7. Foreign Exchange and the Bill Market

The Bill of Exchange

The bill of exchange has a history stretching back to ancient times. Einzig (1970, p.15) observes that the use of bills of exchange predates transactions in coins in the development of foreign exchange: 'Babylonian merchants, about to visit Assyria in order to buy goods, may have acquired a bill in terms of lead, the Assyrian currency, before their departure, against payment in their local currency, silver or barley, enabling them to receive lead in Assyria.' Bills of exchange were sufficiently common in Babylonian times that Article 112 of the Code of Hammurabi requires a penalty of fivefold the principal for those defaulting on a bill. Until modern times, trading in bills of exchange was the central activity in the foreign exchange market.

The ancient bills of exchange involved barter transactions. Recognizing that ancient civilizations used commodity money, foreign exchange transactions could be created by appropriate selection of the commodities involved in the bill of exchange. The introduction and development of coins of the realm made certain types of foreign exchange transactions easier, but did not avoid the risks of loss associated with having to carry coin over, often, long distances to locations where the local coin would be costly to acquire by exchange. Even in Renaissance times, acquiring sizeable amounts of foreign coin in the local market was often difficult due to the large number of locales that issued coins. It was common practice for city states and local princes to issue coinage that was to be used for transactions within the relevant jurisdiction. So, to facilitate the currency transactions involved in long distance trade, the bill of exchange was used.

Unlike bills of exchange in the ancient world that involved barter transactions, the bills of exchange used in the Middle Ages and Renaissance times were much more sophisticated. Until the development of the 'inland' bill in early 17th century in England, all bills of exchange involved some form of foreign exchange trading, hence the name bill of 'exchange' (de Roover 1944, p.194).[1]

However, because foreign exchange transactions were licit under canon law, the bill of exchange could be used to circumvent usury restrictions by disguising the payment of interest in the exchange rate. As a consequence, two important variations on the bill of exchange evolved, with the embedded foreign exchange transactions only being used to disguise an interest-bearing loan. These disguised loans are usually referred to as 'dry exchange' and 'fictitious exchange' (de Roover 1944), with the terminology 'merchants' exchange' or 'real exchange' being used to refer to conventional bill transactions.

In practice, 'manual exchange' involved exchange of coin and was only a small part of the foreign exchange market, with trading in bills of exchange being the most important activity. Market convention was to quote foreign exchange rates in terms of bills payable at usance, with the usance period being determined by market convention. Bills issued in London and payable in Amsterdam or Hamburg would have usance of one month, with half-usance at fifteen days and double usance at two months. Bills issued in London and payable in Italy had usance of three months. Hence, foreign exchange quotations contained a time component that was reflected in the interest rates embedded in the quoted exchange rates. As reflected in the medieval and Renaissance commercial manuals, usance conventions were unchanged for centuries.

Conventions also applied to the method of quoting exchange rates. Market convention was to quote exchange rates between London and the Low Countries and between London and Germany in terms of units of foreign currency per pound sterling. So, for example, the foreign exchange rate quoted on the Antwerp bourse would be the number of Flemish pounds per pound sterling. Flemish pounds were commonly referred to as 'pounds groat' that were subdivided into shillings and *deniers* or pence. The exchange quoting convention was reversed for Italian and French exchange rates, with the quotes being the number of pounds sterling per unit of foreign currency, for example, French *ecus* (three *livres*) or Venetian ducats. In order to avoid confusion about terms such as appreciation and depreciation, the exchange rate between London and the Low Countries will be used in examples. In this case, appreciation means an increase in favour of London and depreciation means the reverse.

Following de Roover (1944, p.183), the working of the foreign exchange market is essential to understanding mercantilist doctrines. Because the foreign exchange markets of that period were substantively different from those of today, modern interpretation can be undermined:

> Most modern critics ... have not always understood what certain utterances of the mercantilists —— especially the early mercantilists —— really meant. Some of their theories are, of course, fallacious; but much of what they wrote makes good sense, if one accepts certain underlying assumptions which are not always explicitly stated but which contemporaries took for granted.

Modern understanding is further complicated by the evolution of the bill market during the mercantilist period. In addition to the emergence of the inland bill and the associated creation of a separate market for commercial paper, the 17th century also witnessed the introduction of negotiable bills and paper currency.

In general, bill transactions involve four persons and two payments. The bill is created when a 'deliverer' exchanges domestic cash money for a bill issued by a 'taker'. The issued bill of exchange is drawn on a correspondent or agent of the taker who is situated abroad. The correspondent, the 'payor' is required to pay a stated amount of foreign cash money to the 'payee', to whom the bill is made payable. In simple cases, the same individual could perform more than one task. To illustrate the basics of a simple bill transaction, consider the following artificial example of a bill (Clough and Rapp 1975, p.101):

> I, Hans Olbrechts, have accepted goods from you, Giovanni Cipolla, at Troyes, June 1, 1493, to the value of 1,000 gros tournois and I promise to pay to you in Venice 1,100 grossi by Sept. 1, 1493. [Signed Hans Olbrechts]

In this case, the bill only involves two persons because taker and payor are the same and the deliverer and payee are the same.

Because only two persons were involved, this simple type of bill transaction was not often observed. However, there are some features common to many bill transactions associated with merchants' exchange. For example, there are the elements of time and foreign exchange. In addition, the bill originates from an underlying goods transaction. In this case, a Flemish buyer is receiving goods from a Venetian merchant, with the Venetian merchant extending credit in order to allow the buyer time to sell the goods. However, it would be uncommon for the Flemish buyer to be the individual making payment on the bill in Venice. A more practical example would introduce a third person by separating the taker and the payor (Clough and Rapp 1975, p.102):

> I, Hans Olbrechts, have accepted goods from you, Giovanni Cipolla, at Troyes, June 1, 1493, to the value of 1,000 gros tournois and I hereby direct

Giuseppe Bellini to pay to pay to you, Giovanni Cipolla, in Venice 1,100 grossi by Sept. 1, 1493. [Signed Hans Olbrechts]

The separation of payor and taker requires a substantively more sophisticated chain of financial relationships.

As for the precise text of actual bills of exchange, de Roover (1949, p.123) provides an example of an early 17th century bill from the Municipal Archives of Antwerp that appeared just prior to the introduction of negotiability:

March 14, 1611

In London for £69.15.7 at 33.9

At half usance pay by this first of exchange to Francesco Rois Serra sixty-nine pounds, fifteen shillings, and seven pence sterling at thirty-three shillings and nine pence groat per £ sterling, value [received] from Master Francesco Pinto de Britto, and put it into our account, God with you.

Giovanni Calandrini and Filippo Burlamachi

Accepted

[On the back:] To Balthasar Andrea in Antwerp

First 117.15.0 [pounds groat]

The essential features of the bill of exchange all appear: the four separate parties; the final payment being made in a different location from the original payment; and the element of currency exchange.

De Roover (1949, p.114) reports that the Antwerp Municipal Archives have thousands of bills of exchange dating from 1600 to the French Revolution and that appropriate Italian archives have bills dating from medieval times up to the 14th and 15th centuries. However, relatively few 16th century bills appear to have survived, though the texts of some bills are available in the surviving notarial protests that were drawn up in legal disputes over bills which were either not accepted or not paid. This situation is significant for a number of reasons. In particular, operations of the bill market played a central role in the analysis of important mercantilist writers, such as Gresham and Malynes. Accurate interpretation of these contributions requires understanding of the temporal evolution of the bill market.

Certain technical features of bills of exchange underwent fundamental changes in the 17th century. Though the practice of endorsing bills of exchange may have started as early as the late 16th century, the practice had became commonplace by the middle of the 17th century. 'The practice of endorsement ... greatly facilitated the circulation of

commercial paper and the use of drafts and promissory notes as money substitutes' (de Roover 1954, pp.220-21). Another key development was the introduction of 'inland' bills, starting in England in the first half of the 17th century. Because these bills were denominated solely in one currency, inland bills represented an unbundling of the credit from the exchange transaction associated with conventional bills of exchange. This development resulted in the emergence of a discount market for bills as well as an important step toward the use of paper currency.

Early Bourses and the Bill Market

The market for bills of exchange went through a number of different stages. The medieval fairs were important financial as well as commodity trading events. At the largest and most strategic fairs, financial activities, especially settlement and creation of bills of exchange, came to dominate the trading in goods. By the 16th century, the importance of the fairs was in decline and bourse trading was on the rise. Tawney (1925, pp.62-5) describes the international money market of the 16th century:

> In its economic organization the machinery of international trade had reached a state of efficiency not noticeably inferior to that of three centuries later. Before the most highly-organized economic systems of the age were ruined by the struggle between Spain and the Netherlands, and by the French wars of religion, there were perhaps ten to twelve commercial centres whose money markets were the financial power-houses of European trade, and whose opinion and policy were decisive in determining financial conditions. In the Flemish, French and Italian cities where it reached its zenith, and of which England was a pupil, the essence of financial organization of the sixteenth century was internationalism, freedom for every capitalist to undertake every transaction within his means, a unity which had as its symptom the movement of all the principal markets in sympathy with each other, and as its effect the mobilisation of immense resources at the strategic points of international finance. Its centre and symbol was the exchange at Antwerp, with its significant dedication, '*Ad mercatorum cujusque gentis ac linguae*' where ... every language under heaven could be heard, or the fairs at Lyon which formed, in the words of a Venetian, 'the foundations of the pecuniary transactions of the whole of Italy and of a good part of Spain and of the Netherlands'.

It is something of an historical oddity that, at a time of almost constant conflict between states and their sovereigns, the fabric of international trade was so cosmopolitan and interdependent.

Tawney (1925) also describes the composition of the international money market:

> Apart from the crowd of traders, speculators, and promoters who hung upon its outskirts, the personnel of the international money market consisted of the resident correspondents maintained by the great financial houses of South Germany, Italy, France, and Spain, of the agents employed by governments either to negotiate their loans, or when, like Portugal and Spain, they traded themselves, to dispose of their products, and of an inner ring of successful merchants who found finance more profitable than trade. The supply of capital concentrated at these nodal points flowed from every country and from every type of undertaking, productive enterprises such as the silver and copper mines of the Fuggers in the Tyrol and Hungary, the profits of trading ventures such as those of the English Wool Staplers and Merchant Adventurers, successful investments and speculations on the part of the financiers themselves, and to a lesser extent, since the habit of leaving money ... at fixed rate of interest had already gone some way in parts of the continent, from savings invested with them by the general public. The demand came from the need of large sums to finance the purchase of the produce handled on the world markets, such as spices —— above all pepper —— copper, alum, and the precious metals, the insatiable appetites of governments engaged in, or contemplating, war, and the requirements of merchants occupied with foreign trade. Linked to each other by the presence in each of the great financial houses of the continent, with abundant capital seeking investment, a considerable class of financial specialists and a highly-developed financial technique, Antwerp, Lyons, Frankfurt, and Venice, and, in the second rank, Rouen, Paris, Strasburg, Seville, and London, apart from their importance as centres of industry and as markets for public loans, formed together the departments of an international clearing house where bills ... of merchants of almost every nationality changed hands.

In the 16th century, London, which was to emerge as the centre of the international money market in the 18th century, operated at a lower level of operations compared to Antwerp and Lyons. The London money market was composed of foreign, particularly Italian, firms that had been operating in London for centuries, together with English merchants, connected primarily to the Wool Staplers and the Merchant Adventurers. This dependence on foreigners contributed to periodic English attempts to control exchange transactions.

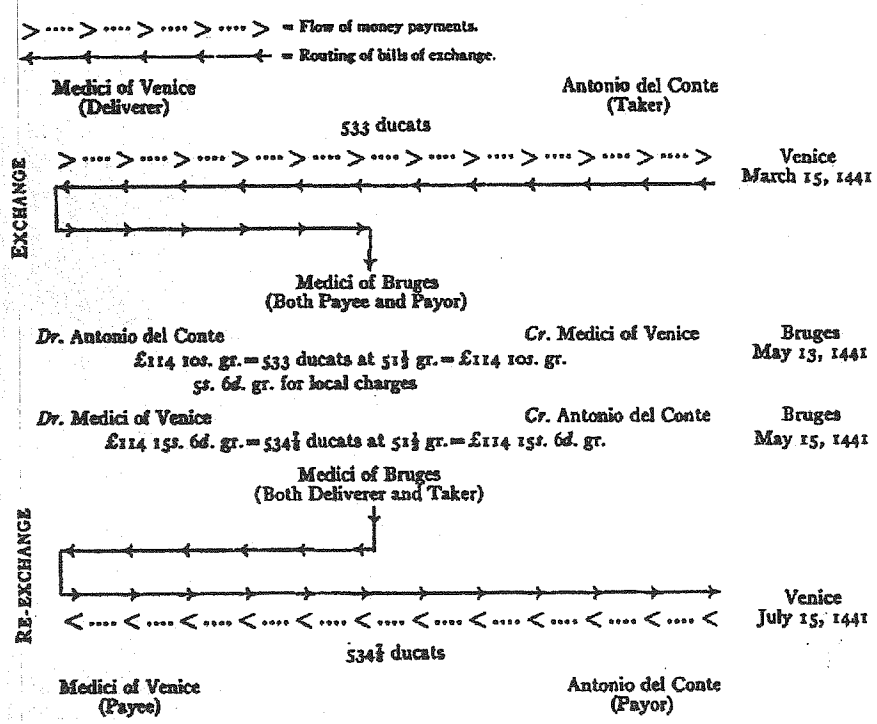
Dry Exchange and Fictitious Exchange

What was Dry Exchange? According to de Roover (1944), dry exchange was 'merely a device by which a local loan was disguised under the form of an exchange transaction'. Because bill of exchange transactions (*cambium de litteras*) were licit under canon law, merchants and financiers involved in the exchange process were able to construct a seemingly licit loan transaction by using a sequence of two bill transactions, an exchange and a re-exchange. Whether dry exchange was actually licit was a source of considerable scholastic controversy. However, given that bill of exchange transactions were licit, it was not practical to bring dry exchange transactions within the scope of the civil law sanctions that were derived from the scholastic usury prohibition. Hence, dry exchange transactions were a central feature of the money market prior to the 18th century.

Dry exchange transactions were common even in the Middle Ages (Noonan 1957, p.179; de Roover 1954, p.203). Yet, there is no modern counterpart to dry exchange.[2] In modern money markets, interest is typically paid by issuing a security, such as a treasury bill or bankers' acceptance, at a discount to face value, with the discount representing the interest earned during the term to maturity. In dry exchange, the initial bill of exchange is purchased at an agreed upon exchange rate in, say, London, to be paid at another location, say Antwerp. At the end of the term to maturity, the bill is presented for payment in Antwerp and the funds delivered in Antwerp are used to purchase another bill of exchange for delivery in London. At the time that the initial bill is purchased, the exchange rate on the second, or re-exchange, bill is unknown making the actual interest earned uncertain at the time the 'loan' is initiated.

Without further information on the determination of exchange rates, it is not immediately apparent how dry exchange functioned as an interest-bearing loan transaction. Recall that exchange rates for bills were quoted with a time element, for example, at usance or half-usance. The payment of interest arose from the market practice of quoting exchange rates in different locations, such as Antwerp, London, or Venice. More precisely, subject to the restrictions imposed by the specie export points, exchange rates were conventionally quoted as lower or higher in different locations to provide interest from the exchange and re-exchange process. For example, in the 16th and 17th centuries the convention was to quote a higher rate of pound sterling in London than in Antwerp. The process of buying a bill in London for

Figure 7.1 Example of dry exchange between Bruges and Venice based on a real case taken from business records



Source: This image was adapted from de Roover (1944).

delivery in Antwerp and then, upon maturity of the bill, doing a re-exchange in Antwerp for settlement in London would, *ceteris parabus*, produce a gain from exchange denominated in domestic currency terms, effectively a disguised loan transaction.

Unlike modern money market transactions, dry exchange transactions were not riskless. The accompanying chart from de Roover (1944, p.196) (Figure 7.1) illustrates the mechanics of an actual dry exchange transaction.

Fictitious exchange was a form of dry exchange that circumvented the process of receiving payment of the bill in another location and then doing the re-exchange, for example, de Roover (1944, p.197). In dry exchange, the initial bill of exchange was physically transported to the foreign location for payment and a bill for re-exchange drawn up and physically transported back to the original location. This process invariably involved fees associated with commission for issuing the bill and other sundries, such as consular fees. In fictitious exchange, the transporting of the original bills to a foreign location, and the issue of the re-exchange bill were fictitious. The bills involved in the transaction were made out *pro forma*, usually using bogus names. However, as in dry exchange, the re-exchange bill was issued using the exchange rates prevailing in the foreign market at the maturity of the original bill.

Like dry exchange, fictitious exchange was not riskless. The exact interest rate earned depended on the exchange rate prevailing on the re-exchange date. However, it is not difficult to conceive of deviations from fictitious exchange that would produce a deterministic interest rate. One method could involve backdating of the bills involved or not noting the specific currency in which the exchange is to take place, allowing that currency to be selected on the re-exchange date to provide the informally agreed upon interest rate. If such transactions were conducted, there is no formal record of these transactions that has survived. Given the civil and ecclesiastic sanctions that applied to lending at interest, this is not surprising. Easing of civil restrictions on the payment of interest, led eventually to market practices, such as the inland bill, that explicitly recognized payment of fixed interest rates.

Fictitious bills could also be constructed in other ways. At least since the 12th century, fictitious bills were created in order to avoid usury laws. The fictitious bills were often created by substituting an initial cash payment for the delivery of goods. Interest was then incorporated into the transaction by including an exchange rate that would apply in the event of default (Einzig 1970, p.70).

> It was tacitly understood between the two parties that the bill would not be met on maturity. The dishonoured bill was protested as a matter of form and was returned to its place of issue. The debtor was then under obligation to repay its amount at the...high rate agreed in advance, which allowed to the creditor a high interest disguised in the form of exchange difference. Repayment was usually guaranteed, or the creditor received adequate security.

Even though in many instances the sale of a bill of exchange genuinely anticipated the proceeds from goods to be sold at the fair, a significant proportion of bills were fictitious.

As pointed out by de Roover (1944), the process of dry and fictitious exchange has been misunderstood in modern presentations of the subject. Given that there were a number of different stages of evolution in the bill market, this is understandable. For example, writing about the 16th century bill market Tawney (1925, p.78) observes:

> It is significant that ... the money market is a unity throughout Europe, and that the English merchant can borrow as easily in Antwerp, Frankfurt, Lyons or Rouen, as in the City. Further, it will be observed that these transactions, resting, as they did, upon a calculation of the future course of the exchanges between London and foreign centres of commerce, necessarily involved a considerable element of speculation. In all dealing of the kind there were at least three factors to be considered, the rate of interest at which the bill was discounted, or the loan made, changes in the course of the exchanges from day to day, and differences in the rates for money on different markets.

Tawney repeatedly makes reference to 'discounting' a bill and makes the statement that 'dry exchange' was 'nothing more mysterious than what to-day would be called a finance bill' (p.73). Similar confusion arises in more recent sources, such as Kindleberger (1993, p.42).

The source of the confusion about the technical features of bill trading operations likely originate from confusions about the various stages of bill market evolution. Social concerns about the direct payment of interest, that were prevalent throughout Europe in the 16th century, had largely dissipated by the middle of the 18th century. As a consequence, money market securities such as 'finance bills', that were negotiable, were being traded in the 18th century, denominated only in one currency and paying an explicit, fixed rate of interest. Such securities could not be traded in the 16th century, hence the need to rely on dry and fictitious exchange transactions. The situation is accurately depicted by de Roover (1944, p.198):

> It is true, as R.H. Tawney points out, that there is nothing mysterious about dry exchange; but to call it a 'finance bill' is not giving an exact definition. Dry exchange may be defined as a transaction involving exchange and re-exchange in which no money payments were made abroad. The merchants resorted to this complicated device because bills were not negotiable and because contracts involving the payment of interest were not enforceable at law. It is true that an English statute of 1571 revived an older statute of Henry VIII which allowed the taking of interest, but the rate was limited to 10 per

> cent. The current rate, however, often exceeded this limit —— especially when the money market was tight —— and rose sometimes as high as 15 or 20 per cent. Moreover, it is likely that dry exchange was less common in England than in those Continental countries in which interest was still forbidden by canon, statutory, or customary law. It is obvious that dry exchange loses its *raison d'etre* from the moment that interest is permitted.

Being concerned with the specifics of financial transactions, accuracy in describing the transactions involved in the bill market is of fundamental importance to financial economics.

Gresham on Foreign Exchange[3]

Sir Thomas Gresham (1519-1579) was the son of Sir Richard Gresham, a Knight who served briefly as Lord Mayor of London, circa 1537. After an education at Cambridge, in 1535 Thomas Gresham entered an apprenticeship with his uncle, Sir John Gresham, in order to be a mercer. Eight years later the apprenticeship was completed and Thomas was admitted to membership in the Mercers' Company, a key guild within one of the important regulated companies of that time, the Merchant Adventurers.[4] Gresham's importance to financial economics begins in April 1551 when he was appointed royal factor, the agent of the English sovereign in Antwerp. In this capacity, Gresham was responsible for raising short-term and long-term funds for the sovereign and performing other duties, such as gathering market intelligence, purchasing war supplies, and disbursing funds for payment of troops stationed overseas.[5] Gresham's activities also involved political tasks, such as gathering intelligence on political conditions on the Continent and, on occasion, acting as a royal envoy to the court in Brussels.

Of necessity, Gresham's role as royal factor required the cultivation of close contacts with the major money market players, such as the important international bankers, merchants and the other royal factors. This entailed quite constant travel between England and the continent. For all but a brief period in 1553, Gresham served continuously as the royal factor from 1551 until 1574, a period during which Antwerp was the centre of the international money market. As a consequence, much of Gresham's travel was to Antwerp, though he also made trips to Spain and other locales. Gresham's borrowing activities on behalf of the British crown peaked around 1560, due a combination of events that included the decline of Antwerp starting from 1557, a general reduction in need for new loans and refinancings, and the complete closure of the Antwerp money market to the English crown from 1568.

At the time that Gresham retired as royal factor, he was probably one of the richest people in England. The extent of his wealth was evidenced in 1571 with the completion of the Royal Exchange building, that had been constructed at Gresham's personal expense. His motives in building the Exchange were ostensively nationalistic, providing an essential step in making London independent of the Antwerp money market that Gresham firmly believed was under the control of scheming Continental bankers. How much of Gresham's wealth was due to gains he had been able to obtain through his activities as royal factor is unknown, though a considerable controversy did erupt regarding the settling of his accounts upon his retirement, for example, de Roover (1949, pp. 22-5). Gresham died without a living heir, his only son dying in 1564. His will provided for a number of other public contributions, including an endowment for the founding of Gresham College, with his Bishopgate residence being left to house the college.

Gresham can be credited with a number of practical and theoretical contributions to early financial economics. Oddly enough, the contribution for which Gresham still receives recognition is Gresham's Law, the dictum that 'bad money drives out good'. Yet, there is 'no support whatsoever' (Feaveryear 1931, p.73-5) for a claim that Gresham was the originator of Gresham's Law, or even that Gresham was a strong proponent of this position during the debate that led up to the 27 September, 1560 proclamation by Queen Elizabeth on base monies (de Roover 1949, pp.91-3).:

> Gresham's law was not the invention of Sir Thomas Gresham, but of Henry D. MacLeod, a nineteenth-century economist. MacLeod was endowed with a marvellous ability for reading into a text what is not there. Nowhere does Gresham state either explicitly or implicitly that bad money drives out the good.

In Gresham's time, the mechanism underlying Gresham's Law was almost certainly understood: 'it was generally known that the excessive issue of base moneys drove good coins out of circulation, because the latter were hoarded, carried abroad, or sent to the melting pot' (de Roover 1949, p.92).

Gresham's contribution has to be weighed against the era in which he wrote. Gresham's Law was concerned with monetary issues that were not theoretically well understood. This contributed to a wide array of, at least partially, misguided mercantilist tracts on macroeconomic and monetary issues. Buckley (1924, p.601) says of Gresham: 'Few men

had the vast experience of Sir Thomas Gresham, and therefore few approached theoretical accuracy so closely; but not even he rose above the rough-and-ready reasoning of the age'. Yet, it is precisely in those areas where Gresham possessed 'vast experience' that he made his greatest contribution. More precisely, Gresham's contributions centred on the following: the use of exchange stabilization funds to control exchange rates (de Roover 1949, p.218); the working of the specie points; the continental banker conspiracy; as well as specific policy recommendations (p.264), including Gresham's manipulation (pp.220-22).

The Rudiments of Early Mercantilism[6]

What is mercantilism? The first significant, systematic treatment of mercantilism appears in Book IV of the *Wealth of Nations*, where Adam Smith weaves the musings of various pamphlet writers of the 17th and 18th century into a distinct school of thought. More recently, there has been considerable disagreement on whether there ever was sufficient consistency in the various writings to warrant recognition as an identifiable school of thought. One impetus for this modern debate was Chapter 23 in J.M. Keynes *The General Theory* (1936).[7] Unfortunately, Keynes's writings on mercantilism do him little credit (for example, de Roover 1949, p.287) and serve only to reinforce the view that 'hucksterism' plays an important role in the chronicling of intellectual history (Stigler 1965).

The doctrine of mercantilism, as developed in England, can readily be divided into two periods, often described as 'early mercantilism' and (later) 'mercantilism'.[8] The early period featured arguments about controlling foreign exchange and schemes to support the pound sterling: '...the early mercantilists were mainly concerned with the question of foreign exchange, that of currency, and other related problems. There is little else in the writings of the early mercantilists, and they give the impression that everything turns around foreign exchange and that is the central problem in economics' (de Roover 1949, p.278). The early mercantilists worked out most of the factors that determined exchange rate fluctuations, 'but were never able to integrate their findings into a comprehensive theory based on the mutual dependence of all variables' (de Roover 1949, p.279). Gresham can be classified as an early mercantilist.

The debate of the 1620s involving the major protagonists Malynes, Edward Missleden (1608-1654) and Thomas Mun marks the dividing

line between early and later mercantilists. Viner (1937, p.3) examines the rationale for selecting 1620 as a dividing line:

> Many writers ... assign 'mercantilism' only to the period after about 1620, and distinguish with varying degrees of emphasis between 'bullionist' doctrines of the earlier period and the 'balance-of-trade' doctrines of the later period. The grounds most commonly given for distinguishing between the two periods are as follows: (1) that, before 1620, stress was put on the importance of a favourable trade balance in each transaction of each merchant, whereas in the later period emphasis was on the aggregate or national balance of trade; (2) that, before 1620, concern about the state of the individual balances was due to anxiety that the country's stock of bullion be *not reduced*, whereas in the later period there was anxiety that it be *increased*; (3) that, before 1620, the chief economic objective of trade policy was to protect the national currency against exchange depreciation, whereas after 1620 this was a minor objective, if a matter of concern at all; (4) that, in the early period, the means advocated and employed to carry out the objectives of the prevailing trade policy were close regulation of the transactions of particular individuals in the exchange market and in coin and bullion, while in the later period the policy recommended and put into practice was to seek the objective of a greater stock of bullion indirectly by regulation of trade rather than directly through restrictions on exchange transactions and on the export of coin and bullion.

Viner goes on to point out that the emergence of mercantilism after 1620 was not due to the originality of balance-of-trade ideas advanced by Misselden and Mun; such notions 'were already old and established'. Neither was there a dramatic end to the early mercantilist ideas advanced by Malynes. Rather, the outcome of the debate occasioned a substantive change in government policy that, as much as the underlying arguments advanced by the various mercantilist writers, became the object of Adam Smith's criticisms.

Consistent with other early mercantilist debates, the debates of the 1620s were conducted between businessmen over a primarily practical matter. The arguments advanced were similar, if somewhat more developed, to those of other early mercantilist debates: economic maladies were the result of a lack of money. Suggested corrective measures ranged from debasement to exchange controls. The significance of the particular 1620 debate, which is typically taken as a demarcation between early and later mercantilists, is due primarily to the contributions of Thomas Mun (1571-1641). In *England's Treasure by Foreign Trade* (written mid-1620s, published 1664) Mun stated one of the fundamental principles of mercantilism: 'The ordinary means to increase our wealth and treasure is by foreign trade, wherein we must

ever observe this rule; to sell more to strangers yearly than we consume of theirs in value'.

The insights of the 1620 debate were not available to Gresham, who was concerned with solving a central problem of early mercantilism: how to control the rate of exchange? Mun and later mercantilists would answer this question by observing that the rate of exchange would be favourable if the nation maintained a balance of exports over imports. Gresham presented much earlier, and arguably more useful, arguments against direct interference with the rate of exchange. Prior to Gresham, the means employed to control the exchange 'were, in the absence of clear ideas on economic theory, necessarily arbitrary and generally bad in their effect' (Buckley 1924, p.592). The most common methods of controlling the exchange relied on regulating the money-changing business and adjusting the mint parities.

Gresham took a large step toward modern practice by arguing and demonstrating that it was possible to manipulate the market in order to keep up the rate. As with all mercantilist efforts, the contribution has been conditioned by the events of the day. In Gresham's case, he was motivated by his job as a royal factor to refund the debts of the English crown (Buckley 1924, p.595):

> It must be understood that the service of these loans involved much greater operations in exchange than that of their modern prototype, because of their essentially temporary character. There was no investing public. The money was lent entirely by the big financiers, who treated the loans as speculations, and expected to turn their capital over at least as often as in business, while if at any time commerce offered better openings, they expected to transfer their money without difficulty. Thus the longest-dated loan raised for the English Crown on the Antwerp market was for twelve months, and the majority were for six. Every six months, therefore, the Crown agents came on the exchange (except in rare cases when they carried out the operation in bullion) for enormous transfers of credit between England and Antwerp. Every effort was made to minimize this by paying loans with newly borrowed money, or by prolonging loans, but with all allowance the exchange had to carry many times the business that would have been involved by payments of interest only.

In this situation, Gresham attempted to engage in operations to create a shortage of bills on London for sale in Antwerp, with there being more bills than money in London.

Arbitrage in the Bill Market?

A number of early modern sources on the pre-18th century bill markets make reference to 'arbitrage' in the bill market. Three examples are Tawney (1925, pp.78-9), Ehrenberg (1928, pp.325-8) and de Roover (1949, p.137). De Roover (1954, p.205) even makes reference to a merchants manual from the Middle Ages, *La practica della mercatura* by the Italian Giovanni di Antonio da Uzzano, that contains a chapter on giving 'advice to bankers engaging in arbitrage'. To the modern reader trained in the financial economics of the last quarter of the 20th century, these early modern references are confusing. As it turns out, the meaning of 'arbitrage' has changed substantively in the modern period.

Due to a flood of intellectual contributions starting in the early 1970s, associated primarily but not exclusively with the pricing of derivative securities, arbitrage has taken on a precise, albeit technical, meaning. While a number of different modern definitions of theoretical arbitrage are possible, the specific intent is given by the following: an arbitrage is a riskless trading strategy generating a positive profit with no net investment of funds.[9] A fundamental concept of modern security pricing theory is that prices do not admit arbitrage opportunities. This definition, and the associated implications for security pricing theory, differs significantly from the concept of arbitrage that prevailed over the previous centuries.

The word 'arbitrage' is derived from a Latin root, with variants appearing in the Romance languages, such as 'arbitrio' in Italian. The original intent implied by using this word appears to be the notion of arbitrating differences in exchange rates for different currencies observed at the same time.[10] Such actions would have been required at medieval fairs to ensure that quoted exchange rates were consistent with triangular arbitrage. In other words, given the exchange between ducats and pounds sterling and between pounds groat and pounds sterling, the quoted exchange rate between ducats and pounds groat would have to be consistent, by arbitrage, with the other two exchange rates.

Using a simple modern example involving pounds, dollars and deutschmarks (DM) that ignores the presence of transactions costs and the bid/offer spread, let £/$ = 0.5 and $/DM = 0.6, then £/DM has to be 0.3 to avoid arbitrage:

$$\frac{£}{\$} \cdot \frac{\$}{DM} = (0.5)\ (0.6) \rightarrow \frac{£}{DM} = 0.3$$

If £/DM was, say, 0.35, then a trader could borrow £100 and convert at the £/$ exchange rate to get $200. This $200 would be simultaneously converted at the $/DM rate to get 333⅓ DM. Simultaneously conversion back to pounds at £/DM = 0.35 would produce more than £100, an arbitrage profit by assumption. A similar arbitrage applies to exchange rates applicable to modern forward contracts.

Opportunities for triangular arbitrage in spot currencies undoubtedly emerged during the more important fairs that attracted merchants from various geographical locations that would be using different coinage systems. Due to the need to make payments in a different location at, possibly, different times, triangular arbitrage in bills of exchange is more complicated. However, with the development of the foreign exchange market and the emergence of bill trading on bourses in important commercial centres, the manual exchange concept of triangular arbitrage was applied to the trade in bills of exchange. In this form, arbitrage became similarly known as 'arbitration of exchange'.

The Oxford International Dictionary (1933) defines arbitrage as: 'The traffic in Bills of Exchange drawn on sundry places, and bought or sold in sight of the daily quotations of rates in several markets (see ARBITRATION of Exchange). Also, the similar traffic in stock.' Under arbitration of exchange, the definition is: 'The determination of the rate of exchange to be obtained between two countries or currencies, when the operation is conducted through a third or several intermediate ones, in order to ascertain the most advantageous method of drawing or remitting bills.' Unfortunately, these definitions do not make apparent how to translate the concept of triangular arbitrage, which has to do with the manual exchange of different currencies, to arbitrage trading of bills of exchange. More precisely, doing arbitrage with bills of exchange introduces two additional elements not involved in manual exchange: time and location.

The various modern sources that mention arbitrage in the bill market are not precise about the transactions that were involved. Tawney (1925, pp.78-9) states that arbitrage trading has to do with 'differences in the rates for money on different markets'. A description of arbitrage dealing between different markets is provided: 'a factor of the great

German firm Imhof, for example, calculates the rates for money in Antwerp, Venice, Frankfurt and Nurenberg, and decides that, money being tight, the instructions of his firm to borrow in Nurenberg and remit to Antwerp cannot be carried out at a profit'. No further description of arbitrage trading is given, aside from a statement (p.136) that lumps 'arbitrage dealings' with futures and finance bills in the category of dry exchange.

Ehrenberg gives more discussion of arbitrage but only incrementally more insight. Arbitrage is referred to as 'business based on the exploitation of present price differences between different Bourses'. While the precise transactions involved in arbitrage trading are not specified, some clues are given. Ehrenberg recognizes that in the 16th century, the ideas of speculation and arbitrage were often confused: '...these two ideas could not be kept entirely distinct, for an arbitrage must be speculation if it aims at making a profit on rapidly changing differences of price between centres such as Antwerp and Lyons, when it took a month to answer back from one to the other'. The impact of differences in location on the execution of the transactions is explicitly recognized.

Both Ehrenberg and de Roover (1944, p.198) make reference to the observations of Giovanni Peri, a 17th century Italian merchant and author of *Il Negotiante* (1638), a text that has a detailed discussion on exchange dealings. In speaking about 'arbitrio', Peri states that profit is the objective of all trade and that the 'activity directed to this end is subject to chance, which mocks at every calculation. Yet there is still ample space for reasonable calculation in which the possibility of adverse fortunes is never left out of account. This mental activity engaged in the service of business is called "arbitrio"'. Peri explicitly identifies a connection between speculation on future price movements and his concept of arbitrage: 'the profits from exchange dealings originate in price differences and not in time' with profits turning to losses if re-exchange is unfavourable. For Peri, the connection between speculation and arbitrage applies to commodities and specie, as well as bills of exchange.

Ehrenberg (1928, p.327) illustrates the lack of clarity that early modern secondary sources provide in discussing arbitrage trading:

> Here we need only deal with arbitrage in exchange and borrowed capital. The business men who engaged in operations of this kind had first of all to be possessed of what Peri called 'scienza', i.e., a knowledge based either on experience or reliable information as to those matters whose influence either on Bourse prices or rates of interest could be predicted either with certainty or

De Roover (1949) on Bill Arbitrage

Raymond de Roover is, arguably, the most important modern writer on the market for bills of exchange during the 15th to 18th centuries. However, as with other secondary sources, de Roover does not provide precise detail on bill arbitrage activities. Perhaps the most informative discussion can be found in de Roover (1949, p.137):

...Already in the Middle Ages, the bankers were constantly engaged in arbitrage transactions. If the pound sterling happened to be cheaper in Paris than in Bruges, the exchange-dealers would profit by selling sterling in Bruges and buying it in Paris, and they did not fail to do so. The effect of arbitrage transactions was to keep all exchange rate on a parity. Temporary discrepancies did occur but they were promptly adjusted.

One example will suffice to illustrate this point. According to the account books of the Borromei bank, the Venetian ducat was worth 47 1/4 groats in Bruges and 41 1/4 sterlings in London in March 1437. At the same time, the ecu of 24 groats, Flemish money, was rated at 21 1/4 sterlings. The market thus considered that 47 1/4 groats were equivalent to 41 1/4 sterlings. On this basis the ecu of 24 groats would then be equal to 21.2 sterlings, which corresponded approximately to the actual rate. All three currencies, the ducat, the groat, and the sterling, were, consequently, on a parity.

Arbitrage was sometimes very profitable and sometimes very disappointing. Because of the slowness of communications, market conditions were apt to change before bills of exchange reached their destination. In the sixteenth century, only the Italian merchant-bankers, the Fuggers of Augsburg, and a few other houses with correspondents in all banking centres were able to engage actively in arbitrage. I doubt whether much arbitrage was done in Lombard Street. Even Gresham was probably not too well informed about this aspect of the exchange business. The English operated only on London and Antwerp.

with a high degree of probability. We know already that the Italians of the Middle Ages had cultivated this 'science' with success. Its results were more or less perfectly imparted by the 16th century to business men of other nations. Unfortunately, however, the upshot was not great, for even in the sixteenth century the sum of the unknown factors in Bourse business greatly exceeded the known. These gaps had to be filled as best they might in some other way, and here we meet once more the ubiquitous activities of Bourse opinion.

This description could hardly be characterized as revealing the mechanics of the underlying transactions in the arbitrage.

Einzig (1970, pp.71-3) provides some useful, if limited, information on the arbitrage in bills:

> Bills were not necessarily payable in terms of the paying centre's currency. Very often they were issued in a third currency, or in fictitious units. For instance, bills drawn on the Champagne fair could be issued not only in Paris *deniers* but also in other currencies, or in a fictitious unit, the *ecu de marc* ... Bills issued in such fictitious units were usually paid by means of a book transfer in terms of that unit. Only the balance of the transactions was paid in an existing currency at the current exchange rate of that currency in terms of the fictitious unit.
>
> Very often triangular transactions were more profitable than direct transactions. The Dantini archives contain evidence showing that remittances from Venice to Bruges were often effected via Barcelona ...
>
> ... There was a great deal of arbitrage between the various markets. A regular service of fast couriers was maintained by banks between the financial centres with the object of ascertaining exchange rates, or of securing early information on changes in coinages or other events that were liable to affect the exchanges. They also conveyed the bills to their place of destination. Many banks kept balances with their branches or correspondents in foreign centres, and a large proportion of the turnover in the Foreign Exchange markets aimed at increasing or reducing such balances.

In all of this discussion from the important secondary sources on this subject, the precise trading strategies involved in implementing the arbitrage are not precisely discussed. Hence, it is only possible to make an educated guess as to some of the more common 'arbitrage' transactions that were being conducted.

Possible Arbitrage Transactions

In modern sense, the trades that are being described as bill market 'arbitrages', do not qualify for this classification. Three types of arbitrage trades appear to have possibly been available: triangular arbitrage; covered interest arbitrage; and 'geographical arbitrage'. Pure triangular arbitrage would require quotes for the various currencies to be all available in one centre. This would only occur in the most important financial centres, such as Antwerp. Even in markets such as Antwerp, it is unlikely that there would be sufficient volume in manual exchange, or spot currency, transactions to generate much profit. Triangular arbitrage also applies to modern forward exchange quotes.

This is relevant as exchange quotes were conventionally in terms of bills of exchange. However, for pure triangular arbitrage, bills are a decidedly more complicated contract than modern forward exchange contracts. Even if the bills involved could all be made payable in the same centre, there is still the problem of offsetting the spot cash flows.

Two variants of covered interest arbitrage are available: spot-forward and forward-forward. These trading strategies are the arbitrages most common to modern currency markets. The spot-forward arbitrage proceeds, heuristically, by borrowing in one currency, converting at the spot exchange rate and investing in another currency. The maturity value of the invested funds is simultaneously sold in the forward market in exchange for the original currency. The same maturity date is used for all contracts in the trade. The spot-forward arbitrage is the trading support for the covered interest parity condition, which provides the precise relationship between the domestic and foreign interest rates and the spot and forward exchange rates. The forward-forward arbitrage is a somewhat more complicated trading strategy that provides the covered interest parity condition applicable to two forward contracts with different maturity dates.

The precise method of executing covered interest arbitrage with bills of exchange is unclear. In theory, funds would be acquired using a bill of exchange that is payable on the centre in which it was issued. These funds would then be converted at the spot exchange rate and invested. This requires the availability of an appropriate short-term security. Presumably, even if inland bills, fictitious bills or some other security were available, these would likely be denominated in domestic currency, which implies that the original bill involved the acquisition of foreign currency and later payment of domestic currency. All of this is quite contrived. More practical transactions would involve bills drawn on other centres and matching of the various investment transactions on the books of a merchant bank. However, such procedures would be somewhat risky and would not qualify as proper arbitrages.

What remains to be discussed is 'geographical arbitrage'. These transactions do not have a modern counterpart and have been deduced from the information available about the operations of the bill market. The transactions involved are not completely riskless as coordination of activities between geographically different centres is required. However, the transactions are consistent with the spirit of modern arbitrage. As presented, the arbitrage involves two issuing locations and two payment centres. It is possible for the same location to be used

as both the issuing and payment location but that will not be assumed. Let the two issuing locations be, say, Antwerp and Hamburg, with the two payment locations being London and Venice. The basic strategy involves making offsetting bill transactions in the two issuing locations and then matching the settlements in the payment centres.

In the following example, $\$G$ is the domestic currency in Hamburg and $\$A$ is the domestic currency in Antwerp, the forward exchange rate imbedded in the bill transaction is denoted as: F_1 for Ducats/$\$A$; F_2 for Ducats/$\$G$; F_3 for £/$\$G$; and, F_4 for £/$\$A$.

At $t = 0$

In Hamburg:

Acquire $\$G\ Q_G$ using a bill which agrees to pay ($\$G\ Q_G\ F_2$) in Venice at time T	Deliver the $\$G\ Q_G$ on another bill which agrees to be repaid ($\$G\ Q_G\ F_3$) in London at time T

In Antwerp:

Acquire $\$A\ Q_A$ using a bill which agrees to pay ($\$A\ Q_A\ F_4$) in London at time T	Deliver the $\$A\ Q_A$ on another bill which agrees to be repaid ($\$A\ Q_A\ F_1$) in Venice at time T

At $t = 0$, the cash flows from all the bill transactions at $t = 0$ offset. If the size of the borrowings in the issuing centres is calculated to produce the same maturity value, in terms of the domestic currencies of the two payment centres, then the profit on the transaction depends on the relative values of the payment centre currencies in the issuing centres. The upshot is that a financial intermediary can generate triangular arbitrage trades designed to profit from discrepancies in bid/offer rates arising in different geographical locations.

To see the precise connection to triangular arbitrage, consider the profit function from the trading strategy. At time T in Venice, the cash flows would provide ($\$A\ Q_A\ F_1$) - ($\$G\ Q_G\ F_2$). And, in London, the cash flows would provide ($\$G\ Q_G\ F_3$) - ($\$A\ Q_A\ F_4$). For the intermediary operating in both locations, the resulting profit (π) on the trade would be the sum of the two cash flows:

$$\pi = (\$A\ Q_A\ F_1 - \$G\ Q_G\ F_2) + (\$G\ Q_G\ F_3 - \$A\ Q_A\ F_4)$$

$$= \$A\ Q_A\ (F_1 - F_4) + \$G\ Q_G\ (F_3 - F_2)$$

Constructing the principal values of the two transactions to be of equal value now permits the substitution of $Q_G = Q_A$ ($\$G/\$A$), where ($\$G/\$A$) $= F_0$ is the prevailing exchange rate between $\$G$ and $\$A$:

$$\pi = \$A\ Q_A\ [(F_1 - F_0\ F_2) - (F_4 - F_0\ F_3)]$$

$$= \$A\ Q_A \left[\left(\frac{Ducats}{\$A} - \frac{\$G}{\$A}\ \frac{Ducats}{G}\right) - \left(\frac{£}{\$A} - \frac{\$G}{\$A}\ \frac{£}{\$G}\right)\right]$$

The method of doing triangular arbitrage can now be illustrated using a simple example.

Assume that the set of exchange rates for the dominant financial centre is given. In this case, take all the exchanges with Antwerp ($\$A$) to be given at: F_1 = (Ducats/$\$A$) = 2; F_0 = $\$G/\$A$ = 2; and F_4 = £/$\$A$ = 1. Triangular arbitrage now permits the intermediary to quote, in Hamburg, exchange rates for receiving and delivering in both London and Venice. In this example, the profit function indicates that for F_2 = (Ducats/$\$G$) = 1 and F_3 = (£/$\$G$) = 0.5 would be consistent with no arbitrage profit. Hence, holding other exchange rates constant, quotes for F_2 = (Ducats/$\$G$) of 0.9 to receive in Venice and 1.1 to pay in Venice would be profitable. Similarly, quotes for F_3 = (£/$\$G$) = 0.55 to receive in London and 0.45 to pay in London would provide 'arbitrage' profit on the exchange.

An Early Example of Technical Analysis?

In modern financial economics, the term 'technical analysis' refers to a body of techniques used to predict future market movements using information generated from market activity. Typically, the objective is to predict future price movements based on the current and past behaviour of price movements. Analysis can focus on either individual price movements or, as in technical models such as the Dow theory, on changes in the aggregate market. The techniques used can be as basic as identifying trends from price charts or, slightly developing this approach, using moving averages of prices. More involved methods take into account other types of market information such as up/down

volume, changes in short sales positions, the amount of odd lot selling and so on. Sometimes data from one market are used to predict changes in another market, for example, the confidence index which uses the ratio of high grade to low grade bond yields to predict stock market movements.

The emergence of liquid financial and commodity markets, such as the Antwerp bourse, created the potential for significant gains or losses from speculation. It was difficult for merchants actively involved in the bill or commodity markets to avoid the implications of rapid price changes on the bourse: 'dealing in commodities in Antwerp (was) a risky business for anyone not able to follow the market from hour to hour and even for those who did so' (Ehrenberg 1928, p.240). The pressing need for merchants to predict price movements created the preconditions for the emergence around 1540 of an interesting early version of technical analysis based on astrology (Ehrenberg 1928, pp.240-42).[11] The originator of this system was one Christopher Kurz, an astrologer from Nuremberg, and his most important clients were the Tucher, one of the most prominent merchant families of that time.

According to Ehrenberg (p.240), around this time:

> astrological prognostications flourished in the Netherlands; these were prophecies of every kind which were reproduced in print. Christopher Kurz had puzzled out an astrological system by which he could foretell prices. He praised his invention to the Tuchers, mixing sober business statements with fantastic combinations in a way that seems absurd to use, but which probably at the time gave quite a different impression ... Lienhard Tucher made marginal notes on the reports that Kurz sent which prove that he read them carefully and did not fail to observe the prognostications.

Acknowledging that 'trade in spices needs great foresight', Kurz claims to have a system for forecasting the prices of pepper, ginger and saffron a fortnight ahead. To quote from one of Kurz's reports to Tucher (quoted in Ehrenberg 1928):

> I sought it three years but until this year found it not. I think God hath given it to me. I have observed it for the space of a year. Yet I will not boast myself of it, till I myself have observed it for yet a time longer with mine own eyes and have traced it out. Yet I doubt not, it is well founded ... In the same manner I have known how to show for the matter as touching cinnamon, nutmegs and cloves... likewise with bills can one hap on many a good chance. As ye have often noted in my writings to you how great an alteration is there here day by day in bills on Germany, Venice, or Lyons, so that in the space of eight, ten,

> fourteen or twenty days with other folks' money, a man may make a profit of 1, 2, 3, 4, 5, or more per cent., with such there is here each day great business on the Bourse. On these also have I my experiment so that I may foretell not only from week to week the Strettezza and Largezza (tightness or ease in money), but also for each day and whether it shall be before midday. I have, however, nigh forgot this again, since I have found you so reluctant.

The similarities of Kurz's claims with those often advanced by modern technical analysis are striking.

Though there has been some progress towards precision in specifying rules, modern technical analysis has been characterized by vagueness in making precise statements about how specific technical trading rules generate future price predictions. For example, concepts such as 'support and resistance levels' are used even though competing technical analysts often identify different support and resistance levels when confronted with the same data. Similar observations can be made about chart patterns, such as 'head-and-shoulders' and 'W-bottoms'. Technical analysts have little *ex post* difficulty identifying such patterns successfully in charts for past price data but exhibit considerable *ex ante* disagreement when asked to identify such patterns to use in predicting future price behaviour. There is a widespread tendency for technical analysts to claim a special ability in interpreting available data which is, somehow, innate enough to be incapable of precise formulation.

The correspondence between Kurz's system and modern technical analysis can be captured by examining Francis (1983, p.434) which provides a rough characterization of the 'basic assumptions of technical analysis':

- Market value is determined solely by the interaction of supply and demand.
- Supply and demand are governed by numerous factors, both rational and irrational.
- Aside from the effects of minor fluctuations in the market, stock prices tend to move in trends that persist for appreciable lengths of time.
- Changes in trends are caused by shifts in supply and demand.
- Shifts in supply and demand, no matter why they occur, can be detected sooner or later in charts of market action.
- Some chart patterns tend to recur, and these recurring patterns can be used to forecast price movements.

Interpreting 'chart patterns' to be 'astrological chart patterns' reveals an interesting, if somewhat whimsical, connection between Kurz's 16th astrological system for predicting future security price movements and the methods used in modern technical analysis.

Negotiable and Inland Bills

Two major changes were introduced to bills of exchange during the 17th century: the insertion of negotiability conditions into the bill of exchange contract; and the development in England of inland or onshore bills. A form of negotiability was present much earlier in bills obligatory, that during the 16th century conventionally contained a payable to the bearer clause. The distinction between a bill obligatory and a bill of exchange is revealed by remembering the characteristic features of a bill of exchange: there were four parties to the transaction; the loan had to be repaid in a location other than the place of origin; and final payment had to be in a currency other than that of the original payment. This form can be contrasted with the form of the bill obligatory, for which Malynes (1622, p.101) gives a sample form:

Forme of Billes Obligatorie

> I A.B. Merchant of Amsterdam doe acknowledge by these presents to be truely indebted to the honest C.D. English Merchant dwelling at Middlebourough, in the summe of five hundreth pounds currant money for merchandise, which is for commodities received of him to my contentment, which summe of five hundreth pound aforesaid, I do promise to pay unto the said C.D. (or the bringer hereof) within six months next after the date of these presents: In witnesse whereof I have subscribed the same at Amsterdam the 10 of Julie 1622, *Stilo nouo*.
>
> A.B.

The contrast with a bill of exchange is immediate. Final payment on the bill obligatory is in the same location as the original payment and in the same currency. The payor is the same as the taker.

By the end of the 16th century, there was a considerable legal tradition surrounding the enforceability of the payable-to-bearer provision in the bill obligatory. In practice, bills obligatory were commonly used and did circulate from hand-to-hand. However, in the event of disputes, the exact legal status of the bearer clause in the bill obligatory varied from centre to centre. The general legal rule was that the debtor could legitimately make payment to the bearer. However, when the bill had been assigned to an individual other than the original creditor, the status of the bearer was uncertain unless a regular power of attorney had also been obtained. English law explicitly rejected legal status for any bill assignment not accompanied by power of attorney, for example, Malynes (1622, p.100). On the continent, Bruges and

Antwerp granted the bearer the right to sue, but other jurisdictions required power of attorney. Hence, the bearer clause on a bill obligatory was only enough to permit assignability and was not generally strong enough to admit negotiability.

Negotiability of bills of exchange was a natural evolution of the bill of exchange. Yet, the powerful Italian merchant bankers were strongly against the inclusion of a bearer clause. Around 1550, German and English merchants attempted to include bearer clauses in bills of exchange being dealt in Antwerp, but this was 'strenuously opposed' by the Italian bankers who protested to the municipal authorities (de Roover 1949, p.121). It was not until around the middle of the 17th century that the practice of endorsing bills of exchange was widespread. Evidence of this is provided by Malynes, *Lex Mercatoria*. The first edition of 1622 warns against including bearer clauses in bills of exchange, while the second edition of 1656 includes an attachment, written by John Marius, that examines the endorsement of bills of exchange in detail. 'One must conclude therefrom that the practice of endorsement had been introduced into England between 1622 and 1650, or somewhat later than it appeared in Antwerp' (de Roover 1949, p.122).

The development of the inland bill of exchange in England was a major step in the development of a functional money market and a modern banking system. These bills first started appearing in the early 17th century and served the same type of function as the foreign bill of exchange, 'to bridge the distance between places having a reciprocal trade, in order to avoid the risk of sending coin' (Feaveryear 1931, p.149). The demand for a paper method of making payments was stimulated by the expansion of trade between London and the 'country'. Important players were the London merchants, 'with their chapmen travelling the country and their factors or agents in the London markets' and the Treasury of the English crown seeking a method of remitting payments. The early London bankers, the goldsmiths, also played a role in the settling of bill payments.

The early inland bills differed from the foreign bill in that the element of foreign exchange was removed. There were still the four parties, with original and final payment being made in different locations. Negotiability was not an issue initially as the inland bills were issued with short dates, 20 days was typical. An important restriction in the early market for inland bills was the imbalance in the re-exchange process. There was a substantial demand to make remittances to London, but only limited demand to make payments in

the country. As the market for inland bills increased in size, two major developments emerged. First, primarily to facilitate the demand for outward payments, bill-brokering became a profitable and important activity for London bankers.

The second major change in the inland bill market was the gradual transition of the inland bill into a credit instrument. Bills came to be drawn for periods much longer than required for simple remittances and the process of discounting bills became common practice. This had at least two important implications. One implication was the rationalization of money market activity, the foreign exchange and credit transactions that were previously embedded in the bill of exchange had become unbundled. Discounting of negotiable paper, a cornerstone of modern money markets, was effectively implemented. Another implication was that the inland bill provided the basis for the emergence of paper currency. Initially the inland bills served as a crude form of currency. Before long banks were issuing notes in exchange for discounted inland bills. These notes were typically payable on demand in the specie that was provided to the banker by depositors.

Cantillon on Speculation in Bills

Like so many important contributors to the early history of financial economics, little is known about the life of Richard Cantillon (16??-1734). This fact is somewhat surprising as the bulk of Cantillon's life was lived in the 18th century and he was a man of considerable wealth. Hyse (1971) and Fage (1952) date Cantillon's birth in 1697, yet Higgs (1931), Hutchison (1988) and others claim his birthdate is unknown. Higgs (p.366) guesses that Cantillon 'was probably born between 1680 and 1690'. His family genealogy indicates his noble ancestors came over from France during the Norman conquest, settling eventually in Ballyhigue Castle on the Kerry coast in Ireland. Cantillon's immediate namesake was 'one Richard Cantillon who went to France in the suite of James II, fought at Boyne in command of a company of dragoons, was wounded and later was made "Chevalier de la facon du Pretendant"' (Higgs 1931, p.365). This Richard Cantillon went on to become a banker in Paris and, at his death in August 1717, left an estate that was insolvent.[12]

The first substantive record of Richard Cantillon, the economist, occurs with his appearance to settle the sizeable unpaid balance on the elder Cantillon's estate, though there is some related evidence to

indicate that he was also involved in this bank's business starting from 1716 (Higgs 1931, p.368). The signed statement of the trustee for the elder Cantillon's will indicates that Richard Cantillon, the economist, was one of the largest creditors of the estate and was moved to settle the balance owing on the estate 'only by the desire to honour the memory of one whose name he bore' (Higgs, p.366). Legal records indicate that Cantillon was engaged in running this banking business until August of 1719 when he left for Italy, leaving Edmund Loftus and Company to manage his banking affairs. Upon his return to Paris in February 1720, he fired the managers and entered into a banking partnership with John Hughes who had 'been before that time a Banker in London'.

From the date of the Hughes partnership until his death there is more information. Surviving correspondence, primarily from Cantillon to others, indicates that Cantillon was seriously at odds with John Law during his time in Paris. This was both because Cantillon's outspoken and negative position on Law's system as well as his operations in the securities market, aimed at profiting from the scheme. Cantillon did not spend much time in Paris, initially because Law made it 'dangerous' for him to be there, though he was familiar enough with the Law family to have the firm of Cantillon and Hughes make a sizeable advance of £20,000 to William Law, John Law's brother. Whether any of these funds passed through to William Law's more famous brother is unknown. In any event, this debt by William Law was later to be defaulted and appears as a listed item in Cantillon's will.

Cantillon was a frequent visitor to Paris over the years. Cantillon was married in 1722 to the daughter of a rich Paris merchant and had one daughter, Henrietta. He maintained a residence in Paris. However, visits to Paris by Cantillon following the collapse of the Law scheme were not without incident, due to outstanding legal cases against him arising out of his banking operations during the collapse of Law's scheme. Ultimately, one of these suits, brought by two Parisian bankers, resulted in his being arrested and held in jail for a few days during 1729. Cantillon travelled so much that it is difficult to ascertain his main place of residence, though his primary roots seem to be in London where, from 1721 until the early 1730s, he had a large house. In addition, Cantillon's closest friends, such as Francis Garvan, were situated in England. He also maintained an estate in Lincolnshire.

Starting in 1726, Cantillon and his wife travelled widely throughout Europe, to locations such as Cologne, Verona, Brussels, Geneva and Utrecht. His daughter was born around 1728 and his wife appears to

have lived primarily in Paris after that date. In early 1734, Cantillon can be found back in London, where he established a new residence in Albemarle Street and engaged some servants. Included among these servants was one Joseph Denier, a Frenchman who had been Cantillon's cook for about eleven years prior. For reasons unknown, Cantillon dismissed Denier and, ten days later on May 13, 1734, Denier apparently used a back window to enter the residence and murder Cantillon. The house was then looted and set on fire. Cantillon's body was burned beyond recognition, together with many important papers that would have aided immeasurably in later historical research. Denier fled to the coast and was able to escape to Holland, engaging a fisherman to carry him over.[13]

That Cantillon met such a tragic end was, arguably, just retribution for previous sins. Cantillon's banking activities in Paris, and later in Amsterdam, generated a number of notarial protests that have provided considerable evidence about his activities during the bubble era promotions in France, England and Holland. One of these suits involved the widow of his partner John Hughes, who died in Paris in June of 1723. Despite making written assurances to Hughes that 'by standing the Tack, you have a maintenance secured to your Family', Cantillon refused to provide an accounting of the sum due to her husband's estate from his banking partnership with Cantillon. In addition to this action, the text of other legal disputes reveals an unscrupulous, if not illegal, pattern of activity on Cantillon's part.

Over the length of his business life, Cantillon was involved in a wide range of activities. In addition to his banking activities, he was also an active speculator in a range of commodities, such as copper, tobacco and sugar (Hyse 1971, p.822). Yet, it is the bubble era speculations that generated, by far, the most notarial or legal protests and that provide the most information about Cantillon's business practices. One of these suits produced a statement of Cantillon's activities with Hughes during the French bubble (Higgs 1931, p.371):

> the schemes ... were to lend money to severall persons upon French India Actions, and to take high premiums or advanced prices on French crowns, and to sell out such Actions, and to remit the produce thereof into Foreign countries in order to turn the same into Sterling money for their own profit, and after the bills and notes ... taken from persons with whom they dealt in that manner should become payable ... to oblige such persons to pay the whole money thereon, and not to disclose that they had sold the said Actions and raised anything thereby.

That Cantillon was fully cognisant of the potential illegality of his activities with Hughes is reflected in a letter he sent to Hughes:

> Your remember upon our first broaching these schemes your were content to stand in the Gap ... If the affair ...was to be carried against us ... there is no medium but your flying or going to Prison ... It will be your own interest to take an imprisonment of a twelve month rather than to see all our schemes pulled to pieces.

As it turns out, in constructing the partnership with Hughes, Cantillon was careful to limit his legal exposure and to have Hughes as 'a man of straw, to go to prison if the scheme turned out badly'.

Protests over Cantillon's practice of selling the collateral that was deposited for security against monies advanced is a constant theme in the bubble era lawsuits that were lodged against him. Cantillon's reply, at least to the French lawsuits, was that the shares were not identifiably connected with specific borrowers and, in any event, he was always prepared to enter the market to repurchase shares if demanded. Another theme in the various disputes is the almost extortionate interest rates that were charged. For example, a 9 month loan of £12,000 to Lady Mary Caryll required repayment of £18,665, an annualized simple interest rate of almost 75%. Rates of 50-60% were likely charged on loans during the South Sea bubble (Higgs 1931, p.213). Another loan to two bankers was for Fl 35,000 for repayment of Fl 41,000 in eight months, a simple annualized interest rate of over 25%. During the bubble period, Cantillon was engaged in lending to speculators, who were almost always prime credits, in Paris, Amsterdam and London.

It is often claimed that Cantillon 'made large sums speculating on the foreign exchanges, the theory of which he was a masterly pioneer' (Hutchison 1988, p.164). While there may have been some theoretical insight involved in Cantillon's activities, available evidence appears to indicate that Cantillon's success was due more to unscrupulous lending practices combined with predatory interest charges.[14] The timing of the scheme involving the sale of collateral was fortuitous, if not insightful. However, the risks were minimal. If the speculative sales of shares held as collateral proved to be incorrect, then the funds had already been remitted off-shore. The Paris banking firm of Cantillon and Hughes would be bankrupted and Cantillon had Hughes in place, if a patsy was required.

It might be expected that, being engaged in banking business, Cantillon would have many relevant observations about the workings of the exchange market, in general, and on trading in bills of exchange,

in particular. In this regard, Cantillon's *Essay*, especially Part III, ch. 2-3, does not disappoint. For example, on the topic of bankers' speculation in bills (Higgs 1931, pp.257-8):

> If Holland sends to England in January merchandise of the value of 100,000 ounces of silver and England only sends to Holland in the same month merchandise to the value of 50,000 ounces (I suppose the sale and payment made in January on both sides) there will be due to Holland in this month a balance of trade of 50,000 ounces, and the exchange on Amsterdam will be in London in January 2 or 3 per cent. above par, or in the language of exchange, the exchange on Holland which was in December at par or at 35 escalins to the pound sterling in London will rise in January to about 36 escalins. But when the Bankers have sent this balance of 50,000 ounces to Holland the exchange on Amsterdam will naturally fall back to par or 35 escalins in London.
>
> But if an English Banker foresees in January, owing to the sending into Holland of an unusual quantity of merchandise, that at the time of payments and sales in March Holland will be indebted to England, he may instead of sending the 50,000 ecus or ounces due in January to Holland, furnish in that month bills of exchange on his Amsterdam correspondent payable at double usance or two months, the amount of the value to be paid on maturity, and by this method profit on the exchange which in January was above par and in March will be below par, and so gain doubly without sending a sol to Holland.
>
> This is what Bankers call speculation, which often causes variations in the exchanges for a short period independently of the balance of trade; but in the long run we must get back to this balance which fixes the constant and uniform rule of exchange.

The contrast of the 18th century market for bills of exchange with that described by de Roover for the 16th and early 17th centuries is striking. In particular, whereas previously the exchange rate between the Low Countries and London was determined to provide an on average interest return on re-exchange, by the 18th century the exchange rate fluctuated around the parity values.

Adam Smith and the Bill Market

By the time of the *Wealth of Nations*, transactions involving bills of exchange had changed dramatically. In England, the conventional bill of 'exchange' no longer involved a foreign exchange transaction but, rather, was in the form of an inland bill. As a consequence, the practice of discounting bills was the norm. The 'drawing' and 'redrawing' of bills associated with the 18th century bill market was not related to exchange and re-exchange of the 16th century. The 'fictitious' bill of the 18th century had nothing to do with dry exchange

but, rather, was concerned with whether the bill originated as a 'real bill'. Paper currency, issued by both the Bank of England and the country banks, was in common usage. The debates of the 16th century on the role of bills in manipulation of the exchange market were long past. By 1776, focus had shifted to the role of 'bills of exchange', specifically real bills, in bank management and, for want of a better description, aggregate monetary theory.

All these points are well illustrated in the *Wealth of Nations* (Bk. II, ch.2, pp.293-6) where Smith deals explicitly with bill of exchange transactions. Smith (p.293) starts with an implicit recognition of the law merchant and the relevant laws governing the bill of exchange contract:

> The customs of merchants, which were established when the barbarous laws of Europe did not enforce the performance of their contracts, and which during the course of two last centuries have been adopted into the laws of all European nations, have given much extraordinary privileges to bills of exchange, that money is more readily advanced upon them, than upon any other species of obligation; especially when they are made payable within so short a period as two or three months after their date.

Smith's (pp.293-4) explicit discussion of the 'endorsement' aspect of the contract reflects the state of development that the bill of exchange contract had achieved by his time:

> If, when the bill becomes due, the acceptor does not pay it as soon as it is presented, he becomes from that moment a bankrupt. The bill is protested, and returns upon the drawer, who, if he does not immediately pay it, becomes likewise a bankrupt. If, before it came to the person who presents it to the acceptor for payment, it had passed through the hands of several other persons, who had successively advanced to one another the contents of it either in money or goods, and who to express that each of them had in his turn received those contents, had all of them in their order endorsed, that is, written their names upon the back of the bill; each endorser becomes in his turn liable to the owner of the bill for those contents, and, if he fails to pay, he becomes too from that moment a bankrupt.

All this is as expected and could readily be applicable to the bill trade in Europe as well as England. Yet, the bill of exchange that Smith has in mind is much different from the late 17th century variant.

By Smith's time, the meaning of 'bill of exchange' in England and Scotland had drifted from the European variant, which embedded a forward foreign exchange contract together with the loan contract.

Similar to English country banks, Scottish banks also relied on the clearing, discounting and other facilities of the Bank of England. The bill of exchange was a credit instrument. Though there was often a premium to be paid when Edinburgh traders issued bills drawn upon London, an interest bearing loan transaction was the objective. Smith (Bk. II, ch. 2, p.294) discusses the late 18th century variant of 'dry exchange' in the bill market:

> The trader A in Edinburgh, we shall suppose, draws a bill upon B in London, payable two months after date. In reality B in London owes nothing to A in Edinburgh; but he agrees to accept A's bill, upon condition that before the term of payment he shall redraw upon A in Edinburgh for the same sum, together with the interest and a commission, another bill payable likewise two months after date. B accordingly, before the expiration of the first two months, re-draws this bill upon A in Edinburgh; who again, before the expiration of the second two months, draws a second bill upon B in London, payable likewise two months after date; and before the expiration of the third two months, B in London re-draws upon A in Edinburgh another bill, payable also two months after date. This practice has sometimes gone on, not only for several months, but, for several years together, the bill always returning up A in Edinburgh, with the accumulated interest and commission of all the former bills. The interest was five per cent. in the year, and the commission was never less than one half per cent. on each draught. This commission being repeated more than six times in the year, whatever money A might raise by this expedient must necessarily have cost him something more than eight per cent. in the year, and sometimes a great deal more; when either the price of the commission happened to rise, or when he was obliged to pay compound interest upon the interest and commission of former bills. This practice was called raising money by circulation.

The objective of the transactions described by Smith are sophisticated loan transactions designed to circumvent the 18th century banking practice of using loans that were secured and collaterialized, such as loans secured by 'real bills'.

Smith (p.295) had a well developed, if metaphorical, understanding of the risks associated with bill trading:

> Though the drawer, acceptor, and endorsers of the bill should, all of them, be persons of doubtful credit; yet still the shortness of the date gives some security to the owner of the bill. Though all of them may be very likely to become bankrupts; it is a chance if they all become so in so short a time. *The house is crazy, says a weary traveller to himself, and will not stand very long; but it is a chance if it falls to-night, and I will venture, therefore, to sleep in it to-night.* (emphasis added)

As for the profitability of raising money by circulation, Smith (pp.295-96) observes that the high implicit interest rates made it difficult to make profits for those projectors using this method of raising funds:

> In the country where the ordinary profits of stock in the greater part of mercantile projects are supposed to run between six and ten per cent., it must have been a very fortunate speculation of which the returns could not only repay the enormous expense at which the money was thus borrowed for carrying it on; but afford, besides, a good surplus profit to the projector. Many vast and extensive projects, however, were undertaken, and for several years carried on without any other fund to support them besides what was raised at this enormous expense. The projectors, no doubt, had in their golden dreams the most distinct vision of this great profit. Upon their awaking, however, either at the end of their projects, or when they were no longer able to carry them on, they very seldom, I believe had the good fortune to find it.

Some debate is associated with Smith's calculation of the costs, especially with respect to the associated gain in exchange when bills were purchased on London.

Ultimately, Smith (p.296) identifies raising money by circulation as the 18th century variant of fictitious exchange:

> The bills which A in Edinburgh drew upon B in London, he regularly discounted two months before they were due with some bank or banker in Edinburgh; and the bills which B in London redrew upon A in Edinburgh, he as regularly discounted either with the bank of England, or with some other bankers in London. Whatever was advanced upon such circulating bills, was, in Edinburgh, advanced in the paper of the Scotch banks, and in London, when they were discounted at the bank of England, in the paper of that bank. Though the bills upon which this paper had been advanced, were all of them re-paid in their turn as soon as they became due; yet the value which had been really advanced upon the first bill, was never really returned to the banks which advanced it; because, before each bill became due, another bill was always drawn to somewhat a greater amount than the bill which was soon to be paid; and the discounting of this other bill was essentially necessary towards the payment of that which was soon to be due. This payment, therefore, was altogether *fictitious*. The stream, which, by means of those circulating bills of exchange, had once been made to run out from the coffers of the banks, was never replaced by any stream which really run into them. (emphasis added)

A comparison between the Gresham's bill of exchange with that of Smith reveals the dramatic evolution in financial markets. By Smith's time, the foreign exchange and loan transactions had been unbundled, permitting the bill of exchange to serve as the workhorse of money

market transactions. This freed the foreign exchange market to price foreign exchange more accurately, for example, Schubert (1988), Buchinsky and Polak (1993).

Appendix: Some Common Monetary Units

The mercantile problems of monetary exchange were a central concern of commercial arithmetic and source of numerous tracts dedicated exclusively to this issue, for example, Justice, *A General Treatise of Monies and Exchanges* (London, 1707) and references in McCusker (1979, p.42, n.44). Even within a given country, there were real difficulties of dealing with different coinages, that were of different weights and minted with different metals of differing fineness. Clipping of coins, though often subject to severe sanctions, posed another type of difficulty. In addition, monetary units of account were subject to periodic changes due to debasements by the sovereign. The gradual evolution of bank deposit transfer and paper money units added a further degree of complication, insofar as an agio between cash money and bank money had to be determined. Against this background, merchants were confronted with the numerous jurisdictions issuing coinage making the 'rate of exchange' between two countries a decidedly abstract concept.

Great Britain

Pound Sterling	Crown	Shilling	Pence	Farthing
1	4	20	240	960
	1	5	60	240
		1	12	48
			1	4

Amsterdam

Pond Vlaamsch	Gulden (Florjn)	Schelling Vlaamsch	Stuiver	Groot Vlaamsch	Penning
1	6	20	120	240	1920
	1	3⅓	20	40	320
		1	6	12	96
			1	2	16
				1	8

Hamburg

Pfund	Reichsthal	Thaler	Mark	Schilling	Schilling	Grot	Pfennig
1	2½	3¾	7½	20	120	240	1,440
	1	1½	3	8	48	96	576
		1	2	5⅓	32	64	384
			1	2⅔	16	32	192
				1	6	12	72
					1	2	12
						1	6

France

Ecu de Change	Livre Tournois	Sou Tournois	Denier Tournois
1	3	60	720
	1	20	240
		1	12

Spain

Doblon	Peso	Real	Maravedi
1	4	32	1,088
	1	8	272
		1	34

Venice

Lira di piccoli	Soldi	Piccoli	Silver grams
1	20	240	19.33
Soldi di piccoli		Piccoli	
1		12	
Lira di grossi	Soldi	Grossi	Silver grams
1	20	240	504.72
Soldi di grossi		Grossi	
1		12	

Grossi	Pizoli
1	32

Ducat	Grossi
1	24

Ducat	Lira di grossi
10	1

Notes

1. This statement is not completely accurate. A much more detailed examination of the various features of bill of exchange contracts, and related transactions, is available in Munro (1998). The relationship between the bill of exchange and bill obligatory is also examined in Munro (1998).

2. A possible exception occurs with some Islamic banking practices.

3. De Roover (1949, p.18) provides a listing of many of the bibliographical sources which are available on Thomas Gresham.

4. The Mercers were a guild operating as an important component of the larger regulated Merchant Adventurers' Company, an organization governing English merchants trading with the continent, especially the Netherlands. Hecksher (1935, p.376) indicates that the guild of London Mercers was particularly important to the running of the company during the late 15th and 16th century, acting 'for it in the most vital transactions'. Such transactions included financial arrangements. Hence, during his apprenticeship, Gresham would have gained an intimate knowledge of the working of the 16th century bill market.

5. During Gresham's time, domestic money and capital markets, such as those in England, were oriented to transactions between individuals, for example, Tracy (1985). The large financing requirements of sovereign governments required accessing funds in foreign financial centres, of which Antwerp was the most important. These centres were conduits for the large financiers, such as the Fuggers, willing to place the large short term loans needed by governments.

6. Some sources, such as Johnson (1937, p.4), maintain that the word 'mercantilism' is vacuous. There is no well specified body of ideas to which the word applies. 'In popular usage, for want of acknowledged definition, the word has become a positive nuisance ... "mercantilism" may be an antonym for *laissez-faire* or a synonym for stupidity. One can never tell'. While not without substance, this position is overstated. In what follows, mercantilism refers to a body of work, written over a period of time spanning the two centuries before the *Wealth of Nations*, and being concerned with 'mercantile' issues. That there are conflicts, lack of cohesion, and faulty ideas contained within this definition of 'mercantilism' is undeniable. Some of the important mercantilists did not adhere to specific doctrines that writers such as Schumpeter (1954) identify with mercantilism. Attempts to attach a cohesive body of theory to mercantilism are also engaged in overstatement.

7. Another impetus for the modern reconsideration of mercantilist ideas came from the "mainly though not exclusively" school of German economic historians writing prior to Keynes, for example, Schumpeter (1954, p.336-7). A primary objective of this school was to provide support for autarkic policies and state management which was socially popular in early 20th century Europe. By Keynes's time, due to contributions from Viner, Hecksher and others, this pro-mercantilist school of thought was generally discredited. To quote Schumpeter: 'the German(s) ... cared little and knew less about economic theory (and) were wrong in their thinking that they had proved anything for what they conceived to be mercantilist doctrine'.

8. A number of pre-WWII sources, such as Seligman (1930) and Hecksher (1935, v.2), refer to the early mercantilists as 'bullionists' and the later mercantilists as 'mercantilists' with the writings of Thomas Mun being used as the dividing line. For a number of reasons, this method of classification has not been followed in post-WWII sources, such as de Roover (1949). One simple reason is that 'bullionists' is also used in reference to debates surrounding the suspension of convertibility of the British pound in the late 18th and early 19th century. There are also those that question the need to create a sharp semantic distinction between types of mercantilists. While there are some significant differences between the early and later mercantilists, 'there are essential points on which all mercantilists seem to agree. For example, most of them considered the acquisition of treasure as desirable. They also overemphasized foreign trade as the main source of national prosperity, to the neglect of agriculture and manufactures' (de Roover 1949, p.281).

9. The term 'self-financing trading strategy' is also used, though this concept is more general in that it allows for the trade profit to depend on uncertain variables. The possibility of negative profit is also not exclusively avoided.

10. Einzig (1970, p.67) discusses the difficulties in executing manual exchange arbitrage involving the value of coins in different locations. In addition to the costs of transportation, this type of arbitrage was restricted by the seigniorage and minting charges levied in all the different countries.

11. Variations of technical analysis have a history stretching back to antiquity. An early Greek example is provided by Aristotle's anecdote about Thales, supposedly an expert on 'meteorology' which he used to make predictions about the olive crop in Miletus. Unfortunately, there are no available secondary sources detailing the specifics of the various technical systems used in the premodern era.

12. Murphy (1986) provides a detailed examination of the life of Cantillon. There are a number of minor points of discrepancy and disagreement between Murphy (1986) and Higgs (1931).

13. In a remarkable example of historical detective work, Murphy (1986, ch.14) develops the hypothesis that Cantillon faked his own death. It is difficult, if not impossible, to assess the validity of Murphy's argument. However, Murphy's line of reasoning, together with an impressive collection of supporting primary material, makes fascinating reading.

14. This position follows Higgs (1931) and does differ somewhat from Murphy (1986) which argues for Cantillon being an astute securities trader and, possibly, something of a victim of vindictive legal attacks from speculators who incurred large losses during the Mississippi scheme.