

# Charting The Diffusion of the Commercial Revolution

a Socio-Economic History of Hindu-Arabic Numerals: XIII – XVII centuries

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## 1) Why is this important?

With the 'Commercial Revolution' of the late middle ages (De Roover 1953) several innovations were introduced (financial instruments, new corporate structures, modern bookkeeping and new mathematical tools). All of these innovations were characteristic to the European economy throughout the early modern period. Research has been done on the origins of these innovations in late-medieval Italy, but not much is known about the history of their slow transfer from the South to the North of Europe. How can we study the adoption of the skills of the commercial revolution through time and space? How can we investigate the transfer of implicit knowledge and practices? How can we chart this slow development of human capital?

## Where does this feed into?

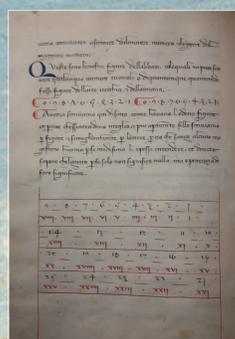
- Adoption of Hindu-Arabic digits: a case study in a (very) early-modern diffusion of innovations
- History of arithmetic and of its adoption/appropriation/recombination/translation
- History of numeracy and human capital

## 2) Methodology: tracking the adoption of Hindu-Arabic numerals in Europe

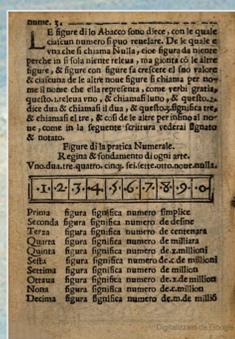
The proposed methodology is to concentrate on the tradition of practical arithmetic manuals. The positional numeral system was a key tool for early modern merchants:

- Written calculation
- Higher and quicker calculations
- Fractions (exchange rates)
- Proportions (currency exchange)
- Percentages (interest rates)

Starting from Leonardo Fibonacci's *Liber Abaci* (1202) it is possible to identify a continuous tradition of practical arithmetic manuals. This is a continuous tradition from the XIII to the beginning of the XVII century. It developed independently from universities and was fuelled by an emerging demand for quantitative skills.



Jacopo da Firenze  
Montpellier, c. 1307



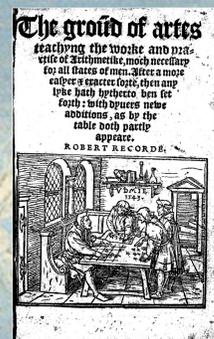
Girolamo Tagliente  
Venice, 1515



Juan Andrés de Zaragoza  
Valencia, 1515



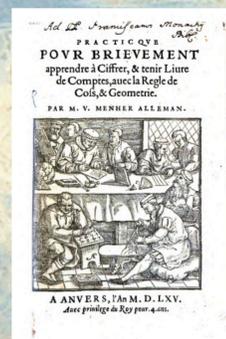
Adan Ries  
Erfurt, 1522



Robert Recorde  
London, 1543



Claude de Boissière  
Paris, 1544



Valentin Menhner  
Antwerp, 1550

## 3) Database

Relying on archival research, existing catalogues – such as Smith (1908), Van Egmond (1980) and Hoock, Jeannin, (1991-2001) – and online databases (ISTC, USTC) I am currently collecting a database of practical arithmetic manuals from the XIII to the beginning of the XVII century. For each text I am collecting information on:

Year of publication	Area	City	Author	Title
Language	Manuscript or printed	(Number of ms. copies)	(Printer)	(Number of reprints)
Source (secondary or primary)	(Link to digitized document)	Holding institution	Table of contents	Notes

I have collected this information on **more than 1100 texts** between 1228 and 1600. All of these texts show how to use the Hindu-Arabic numeral system, and most of them use arithmetic as a commercial tool.

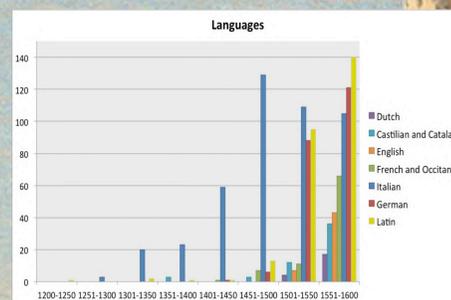
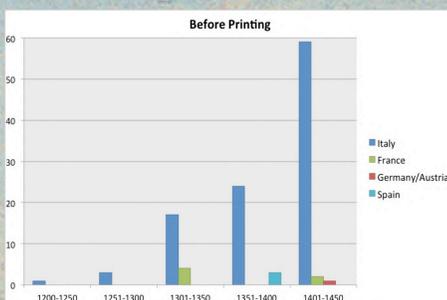
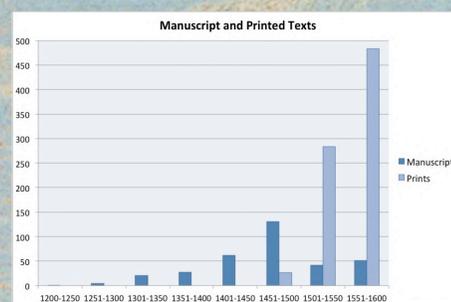
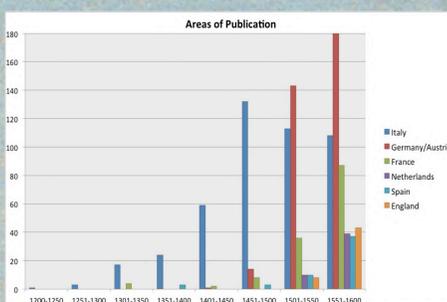
- **Languages:** Castilian, Catalan, Dutch, English, French, German, Italian, Latin, Occitan
- **Main areas:** Austria, Bohemia, England, France, Germany, Italy, Netherlands, Spain, Switzerland

This database could be a valuable source to study the development of human capital. It could be employed to have a rather conservative estimate of the cognitive impact of the development of markets.

## 4) Further research

My future research will concentrate on expanding the database and on experimenting possible applications of it (for example, representing it with GIS methods). At the same time, I plan to study in depth a selected set of these documents, showing their relevance in this long-run social history of numbers.

## Preliminary data analysis:



### References Cited

- De Roover, R., The Commercial Revolution of the Thirteenth Century, in Lane, F., Riemersma, F. C., eds. (1953) Enterprise and secular change: readings in economic history, London: Allen and Unwin.
- Hoock, J, Jeannin, P, (1991) *Ars Mercatoria: Handbücher und Traktate für den Gebrauch des Kaufmanns, 1470-1820*, Paderborn: Schöningh.
- Smith, D. (1908) *Rara arithmetica: A catalogue of the arithmetics written before the year MDCl*, Boston, Mass.: Ginn.
- USTC: Universal Short Title Catalogue: <http://ustc.ac.uk/>
- Van Egmond, W. (1980), *Practical Mathematics in the Italian Renaissance: a Catalogue of Italian Abacus Manuscripts and Printed Books to 1600*, Firenze: Istituto e museo di storia della scienza.



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