



Tallies & Technologies

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Abstract:

A woman in Atlanta, curious about a bunch of "twigs" that had been passed down through several generations of her family, contacted a Sotheby's representative about them . They turned out to be a large collection of rare wooden tally sticks, used in the 13th century to compute royal receipts, and were sold at auction for \$32,912 [1]. The story of the wooden tally stick provides a rich source of analogy and anecdote about the evolution of money technologies.

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1. Tallying Up

Tally sticks came into use in England after the Norman invasion. Tax assessments were made for areas of the country and the relevant sheriff was required to collect the taxes and remit them to the king. To ensure that both the sheriff and the king knew where they stood, the tax assessment was recorded by cutting notches in a wooden twig and then splitting the twig in two, so that each of them had a durable record of the assessment. When it was time to pay up, the sheriff would show up with the cash and his half of the tally to be reckoned against the King's half. As the system evolved, the taxes were paid in two stages [2]: half paid up front at Easter and the rest paid later in the year at Michaelmas when the "tallying up" took place.

Technologically, the system worked very well. The tally sticks were small and long&endash;lasting, were easy to store and transport, and easily understood by those who couldn't read (i.e. almost everyone). As a new technology, however, they soon began to exhibit some unforeseen (in the context of their record&endash;keeping function) characteristics.

By the reign of Henry II (who died in France in 1189), the Exchequer was already a sophisticated and organised department of the king's court with an elaborate staff of officers. The use of tallies to enable this operation had an interesting side&endash;effect. Since the king (as is generally the case) couldn't be bothered to wait until taxes fell due, and could not borrow money at interest, he would sell the tallies at a discount. The holder of the tally could then cash it in when the taxes fell due, making it (in effect) a fixed&endash;term government bond. The discount on the tallies

varied, just as one would expect, by economic circumstances. Adam Smith notes [3] that in the time of King William the discount reached 60% when the Bank of England suspended transactions during a debasement of the coinage. The tally system could (of course) be abused by the Exchequer selling tallies which they would not redeem, but kings soon learned not to renege on tallies, since the discount on future tallies would be increased and the Exchequer would be hit hard.

The market for tallies evolved quickly. Someone in (say) Bristol who was holding a tally for taxes due in (say) York would either have to travel to collect their due payment or find someone else who would, for an appropriate discount, buy the tally. Thus, a market for tallies grew, arbitrating various temporal and spatial preferences by discounting. It is known from recorded instances that officials working in the Exchequer helped this market to operate smoothly [4].

To summarise: by middle of the twelfth century, there was a functional market in government debt centred on London. No wonder the London money markets are so sophisticated. I often fall into the trap of thinking that there's never been a revolution in monetary technology before, so I forget how rapidly previous significant developments were co-opted by the financial 'establishment' and taken for granted or just how old some aspects of the apparently modern financial infrastructure are. When the Doge of Venice died in 1238, he left an estate indistinguishable from a modern portfolio: 7% in cash (coins) and the rest in negotiable municipal bonds and 'partnerships', a precursor to equities [5].

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2. Burning Issue

The Bank of England, being a sensible and conservative institution naturally suspicious of new technologies, continued to use wooden tally sticks until 1826: some 500 years after the invention of double-entry bookkeeping and 400 years after Johann Gutenberg's invention of printing. The tally sticks were then taken out of circulation and stored in the Houses of Parliament until 1834, when the authorities decided that the tallies were no longer required and that they should be burned. As it happened, they were burned rather too enthusiastically and in the resulting conflagration the Houses of Parliament were razed to the ground [6], an incident so loaded with symbolism about the long-term impact of innovations in the technology of money that had it occurred in a novel one would believe it.



*An Exchequer Tally for the Land Tax collected in Buckinghamshire in 1819
(Illustrated London News, 1858)*

The technology of money, like all technologies, exhibits the law of unintended consequences and this stands square in the way of anyone who claims that they can see clearly the direction that a new technology will take us [7]. The story of the tally illustrates this point well: what began as a technology for record-keeping soon went on to become the basis of a money market, and then went on to remain in use long after 'better' alternatives were available. It's impossible to say what the unintended consequences of current innovations in financial technology will be, only to observe that there will be some.

This is not a negative message: after all, London has survived and thrived through the introduction of banknotes and bills of exchange, derivatives and EFT. The City has always been associated with financial innovation and the creation of markets. London didn't invent insurance: the preamble to the Insurance Act of 1601 talks about it as a long established business [8], starting "Whereas it hath bene tyme out of mynde an usage amongste Merchantes...". London invented Lloyd's. Today, the City of London handles 30% of world foreign exchange dealing (more than New York and Tokyo combined). Some 60% of all international bonds are issued in London, and 75% of the trading of them takes place in the City. The City is the world centre for settling gold trades and half the world's oil cargoes are fixed up on the Baltic Exchange [9]. London is sure to be the principal wholesale market for the Euro, even if the UK isn't part

of EMU. All things considered, there doesn't seem to be any reason for London to be worried about the rise of the Net!

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3. Money is Technology

Having noted the infeasibility of predicting the consequences of developments such as public key cryptography or digital cash, we can at least try to consider the issues involved. I think that these can be summarised in the three key areas discussed below.

Firstly, organisations can be very conservative about the technology of money even when the market isn't. It takes a lot for societies to change the technology of money even if they are comfortable with changing all sorts of other technologies. The particular intersection of consumer, regulator, business and government interests means that there are significant pressures against radical change. Consumers may be perfectly happy to adopt online trading and digital cash, but institutions will still take time to adapt. Once pressure builds up and change occurs, however, then it then takes some time for society to become ready to change again and technologies are kept in use past even after better alternatives become available.

Secondly, the impact of technological innovation on finance (as in every other field) is impossible to predict. Across all technological changes, however

What is almost a constant, though, is that the real benefits usually are not the ones that we expected, and the real perils are not those we feared... the New Deal's precautions against the bank failures of the Depression created institutions that helped promote the wave of savings&endash;and&endash;loan bankruptcies of the 1980s [10].

We have no basis for saying right now whether the impact of (for example) digital identity on the financial sector will be good or bad. What will it mean to have remote, anonymous parties doing business with each other? We must be careful, therefore, to avoid rushing into regulation or legislation on the basis of imagined threats or opportunities and businesses must be careful about adopting old business models to deal with fundamentally different technologies. After all,

All forecasting is in an important sense backward looking&endash;vividly compared to steering a ship by it's wake [11]

Thirdly, the financial community will take advantage of innovation. Once the king (or Bill Gates) adopts a particular technology to fulfill the important function of representing money, then financial innovators will take the same technology and use it to make markets. Some organisations (e.g. traditional exchanges) may fade and new entrants (e.g. Net&endash;based private capital placement spaces) may prosper, but overall the City will thrive.

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