TRANSFERRING TECHNICAL KNOWLEDGE AND INNOVATING IN EUROPE, c.1200-c.1800

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BACKGROUND

- The ‘Great Divergence’ (Pomeranz 2000)
- The ‘Industrial Enlightenment’ (Mokyr 2002)
- The 1st Industrial Revolution as a technological revolution

FIVE STYLIZED FACTS

1. The **institutional context** of technological innovation in 18th c. Europe was **not significantly different** from that in 13th c. Europe.

2. Europe c.1200 was a **technological backwater** by comparison with China, India. By 1800, Europe had **forged ahead**. Catching up was the result of small-scale, cumulative innovation.

3. The main source of human capital formation was the **craft guild**. European guilds were **non-ascriptive**: entry and exit were cheap.

4. The knowledge of premodern technicians was **experiential and largely tacit** ➔ technological diffusion and progress through recombination required high levels of labour mobility.

5. Technological progress in Europe withstood **local shocks** better than in China, because skilled technicians could migrate.

HUMAN CAPITAL FORMATION

- EIC: Craft guilds emerged during the 11th/12th c.s for welfare, training etc. purposes

  - Overcome **training externalities** by banning poaching and monitoring master / apprentice relations

  - Share '**collective knowledge'**, including 'collective invention'

  - Survive to the late 18th / 19th c.s as main (though not sole) institution for **skills transfer**

Figure 1. Established craft guilds, Italy and Netherlands 1100-1800

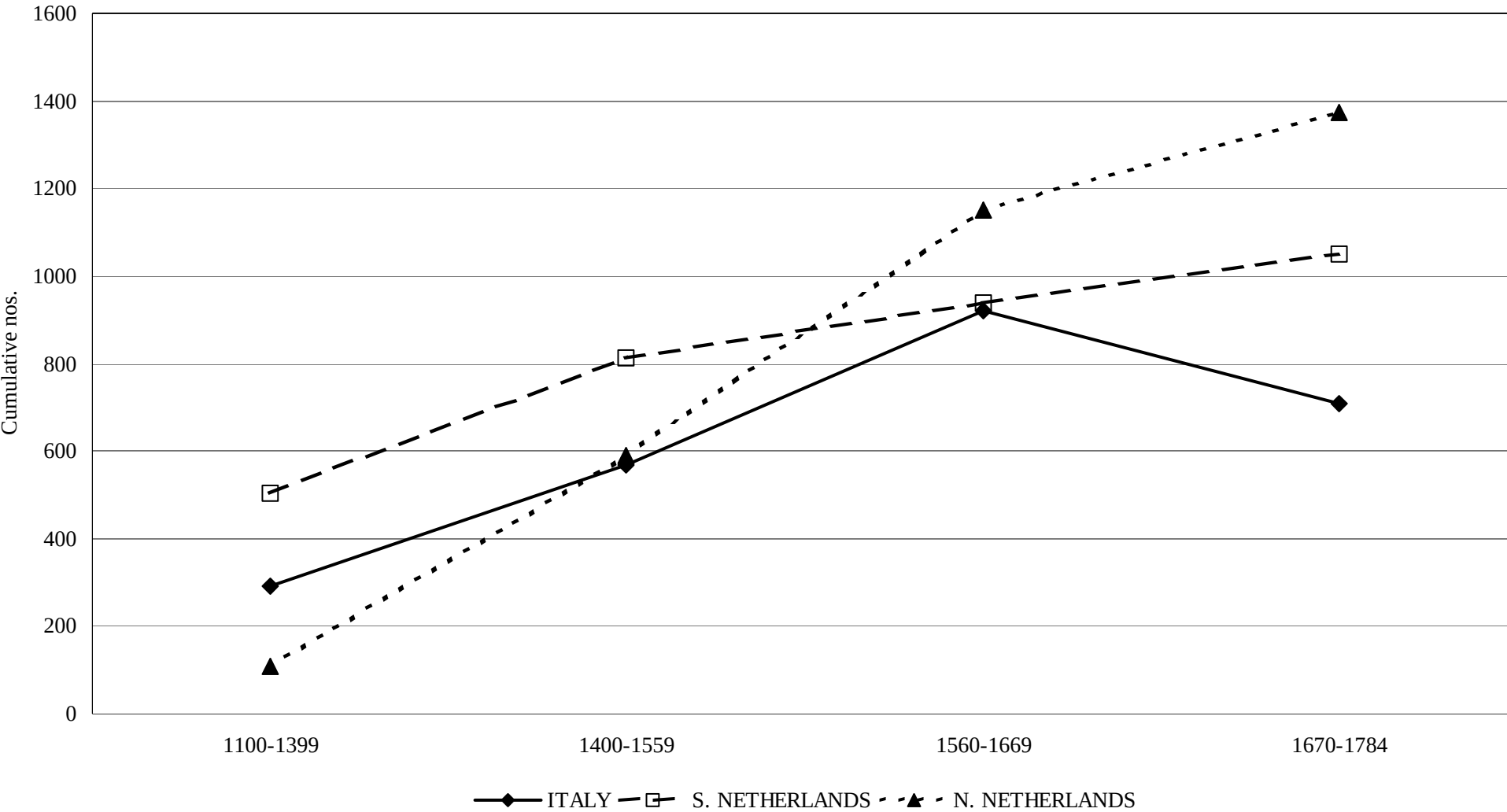
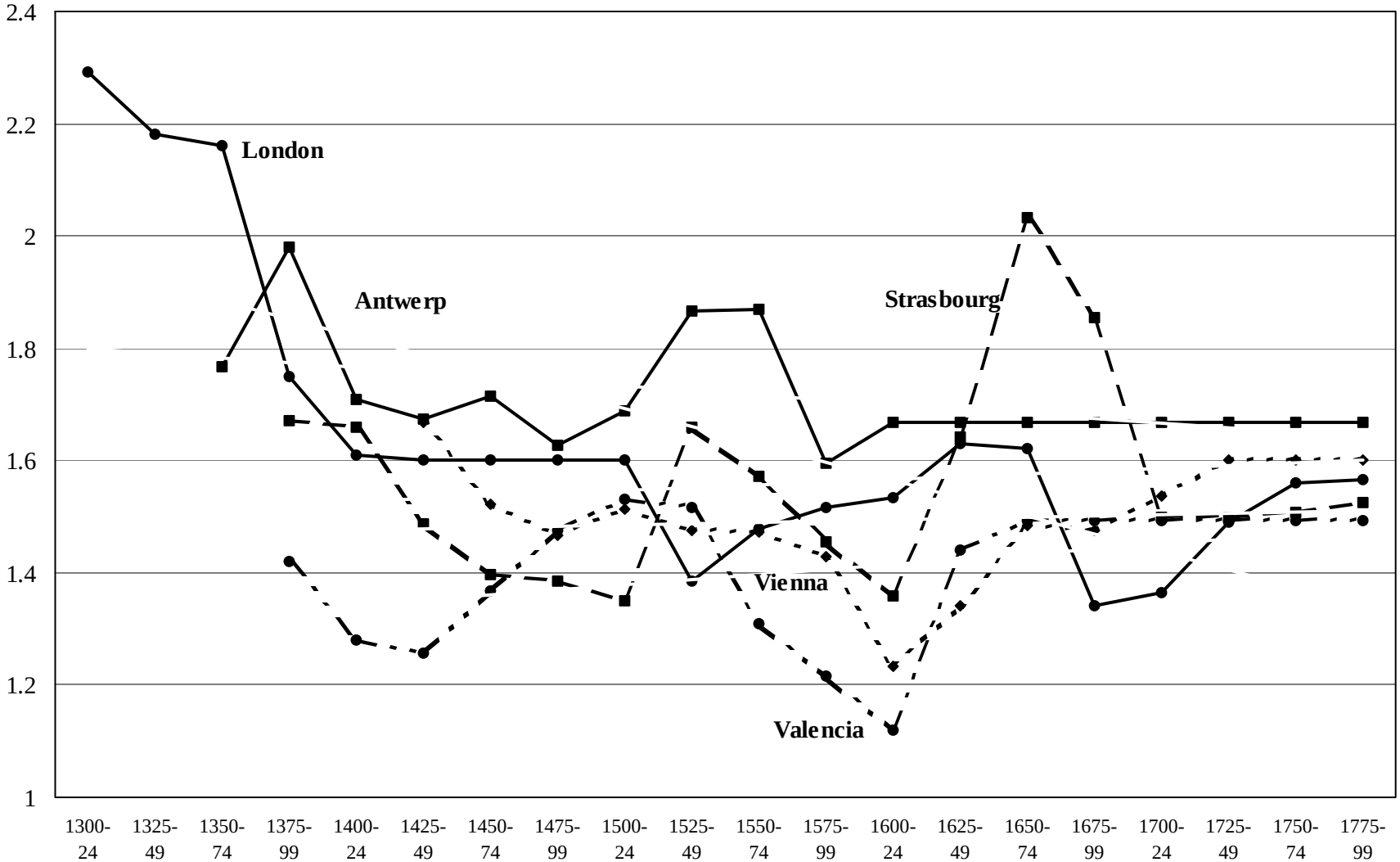


Figure 2. Skill differentials in the European building industry, 1300-1799 (by city)



EIC: ABILITY TO CODIFY AND EXPERIMENT

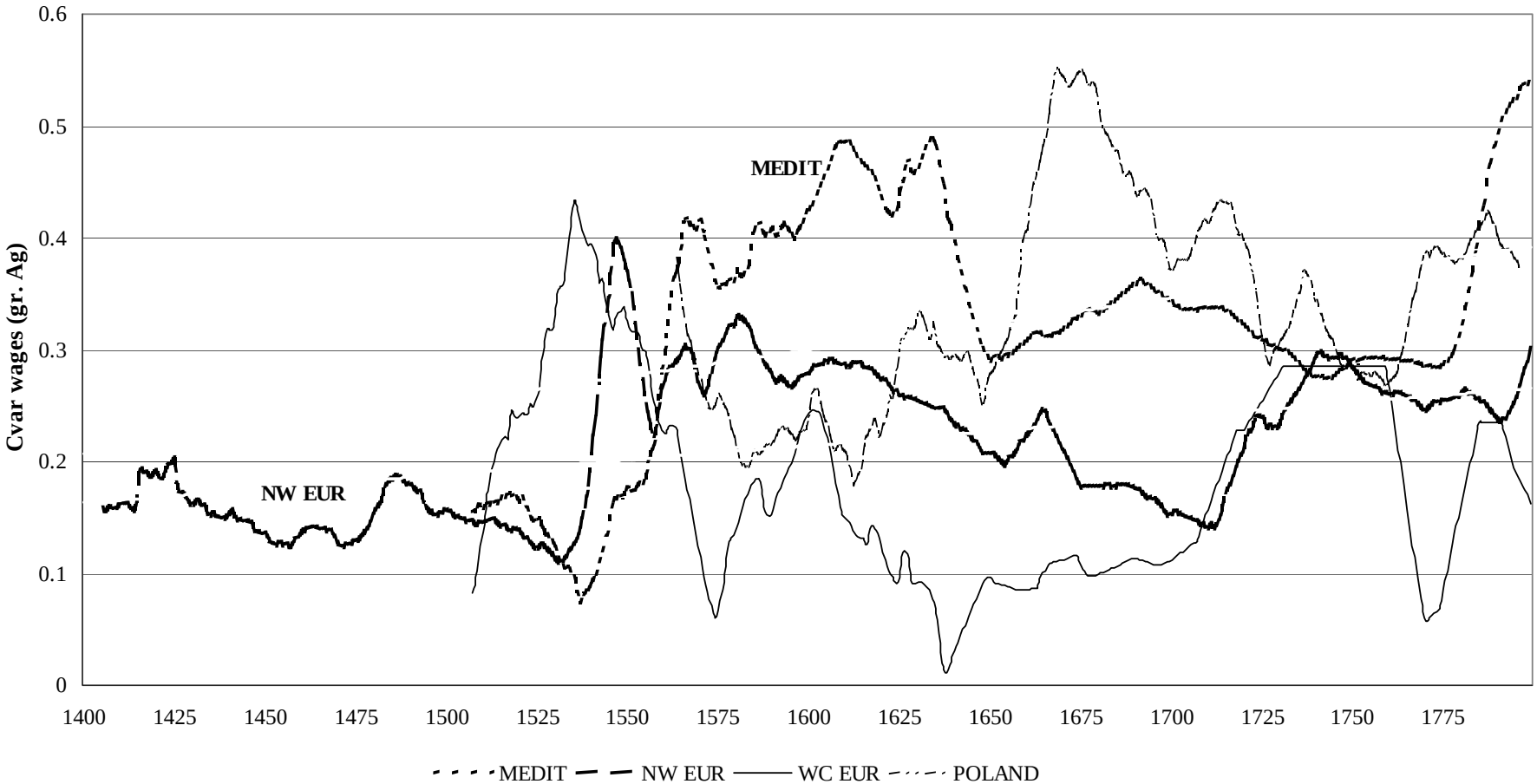
- Extensive **codification** via drawing, product design, 3D modelling, numbers
- Codification as means for **technical heuristics**
- Pressure for codification arises endogenously from circulation of technicians with **different practices**
- **Experimentation** for product and process innovation from 15th c.

TRANSFERRING KNOWLEDGE ACROSS SPACE

- 3 kinds of transfer: by **text**, by **patent**, by **migrating individuals**

  - Transfer by text and patent of little use before 1800
  - Two kinds of physical transfer: temporary and permanent
  - Temporary transfer via journeyman tramping (allocation mechanism) from 14th c. (EIC)
  - Some evidence of labor market integration in the Gothic era (pre 1550) ➔

Figure 3. Integration of the skilled builders' market 1400-1799



TRANSFERRING KNOWLEDGE ACROSS SPACE cont.

- Permanent transfer caused by local shocks (push) and competing mercantilist states (pull)
- Guild opposition to incoming innovators based on nature of innovation (L/K saving) and internal guild structure (large vs. small artisans)
- Evidence that transfer system works successfully from shifting technological frontier from SE (c.1200-1500) to NW (1600-1800)

TRANSFERRING KNOWLEDGE ACROSS SPACE cont.

- Two main impediments to technological transfer were information and transport costs, and lack of technical complementarities

- Transfer costs fall over time (cf. urbanization, transport, market integration)

CONCLUSIONS

1. Craft guilds generate human capital, but have weak control over entry and esp. exit (**distinctively European**)

2. High ecological variation in demand (**not distinctively European**)

3. Competing sources of court-based demand (not source of dynamic disequilibrium; **distinctively European?**)

4. Persistent military competition (source of dynamic disequilibrium; **distinctively European**)

5. ‘Cardwell’s Law’ (long-run diminishing returns due to rent-seeking etc.) is evaded through migration (**distinctively European?)**