Reserve Bank. At the end of 2009, of the 149 million bank notes currently in circulation, 8.6 million bank notes were obsolete. Their total value was \$112 million.

At the end of 1998 (the last year the Reserve Bank issued paper notes), there were almost 54 million paper bank notes in circulation. Of those, just fewer than 6 million or 11 percent of the notes had not been returned as of February 2010.

Chart 1 shows the distribution of the obsolete banknotes that are still held by the public. It is evident that the vast majority of unreturned notes of older series are \$5 and \$10 notes. There are proportionally more lower-denomination notes outstanding than there are now circulating. This shows how people take better care of higher-value notes, not losing or damaging them.

Chart 1
Bank notes (current and outdated) in circulation – as percent of total outstanding notes

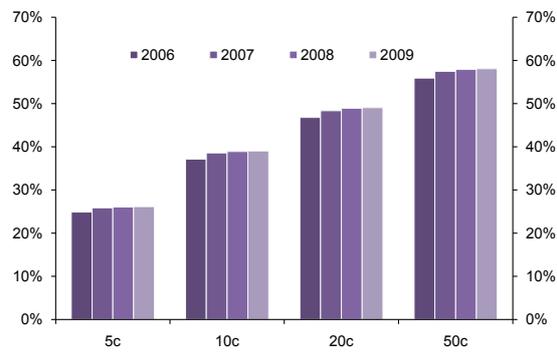


Source: RBNZ.

Further, there are \$18 million \$1 and \$2 bank notes that were never returned to the Reserve Bank. The \$1 and \$2 banknotes were replaced by \$1 and \$2 coins in 1991, yet there are still 13.7 million \$1 and \$2 notes unreturned.

³ Boaden (2008) discussed the return of demonetised coins directly following the introduction of the new coins.

Chart 2
Cumulative return of obsolete coins as percent of coins in circulation March 2006



Source: RBNZ.

The coins issued in 2006 replaced the larger and heavier coins, of which many are still in circulation.³ The 5 cent piece was withdrawn altogether. The largest return of coins was in 2006. Thereafter, obsolete coins were repatriated to

the Reserve Bank in much lower numbers. Until the end of 2009, a total of 358 million obsolete coins were returned. Of those, 340 million (94 percent) were returned in 2006 alone. Chart 2 shows these developments as a share of the coins in circulation in March 2006.⁴

Chart 2 also shows that most of the higher-denomination coins were returned, while the proportion of lower-denomination coins returned was significantly less.

There are a variety of reasons for currency not being returned to the Reserve Bank. Currency might be stored and forgotten about. Sometimes these stocks emerge after the notes have become obsolete. Further, notes and coins are lost, taken overseas or destroyed. Charts 1 and 2 suggest that lower-denomination notes and coins are more affected by this behaviour.

⁴ The number of coins in circulation refers to the number of coins issued by the Reserve Bank since 1989 and the Treasury in earlier years.