4 How fast is that buck? The velocity of money

How often does a dollar bill change hands? This quantity, known as the velocity of money, is relevant because it influences inflation: higher velocity of money has the same effect as an increase in the quantity of money; if money works harder, you need less of it (see inset).

The relativity of money

Economics has its own version of Einstein's $E=MC^2$. It is Irving Fisher's equation of exchange:

$$MV = PT$$

Here *M* denotes the total money supply, *V* the velocity of money, *P* the price level and *T* the amount of transactions. The formula is simple and intuitively appealing, but estimating the actual values for these variables is not straightforward, to put it mildly. Perhaps the most enigmatic of all is V, the velocity of money: how often does a dollar or euro change hands? We can rewrite Fisher's equation to $V = \frac{PT}{M}$, but while *M* is measurable, PT is much harder to obtain. We measure *changes* to *P* through price level indices, but for the formula we need the value of all transactions, i.e. the average price times the volume of all transactions, including intermediate goods and asset transactions.

One way to estimate the speed of cash is to look directly at consumer cash behaviour. A Federal Reserve survey, for example, that finds that physical currency turns over 55 times per year, i.e. about once a week.[1] We can combine this with data on banknote fitness and replacement by the Federal Reserve. The Federal Reserve inspects notes returned by banks and replaces the ones that are worn out. It turns out that that lower denomination notes have a relatively short lifetime of about 1.5 years, while a $100 bill last 7.5 years.[2] Assume that each note is used for the same amount of payments before it is

[1] See Avery (1986).
[2] Analysis and figures from Feige (1989)

worn out. This gives an average turnover of about 110 times/year for $1 and $5 notes; this would imply that each such note is used for a payment about twice a week. For $20 notes this is 75 times/yr or once every 5 days, while the $100 notes are used much less: 20 payments a year, or once every 2.5 weeks.

It is interesting to compare the velocity of cash with the velocity of bank deposits. In 2010, US bank deposits stood at $ 7.6 trillion.[3] The total volume of Chips and Fedwire transfers for that year was $965 trillion; if we add ACH and check clearing volumes we get around $1000 trillion. This gives a velocity of 1000/8.4 = 138 times/year, more than double the velocity of cash. This means that bank deposits "work at least twice as hard" as cash.

It is equally interesting to estimate the velocity of the "missing cash" used in the underground economy (as discussed in chapter 3). Cash held by consumers and businesses accounts for some 15% of total currency, with another 30-37% residing abroad. This implies that about half of all currency would be used in the underground economy, about 3½ times the cash used for official purposes. If the underground economy really is 22% of the official economy, then the underground cash is not very fast: its velocity is $\frac{22\%}{3.5} \approx 6\%$ of the official speed. This corresponds to 3.3 payments per year, or less than one transaction per quarter. Even if we assume all underground transactions are made with relatively slow moving $ 100 notes, these notes have a relaxed life compared to their official cousins who are used in transactions every 2.5 weeks, 6 times as often. Presumably these unofficial $100 notes spend most of their life in vaults, storing value and avoiding taxes and drug enforcement officials.

[3] US *M2* was 8$.4 trillion. This definition of money includes both currency in circulation and bank deposits. Currency (coins and notes) stood at $800 billion leaving $7.6 trillion for bank deposits.