tions not captured by banks, including those that occurred as the note was passed hand to hand, starting with the party who issued it and ending with whoever returned it to the bank. To increase the accuracy of their records, authorities will indeed expect intermediate retail and service outlets to identify customers, then read and report their tags. Cash registers can record all transactions, good and bad, legal and illegal, honest and dishonest, and identify notes that enter their system, flagging those that are either counterfeit or no longer accepted as legal tender. The new RFID-based technology gives the authorities the power to cancel a particular note. The more detailed the recording of RFID transfers, the tighter the net becomes, and the more limitations that are placed on the individual's ability to remain anonymous.

A 2004 Internet hoax involved $20 bills with an RFID tag in Andrew Jackson's eye [10]. So it's all a ruse? Not at all. The 10,000-yen bills (~$100) of 2004 were to be implanted with Hitachi's 0.4mm^2, 60-micron-thick "μ-chip" [8], each costing around 50 yen [9]. Plausibly, as the price of tags decreases further, they will be embedded into smaller-denomination bank notes to increase the recording and monitoring of yet more cash transactions. The European Union considered implanting tags in its notes by the end of 2005, though this is on hold, and the Swedish National Bank has announced a similar idea. Is the U.K. or U.S. next?

No more anonymous cash. But worse, two other properties of cash—fungibility and stored value—are also under attack. Each bank note, whatever its denomination, should be as good as any other, but not if it's rejected, discounted, or terminated. By insisting that only bank notes with operational tags are legal tender, governments may cancel the cash of targeted individuals.

What a great method for instantly taxing citizens. Governments calculate the tax owed and take the correct sum straight out of each taxpayer's pocket by canceling bank notes, then reprinting and reissuing new ones bearing different RFID tags. The possibilities are limitless. By giving each note an expiration date, governments may force bearers of cash to spend their money. The government can also hold out the threat of instant devaluation, with the value of a bank note being not the numbers printed on the note itself but the amount coded into the tag, drastically transforming the notion of stored value.

Why doesn't everyone object loudly and publicly? It's not just ignorance of the technology. A very real opportunity presents itself, as RFID technology finds its way into the home at a price all can afford. The viral message is going out that the benefits far outweigh the hazards through a marketing blitz aimed at gaining widespread public acceptance.

It's not only that passive RFID tag technology is rapidly maturing among a passive (some might say apathetic) public. Innovators predict huge public demand for the products of the convergence of personal RFID readers and mobile telephones. The mobile telephony industry senses a killer application. Who wouldn't pay to locate misplaced keys, spectacles, gloves, or socks (conveniently tagged by their manufacturers)? By marrying an asynchronous reader with a synchronous mobile phone, the emergent device would be able to read and transfer tag data anywhere in near real time. Connecting phones and/or tags would make it possible to send and receive electronic funds. Accessing a tag might also trigger a connection to the manufacturer or retailer's Internet presence through a mobile phone. Applications for mobile phones equipped with RFID readers are endless, promising to introduce huge new revenue streams to handset manufacturers, application developers, and service providers.

The security infrastructure surrounding this technology, balancing privacy against commercial applications, is a major concern. RFID does not require line-of-sight for reading tags, operating instead on radio frequency. Hence, private data about people and their belongings and shopping behavior can be received simply by waving a reader near their clothes, handbags, and other personal items. The size of their shirts is no longer their personal secret, nor is the amount of cash they are carrying. By collecting tag data on the person being RF-interrogated, the "data voyeur" might create a complete commercial, and, worse, personal profile.

One may argue that this problem would be solved by disabling each tag when it leaves a shop, but this is neither in the interest of the retailer nor, in fact, of the customer. Tags will store warranty information (paper receipts will no longer be accepted) and, more important, the rights of ownership (a stolen item is easily identified). It is thus in the interest of the purchaser to keep tags alive. Furthermore, using RFID-enabled phones in the exchange of goods and money is both a guarantee and a proof of the transfer of ownership. Only a troublemaker would want to destroy or disable such useful data.

So there are very real general benefits in RFID technology. However, this does not mean that the mixing of cash and mobile RFID will receive strong support. As with many new technologies, innovators promise utopia; meanwhile, governments may declare