

## **The international transfer of technology: Examples from the development of accounting\***

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### **ABSTRACT**

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This paper examines the international transfer of accounting technology, using seven examples in chronological order. These include double-entry bookkeeping, the true and fair view requirement, and the second income statement. Some overarching features of these transfers are noted. Inventions respond to commercial need, particularly increasing complexity. They therefore spread slowly if complexity spreads slowly. Common culture and language can speed up transfers but are not the major drivers. Political and legal intervention spreads technology, but sometimes inappropriately.

### **KEYWORDS**

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Accounting, Double-entry Bookkeeping, International Accounting, Accounting technology.

## 1. Introduction

This paper considers the international transfer of accounting technology, starting with the invention and spread of double entry bookkeeping, and finishing with some developments of the twenty-first century. Table 1 shows the topics to be examined. Some overarching features of these transfers are noted. Conclusions are reached about the international transfer of accounting technology.

• <i>Debits and credits</i>
• Double entry
• Published, audited financial statements
• Consolidation
• The equity method
• The “true and fair view”
• The second income statement: “other comprehensive income”

**Table 1:** Accounting inventions: in chronological order

The provenance of this paper (a lecture at the Reial Acadèmia de Doctors in Barcelona) explains the use of some informal language, why there is less referencing than in some academic papers, and why there are many references to Spain.

Parker (1989) traces the spread across time and across countries of professional accountancy and other accounting inventions. He concludes that diffusion is most successful when both exporters and importers of accounting technology are actively involved. Sometimes, diffusion goes too far, when a country copies unsuitable or unnecessarily expensive accounting techniques. Briston (1978) suggests that this occurred in developing countries, and Nobes (1998) mentions some African countries which have no stock markets but nevertheless use British-style investor-oriented accounting.

## **2. The invention and spread of double entry**

### **2.1. Before double entry**

Double-entry bookkeeping (DEB) gradually evolved, almost certainly in thirteenth century Italy, from more primitive forms of record keeping which already included the concepts of debit and credit. It is not surprising that Spanish words for accounting come from Italian but the same is also true for English words, as the examples in Table 2 show. That is, not only ideas but also the words for them are involved in international transfer.

Account	Debit, Debtor
Amortise	Discount
Audit	Dividend
Balance	Folio
Bank	Fund
Capital/ise	Interest
Cash	Liquidity
Contract	Pension
Cost	Reserve
Credit, Creditor	Value

**Table 2:** Examples of English accounting words of Italian origin

Imagine thirteenth century Florence. Apart from banking, a major type of business was clothing, as it is now. Family businesses (like Prada, Gucci, Versace or Dolce & Gabbana) turned raw ingredients (e.g. wool from England) into expensive luxury clothing. Given that accounting uses up time and expensive paper, a business keeps its

accounting to a minimum. There is no need to record the payment of wages: we either have no staff or we only pay wages on Friday. There is no need to record cash or inventory: we can look in the cash box or in the inventory cupboard. We do not need to calculate profit because there is no-one to share it with and there is no tax on profits. However, what the business must record is debts by customers and debts to suppliers. Without such records, financial chaos would soon result.

At the time (e.g. early 12th century), there was no “zero” and no negative numbers in Christian Europe. Accounting worked with Roman numerals and an abacus. There were no crossings out. In an account for a customer, increasing debt (caused by sales) is shown on the left (as “debit”, meaning “he owes”), whereas receipts from the customer are shown on the right (as “credit”, meaning “he trusts”). In an account for a supplier, amounts owed are on the right, whereas payments to the supplier on the left.

We can speculate that the credits were put on the right because they were “good”: a supplier trusting us. There is a long history of the right being good, and the left being bad. This can be illustrated with paintings of “The Last Supper” in which Judas is on Christ’s left, or paintings of “The Last Judgement” in which the good go up to heaven on Christ’s right.

## 2.2. The invention of DEB

As commerce became more complex (e.g. taking on staff or taking on partners), better record keeping became useful. For example, if an employee looks after cash, it becomes necessary to know how much cash there should be not just how much there is. This can be done by treating the cashier as a customer. The receipt of cash from a real customer is then recorded as: debit cashier, credit customer. If a supplier is paid, the entry is debit supplier, credit cashier. At any time, it is then possible to calculate the balances of amounts owed by customers and to suppliers, and the amount of cash that is owed to the business by the cashier.

Eventually, all transactions can be recorded with double entries. Then the total of the debits should equal the total of the credits. At the end of a period, the balances on some of the accounts (e.g. sales and wages) are used to calculate profit. The remaining balances

(e.g. cash and amounts owed) could be listed on a balance sheet, to show the financial position of the business at the period end.

The earliest DEB accounting records that we still have date from 1299 in Provence (Lee, 1977) and 1305 in London (Nobes, 1982). In both cases, the records were kept by Italian merchants. Furthermore, a study of thirteenth century Italian records shows that elements of DEB were gradually evolving before 1299 (Lee, 1973). This is all strong evidence that DEB was invented in northern Italy before 1300. The invention was probably driven by increasing complexity. Accounting developments tend to happen in innovative commercial nations. In this case, the Italians were ahead in such matters as: trading on credit, partnerships, foreign branches, multiple currencies.

Can we identify a particular inventor of DEB? Wikipedia, that great fount of student wisdom, begins its entry on Pacioli by stating that “in fact, he is the Father of double entry Book-keeping system” [capitals and doubtful grammar in the original]<sup>1</sup>. Given that we have DEB records from 1299 whereas Pacioli was born in the 1440s, this is clearly inaccurate. Pacioli was a Franciscan friar and professor of mathematics. He had learned commercial arithmetic while being a tutor to a merchant’s children in Venice (Taylor, 1980). His contribution was to describe DEB in a part of a major work on mathematics (*Summa de Arithmetica, Geometria, Proportioni et Proportionalita*) which was published in Venice in 1494. Many papers have been written on the accounting part of the book, several recently (e.g. Sangster et al., 2008).

Pacioli’s treatise on bookkeeping led to translations or versions in several languages (e.g. in Flanders and in England in 1543). In Spain, an apparently original work on DEB by Bartolomé Salvador de Solóranzo appeared in 1590 (Esteve, 1989).

#### Spread of practice

Partly as a result of the availability of publications explaining DEB, the method spread throughout Europe, but slowly. Table 3 gives examples. Spain led the world in terms of requirements for merchants to use DEB, in the Pragmáticas of Emperor Carlos I in 1549.

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<sup>1</sup> [http://en.wikipedia.org/wiki/Luca\\_Pacioli](http://en.wikipedia.org/wiki/Luca_Pacioli), accessed 29.5.2014

1290s: Italian merchants
1340s: City of Genoa
1500s: slow spread via Antwerp to merchants around Europe
1549: <i>Pragmáticas</i> requiring merchants to use double entry
1746: City of Bristol
1826: the UK Exchequer

**Table 3: Examples of the introduction of double entry**

An example of the extraordinarily slow spread of practice is that the administrators of the City of Genoa<sup>2</sup> in Italy used DEB in the 1340s but it took until 1786 for the administrators of Bristol in England to adopt DEB. This was despite the fact that boats frequently travelled between these two major ports every year. It would not be a lack of knowledge or a language difficulty which caused the slow spread of practices. Presumably, Bristol did not need the complication of DEB.

In 1826, the UK state's financial administration (the Exchequer) eventually adopted DEB. It then burnt the old tally sticks which had previously been used for accounting. This led to the destruction by fire of the Houses of Parliament in 1834, now replaced by the famous Victorian gothic buildings.

### 3. Published, audited financial statements

There were no general requirements in Spain for companies to publish audited financial statements until 1989 when the EU Fourth Directive was implemented (Gonzalo and Gallizo, 1992, p.74). By contrast, in the UK, publication has been required since 1844, and audit since 1900. This remarkable difference is obviously not caused because Spain did not know about the inventions but because the inventions were not needed in Spain. The industrial revolution appeared first in the UK, and it led to the need for large amounts of capital which was provided by a large number of private investors. The model for this had been tried out earlier by the East India Company from 1600, and somewhat similarly in Amsterdam. The ability to set up companies by simple registration was allowed by the Companies Act 1844, and then limited liability was allowed by the 1855 Act. This led to

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<sup>2</sup> That is, *Genova* in Italian or *Génova* in Spanish.

many companies having widespread ownership. Publication and audit help to protect the outside (non-manager) owners from bad managers.

Spain (like France, Germany and Italy) took a different route. Industrialisation came later, and many companies were owned or financed by the state, by banks or by families. There was therefore no need for published statements, which meant that taxation became a major purpose of accounting. By contrast, in the UK (and under IFRS) taxation is specifically ruled out as the prime purpose of financial reporting, and tax calculations use different rules.

Scandals and catastrophes affect the arrival of new ideas and rules. The failure of the City of Glasgow Bank led to the world's first audit requirements (in the Companies Act 1879, for banks in the UK). The Wall Street Crash led to the world's oldest and toughest regulatory agency for accounting and auditing: the Securities and Exchange Commission (SEC), founded in Washington DC in 1934. The SEC immediately introduced the requirement for audited published financial statements for listed companies.

#### **4. Consolidation**

The first set of consolidated statements in the world was that published by US Steel in 1902. There are various explanations for why the US should have led developments in this field (Nobes and Parker, 2012, pp. 382/3). The idea gradually spread into the practice of some large companies elsewhere: UK (1910), Australia (1931), Germany (1930s), France (1960s). Compulsory consolidation followed later (e.g. US requirements of 1934 and German law of 1965).

The EU caught up with this by passing the Seventh Directive on company law in 1983, which led to Spanish law in 1989 and Spanish practice from 1991. This gradual spread around the world over nearly a century is summarised in Table 4. That it took so long for consolidation to spread from the US to Spain is related to the purposes of accounting and to the much greater prevalence of group structures in the US.

US:	1902 [1934 law]
UK:	1910 [1947 law]
Australia:	1931 [1938 law]
Germany:	1930s [1965 law]
France:	1960s [1986 law]

EU Directive: [1983 law]
Spain: [1991 law]

**Table 4:** The arrival of consolidation in practice and law

## 5. The equity method

The equity method (*puesta en equivalencia*) has a long history of different uses in different countries (Nobes, 2002). It brings entities into the financial statements of an investor, in a single line, as the share of net assets of an investee. The method was used in the UK in the 1910s to 1930s before consolidation; in unconsolidated statements in the US and the Netherlands; in the US and the UK for unconsolidated subsidiaries (e.g. in the 1980s); and now throughout the world to include associates and joint ventures in consolidated statements. For this latter purpose, it arrived in requirements as follows: France (1968), UK and US (1971), IFRS (1976), EU Seventh Directive (1983), Spain (1991) and Australia (1998).

However, no-one is really sure what the equity method is trying to do: is it valuation or consolidation (EFRAG, 2014)? It might be better to abandon it (Milburn and Chant, 1999). As noted in the introduction, it is perfectly possible for ideas to travel to inappropriate places or for bad ideas to travel all round the world.

## 6. The true and fair view

UK law contains the idea (since 1947) that it is even more important for a company's financial statements to give a true and fair view than for them to comply with the detail of regulations. Therefore, the law foresees occasions when a company must depart from the details of the law in order to give a true and fair view (TFV).

This idea spread all round the British commonwealth, e.g. arriving in Australian law in 1955. However, it did not spread to Canada or the USA. After a battle in Brussels in the 1970s (see Nobes, 1983), the TFV requirement and its overriding nature were included in the EU's Fourth Directive on company law, and arrived in Spanish law in 1989 as "*la imagen fiel*". Incidentally, this is a problematic translation. The "*la*" implies that there can be only one TFV, which is not the British concept. Further, the "*fiel*" is bearing the weight of two quite different English adjectives: "true" and "fair".

International Financial Reporting Standards (IFRS) did not deal with the TFV issue in Standards until a revision of IAS 1 in 1997, in which TFV is expressed as “fair presentation”. There was a major argument against the idea that it should be overriding (Camfferman and Zeff, 2007, p.390-392). Nevertheless, IAS 1 (para. 19) contains that requirement “if the relevant regulatory framework requires, or otherwise does not prohibit, such a departure”. Thus, it applies in Spanish law, but if IFRS were ever adopted in the USA, the override would then not apply there.

## **7. The second and income statement**

Spanish law, based on the EU’s Fourth Directive, requires a company to present a *cuenta de pérdidas y ganancias*. For some individual companies, this statement includes all a company’s gains and losses of the year. However, for more complex entities, some gains and losses are excluded. For example, suppose that a group of companies based in Barcelona owns a subsidiary company in the United States. The assets (e.g. the American land and buildings) of the subsidiary are included in its own balance sheet (in dollars) and they are also in the balance sheet of the group (which is in euros). Suppose that the dollar rises in value against the euro. Accountants would increase the measure of the properties in the group’s euro balance sheet. DEB requires that this is also recorded as some sort of gain. However, the properties have not been sold, there may be no intention to sell them, cash has not been received, and the dollar might fall again next month. Perhaps<sup>3</sup> for such reasons, the a gain is not recorded as “profit or loss”.

In the UK in 1992, a new statement was invented to record this type of gain or loss and some other types (e.g. revaluing buildings): “the statement of total recognised gains and losses” (STRGL)<sup>4</sup>. This invention was in response to a financial crisis in which a company called Polly Peck had not recorded the above type of currency losses in any statement but had recorded another related type<sup>5</sup> of currency gain as profit or loss. The

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<sup>3</sup> There is no principle in IFRS which explains why some income and expenses are presented as ‘other comprehensive income’.

<sup>4</sup> Required by Financial Reporting Standard No. 3.

<sup>5</sup> Suppose that the above Spanish group had borrowed dollars to buy a US subsidiary, and then the dollar fell in value. Under certain conditions, the gain (caused by the reduction in the burden of the debt in euro terms) would be ‘profit’ but the loss on the US assets would not be.

STRGL was also used in UK practice until 2014<sup>6</sup> to record other items, including revaluing fixed assets and actuarial gains and losses.

Accounting practices differ internationally, and there were more things to put into the STRGL than there would be in most other countries. For example, in the USA, it is not permitted to revalue tangible or intangible fixed assets. Nevertheless, in 1997, both US generally accepted accounting principles (GAAP) and IFRS followed the UK precedent, by requiring a “Statement of changes in equity”. However, in IFRS, entities were given a choice: present either (i) a statement like a UK STRGL (called in IFRS from 2005 a “Statement of recognised income and expense”)<sup>7</sup>, or (ii) a statement containing all changes in equity, i.e. not just all income/expense but also new share capital, dividend payments, policy changes and corrections of errors. In 2007, IFRS was amended to require both statements: (i) “comprehensive income” (separately showing other comprehensive income, OCI)<sup>8</sup> and (ii) changes in equity. From 2012 and 2015, respectively, both statements are also required in US GAAP and UK GAAP. So, reporters under any of these three GAAPs now show five financial statements: balance sheet, profit or loss, comprehensive income, changes in equity, and cash flow statement. The GAAPs allow companies to combine the profit/loss with OCI statements, but this is very rare in practice.

In Spain, the 2007 revision of the plan general de contabilidad reacted to the US/IFRS changes of 1997 by requiring<sup>9</sup> a statement of changes in equity (estado de cambios en el patrimonio neto). However, this statement is a compromise between the two IFRS approaches of 1997 because it begins with a separate statement of “ingresos y gastos reconocidos” (a translation of the IFRS term “recognised income and expense”). Thus Spain became the first European country to require a full statement of changes in equity and the first continental European country to require the disclosure of OCI in a financial statement.

Neither of the two new statements have arrived in EU Directives, despite a revision of the Directives in 2013. Therefore the statements are not yet required in most EU countries.

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<sup>6</sup> When UK accounting standards were replaced by a UK version of the IFRS for SMEs.

<sup>7</sup> This title was imposed by an amendment to IAS 19 in 2004 (para. 93B).

<sup>8</sup> IAS 1 allows an entity to show OCI after profit or loss as part of a statement of comprehensive income. However, in practice, nearly all companies show two income statements.

<sup>9</sup> Tercera parte, 1, 8a.

The position changes nearly every year, but Table 5 summarises it in 2011, as an example. The exact names of the statements have also changed over time.

	<b>US</b>	<b>Spain</b>	<b>UK</b>	<b>IFRS</b>	<b>EU Directives</b>
Balance sheet	✓	✓	✓	✓	✓
Profit or loss*	✓	✓	✓	✓	✓
Comprehensive income, including OCI*	?	x	✓	✓	X
Changes in equity, including OCI	?	✓	x	✓	x
Cash flow	✓	✓	✓	✓	x

**Table 5:** Statements required in 2011

\*= US GAAP and IFRS allow profit/loss and OCI to be shown as a single statement but that is rare.

?= Entities had to present one of these two statements.

## 8. Conclusions

The examples in this paper show that accounting technology tends to move very slowly from one country to another. This is generally not caused by lack of information or by language difficulties. The inventions originally happen in response to new needs, which result from new complexity, including new ways of doing business or financing it.

Complex business requires complex accounting. The geographical locations of advances in accounting are therefore related to thriving economies. Thirteenth century Italy saw the invention of double entry. Sixteenth century Spain saw its imposition on merchants. Nineteenth century Britain saw the development of published audited accounting. Twentieth century America invented consolidation.

Accounting inventions travel with commerce and colonisation. They move fastest to places with a shared language and culture. So, inventions move quickly from the UK to Australia, but more slowly from Italy to the UK or from the UK to Spain. However, there is little evidence that the spread of inventions is seriously held up by ignorance or language. It is more likely that some inventions are unnecessarily complicated for some companies or economies to need.

In the late twentieth century, many accounting inventions were spread by international standardisation. For example, this brought new techniques to Spain. Under these circumstances, some of the spread of technology might be inappropriate because it might not correspond to commercial needs. The trigger for new laws which impose new techniques is often some form of crisis. More recently, EU harmonisation has brought the compulsory transfer of ideas.

When appropriate accounting serves commerce, the effects can be highly positive. There has been a debate about whether DEB was a vital spur to the development of capitalism or merely oiled its wheels (e.g. Sombart, 1924; Yamey, 1964; Edwards, 1989, p.63; Bryer, 1993). Much more recently, researchers have detected many improvements, for large groups, associated with the adoption of IFRS, e.g. reduced cost of capital, greater accuracy of analysts' forecasts, and reduced bid-ask spreads (see, for example, ICAEW, 2014).

## REFERENCES

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Briston, R.J. (1978). The evolution of accounting in developing countries. *International Journal of Accounting*, Fall.

Bryer, R.A. (1993). The late nineteenth-century revolution in financial reporting: accounting for the rise of investor or managerial capitalism. *Accounting, Organizations and Society*, 18 (7/8), 649-690.

Camfferman, K. and Zeff, S. (2007). *Financial Reporting and Global Capital Markets*. Oxford: Oxford University Press.

Edwards, J.R. (1989). *A History of Financial Accounting*. London: Routledge.

EFRAG, (2014). *The Equity Method: A Measurement Basis or One-line Consolidation?*. Brussels: European Financial Reporting Advisory Group.

Esteve, E.H. (1989). The life of Bartolomé Salvador de Solóranzo: some further evidence. *Accounting Historians Journal*, 16(1), 87-99.

Gonzalo, J.A. and Gallizo, J.L. (1992). *European Financial Reporting: Spain*. London: Routledge, 74.

ICAEW, (2014). *The Effects of Mandatory IFRS Adoption in the EU: A Review of Empirical Research*. London: Institute of Chartered Accountants in England and Wales.

Lee, G.A. (1973). The Florentine bank ledger fragments of 1211: some new insights. *Journal of Accounting Research*, 11(1), 47-61.

Lee, G.A. (1977). The coming of age of double entry: the Giovanni Farolfi ledger of 1299-1300. *Accounting Historians Journal*, 4(2), 79-95.

Milburn, J.A. and Chant, P.D. (1999). *Reporting Interests in Joint Ventures and Similar Arrangements*. Norwalk, Conn.: Financial Accounting Standards Board for G4 + 1.

Nobes, C.W. (1982). The Gallerani Account Book of 1305-1308. *Accounting Review*, April, 303-10.

Nobes, C.W. (1983). The evolution of the harmonising provisions of the 1980 and 1981 Companies Acts. *Accounting and Business Research*, Winter, 43-53.

Nobes, C.W. (1998). Towards a general model of the reasons for international differences in financial reporting. *Abacus*, 34(2), 162-187.

Nobes, C.W. (2002). An analysis of the international development of the equity method. *Abacus*, 38(1), 16-45.

Nobes, C.W. and Parker, R.H. (2012). *Comparative International Accounting*. Harlow: Prentice-Hall.

Parker, R.H. (1989). Importing and exporting accounting: the British experience, in Hopwood, A.G., *International Pressures for Accounting Change*, Prentice Hall.

Sangster, A., Stoner, G. and McCarthy, P. (2008). The market for Luca Pacioli's *Summa Arithmetica*. *Accounting Historians Journal*, 35(1), 111-134.

Sombart, W. (1924). *Der moderne Kapitalismus*, 6th edition. Duncker & Humboldt.

Taylor, R.E. (1980). *No Royal Road; Luca Pacioli and his Times*, New York: Arno Press.

Yamey, B.S. (1964). Accounting and the rise of capitalism: some further notes on a theme by Sombart. *Journal of Accounting Research*, 2(1), 33-45.