Information Technology and Institutions Supporting Human Capital Accumulation and Exchange

Reporting

Project Information

INFO TECHNOLOGY

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This project is featured in...

Periodic Reporting for period 4 - INFO TECHNOLOGY (Information Technology and Institutions Supporting Human Capital Accumulation and Exchange)

Reporting period: 2019-11-01 to 2021-10-31

Summary of the context and overall objectives of the project

Information technology revolutions transform the production and exchange of ideas and drive profound institutional and cultural change. Our contemporary experience with computer-based information technology raises important questions about how the diffusion of ideas in new media shapes institutional change and how institutional innovations support the diffusion of knowledge, the accumulation of human capital, and markets. History provides unique settings in which we can document the causal impact of changes in information technology and institutions, and the best evidence on their long-run effects.

This project has focused on studying these dynamics in European history, an ideal laboratory for understanding the causal forces driving economic change. Early modern Europe provides a historical setting in which we observe two profound and interlinked social changes: the introduction of the printing press and the political and cultural shock of the Protestant Reformation. The printing press transformed how ideas were transmitted, influencing economic activity and shaping changes in politics and religion. The Reformation challenged the ruling institutions, reshaping religion and the political economy process in Europe. These shifts shaped the paths of economic development, including later changes in knowledge production. Further, historical settings provide rich evidence in which to study the causal forces and economics connecting changes in technology, institutions, and growth.

This research more broadly uses historical evidence to our economic understanding of how Europe became: a society with economic growth; a society with intellectual innovation and competition; a more secular society; a society with states that collect revenue and provide public goods; and a society with sustained scientific and technological development.

The research delivers several key conclusions. First, the impact of the printing press was not a pure technological phenomenon: it was profoundly shaped by the extent of economic competition in the printing industry. How printing shaped economic change varied over time and space with differences in economic competition in the industry. Second, the introduction of religious competition, which printing promoted, changed the larger political economy. This led to shifts in resources away from religious and towards secular uses. It also led to pioneering innovations in the provision of public goods, including public education and welfare provision, which fostered growth. Third, the introduction of printing increased the returns to scientific study and research during the Renaissance. In particular, the introduction of printing promoted the Scientific Revolution through its joint impact on the labor market and the market for ideas. Fourth, the subsequent development of the modern research university in early 1800s Germany led to a dramatic pivot and acceleration in inventive and industrial activity starting in the early 1800s. The shift in inventive and industrial activity towards universities occurred before other developments which previously have been emphasized, including the construction of railroads and the reduction of internal tariffs.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

This project examines the interplay between technological, institutional, and cultural change by constructing and investigating novel bodies of large-scale microdata.

To examine the role of competition in shaping the impact of Gutenberg's printing press, the research constructs data on the pattern of publications, book prices, and industrial organization in the printing industry across the cities of Renaissance Europe.

The research uses the data to study how economic competition among printers shaped the number and content of books printed across European cities, and how the spread of ideas in print shaped local development. We find that competition in local printing drove differences in prices and in quantities. Competition in printing promoted the spread of Protestant ideas, leading to institutional change at the local level, during the Reformation. Competition among printers specialized in technical fields promoted the spread of mathematical knowledge and local development. Our findings indicate that the economics of the media industry influenced larger processes of social change.

To study the how the introduction of religious competition impacted the economy, the research examines novel evidence on urban construction across thousands of European cities and on the degree program choices of university students before and after the Protestant Reformation. We find that the Reformation led to a sharp shift in fixed investments and human capital investments away from religious uses and towards more secular activities. We also find that in this era of greater ideological competition disease epidemics led to pioneering expansions in local public goods provision, which ultimately promoted city growth.

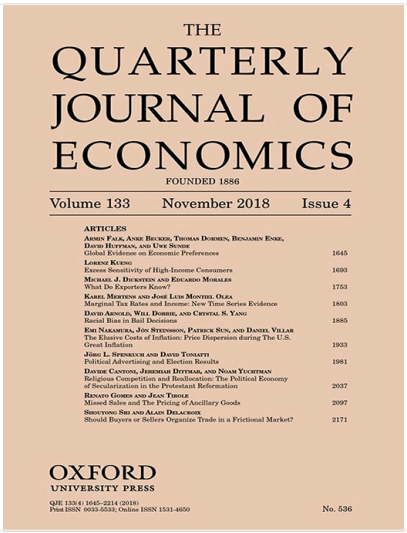
To investigate how the introduction of printing transformed higher education and the labor market, the research gathers microdata on the teaching assignments and pay of professors at Italian universities,

which were the forefront of higher education in the 1400s and 1500s. The research shows a shift in teaching and pay towards the natural sciences following the introduction of printing.

Finally, the research also examines the economic impact of the modern research university in early 1800s Germany. We gather novel data on scientific and technological innovation, and on the development of manufacturing, across German cities. We find that German cities near universities enjoyed no differences in the pattern of scientific, technological, or economic development across the 1700s. The development of the research university led to an acceleration in invention and industrial activity in the early 1800s, concentrated around universities.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

This project makes several contributions to the economic analysis of technological and institutional change. (1) This research provides the first systematic quantitative analysis on the historical diffusion of ideas in print and the role of economic competition in shaping how Gutenberg's printing technology influenced the development of the European economy. (2) The research provides novel empirical evidence showing how the introduction of religious competition in Europe changed the bargains made between religious and secular political elites, and led to a reallocation of resources away from religious uses and towards secular uses. (3) The research documents how the introduction of religious competition during the Protestant Reformation led to pioneering expansions in public goods provision, including the first large scale experiments with public education and important innovations in municipal welfare provision, and how public goods provision supported growth. (4) The research provides the first evidence on how the introduction of printing in the late 1400s shifted returns in the labor market, increasing the returns to scientific research and study at European universities, and thus promoting the scientific revolution. (5) The research provides novel evidence on how the emergence of the modern research university, in early 1800s Germany, drove a major pivot in development by promoting science, invention, industrial activity around universities. The findings rest on the analysis of multiple novel bodies of large-scale microdata.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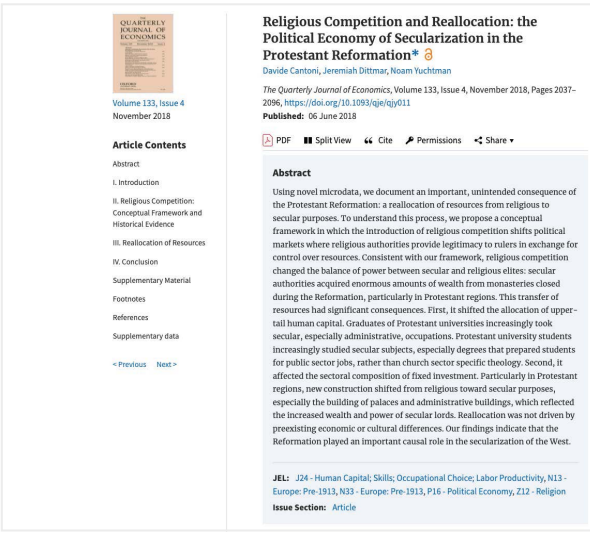
Religious Competition and Reallocation: the Political Economy of Secularization in the Protestant Reformation*
Davide Cantoni, Jeremiah Dittmar, Noam Yuchtman
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Abstract
Using novel microdata, we document an important, unintended consequence of the Protestant Reformation: a reallocation of resources from religious to secular purposes. To understand this process, we propose a conceptual framework in which the introduction of religious competition shifts political markets where religious authorities provide legitimacy to rulers in exchange for control over resources. Consistent with our framework, religious competition changed the balance of power between secular and religious elites: secular authorities acquired enormous amounts of wealth from monasteries closed during the Reformation, particularly in Protestant regions. This transfer of resources had significant consequences. First, it shifted the allocation of upper-tail human capital. Graduates of Protestant universities increasingly took secular, especially administrative, occupations. Protestant university students increasingly studied secular subjects, especially degrees that prepared students for public sector jobs, rather than church sector specific theology. Second, it affected the sectoral composition of fixed investment. Particularly in Protestant regions, new construction shifted from religious toward secular purposes, especially the building of palaces and administrative buildings, which reflected the increased wealth and power of secular lords. Reallocation was not driven by preexisting economic or cultural differences. Our findings indicate that the Reformation played an important causal role in the secularization of the West.
JEL: J24 - Human Capital; Skills; Occupational Choice; Labor Productivity, N13 - Europe: Pre-1913, N33 - Europe: Pre-1913, P16 - Political Economy, Z12 - Religion
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