Future of Professional Work:
Evidence from legal jobs in Britain and the United States

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Agenda

How is digital technology affecting the future of professional work? theory development

Data, methods, and key findings

Conclusion and ideas for further analyses

Theory – future of work (economics) + system of professions (sociology)

Estimates of today's jobs "at risk of automation" range from 9% to 96%. Why such wide variation?

- Arntz, M., Gregory, T., and Zierahn, U. (2016) *The risk of automation for jobs in OECD countries,* OECD, Paris.
- Dellot, B., Mason, R., and Wallace-Stephens, F. (2020) *The Four Futures of Work: Coping with Uncertainty in an Age of Radical Technologies*. RSA, London.
- Manyika, J. et al.(2017) *A Future that Works: AI, Automation, Employment, and Productivity*. McKinsey Global Institute.
- Muro, M., Whiton, J., and Maxim, R. (2019) *What jobs are affected by AI?* Brookings Metropolitan Policy Program, Washington, D.C.

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Mari Sako

Technology Strategy and Management

Artificial Intelligence and the Future of Professional Work

Considering the implications of the influence of artificial intelligence given previous industrial revolutions.

IF YOU ARE a software engineer or a data scientist, your job did not exist a century ago. A century from now, your job will most likely look quite different. One driving force behind such work transformation is artificial intelligence (AI). Dwelling on the nearer term, the next decade or two, projections on the proportion of today's jobs that are susceptible to automation vary enormously—from 9% (in OEDC countries)[2] and 47% (of 702 occupations)[7] to 96% (740 out of 769 occupations).[6,8,9] Why is there such wide variation? What makes it difficult to predict with greater precision? And should we alter the way we think about jobs, given that better education is no longer a protection against risk of technological unemployment? This column addresses these questions, so that we might make better decisions about the future of work for our children and grandchildren.

History of Automation and Its Impact on Jobs Before AI

We are in the midst of the so-called fourth Industrial Revolution that fuses advances in AI, robotics, the Internet of Things, 3D printing, genetic engineering, quantum computing, and other technologies to bring about enormous improvements in efficiency and productivity. A brief historical review of how technologies in the earlier industrial revolutions affected work helps trace implications for the current industrial revolution.

The first Industrial Revolution was associated with the advent of the steam engine in the 18th century, enabling the mechanization of production. Productivity increased in textile and other factories as they switched their energy source from watermill to steam. The second Industrial Revolution in the 19th century was triggered by electricity and the application of scientific principles, which led to the proliferation of mass production. Images of the early 19th-century Luddites who destroyed textile machinery as a way of protesting against mechanization and of Charlie Chaplin hardly keeping pace on the assembly line in the film *Modern Times* remind us that a fundamental change in work was taking place. Industrial engineers designed production processes, and factory workers executed the preplanned tasks typically on an assembly line. In effect, craftsmen's work was disaggregated into standardized tasks that could be carried out by semi-skilled operatives.

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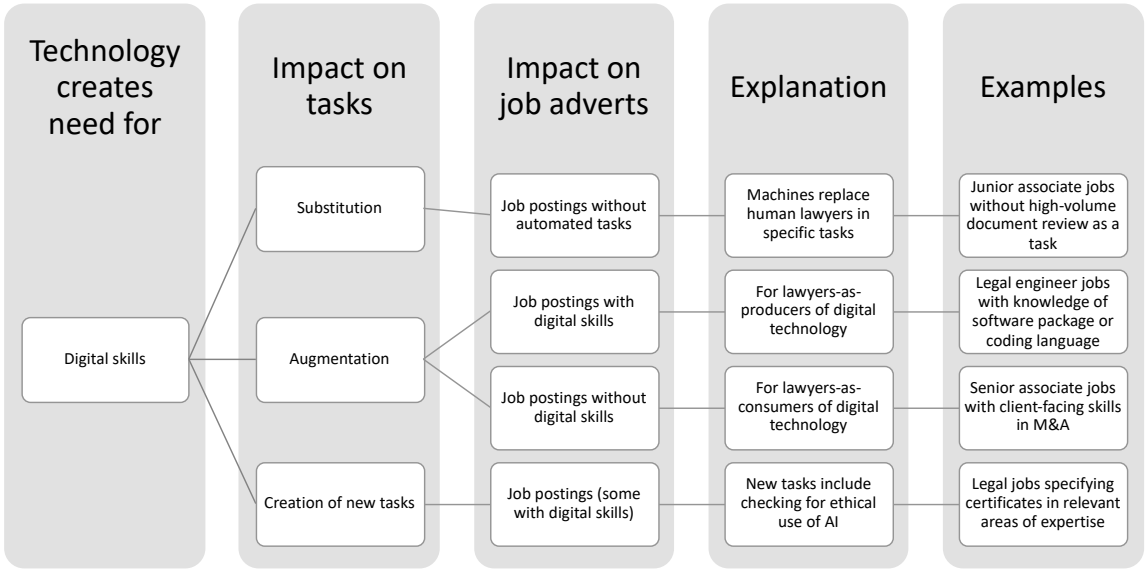
Theory: bringing together Economic and Sociological Theory

Economics: Future of Work

- From jobs to tasks



Sociology: System of Professions

- Direct link to tasks: ”The central organizing reality of professional life is control of tasks. The tasks themselves are defined in the professions’ cultural work. Control over them is established … by competitive claims in public, media, in legal discourse, and in workplace negotiations.” (Abbott 1988: 84)
- Focus on strength of professional control
  - More strongly organized a profession is, the more effective its claims to jurisdiction (i.e. link between a profession and its work)
  - This holds at the field level, and also at the workplace (organizational level).

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Hypotheses

*H1: A greater proportion of job postings for **lawyers and other legal professionals** require digital skills when lawyers' professional control is stronger.*

- *H1a: Greater in the regulated than in the unregulated sector in the UK (NOT SUPPORTED)*
- *H1b: Greater in the US than in the UK (SUPPORTED)*
- *H1c: Greater in the legal sector than in non-legal sectors in both the UK and the US (NOT SUPPORTED)*

*H2: A greater proportion of job postings for **non-legal occupations** require digital skills when lawyers' professional control is weaker.*

- *H2a: Greater in the unregulated than in the regulated sector in the UK (NOT SUPORTED)*
- *H2b: Greater in the UK than in the US (SUPPORTED)*

*H3: Digital skills command a lower **pay premium for licensed lawyers and other legal professionals** when professional control is stronger.*

- *H3a: Lower in the US than in the UK (SUPPORTED)*
- *H3b: Lower in the legal sector than in non-legal sectors in both the UK and the US (SUPPORTED)*

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Data and methodology

Distribution of job postings with sector and occupational breakdowns

	Job postings for lawyers and judges	Job postings for other legal professionals	Job postings for non-legal employees	Total
		United Kingdom		
Legal sector	426,526	195,275	270,002	891,803
Non-legal sectors	191,065	211,810		402,875
Total	617,591	407,085		
		United States		
Legal sector	295,737	240,926	252,607	789,270
Non-legal sectors	373,163	1,044,278		1,417,441
Total	668,900	1,285,202		

List of digital skills in job postings

artificial intelligence "AI" "machine learning" "deep learning" "data science" "data scientist" "accountant engineer" "accountancy engineering" "accountancy tech" "accountancytech" "natural language processing" "NLP" "semantic analysis" "decision tree" "document analysis" "document review" "contract intelligence" "case prediction" "neural networks" "neural nets" "full stack" "developer" "automate" "API" "data architecture" "micro-services architecture" "technology stack" "DevOps" "Net Core" "Docker" "Kubernetes" "Azure Cloud" "Chef" "Java" "Python" "Angular" "coding" "testing" "deployment" "Agile Kanban" "RESTful API" "SOA" ".NET" "JavaScript" "C#" "SQL" "continuous integration" "test automation" "automated configuration" "relational database" "non-relational database" "SOAP" "REST" "software design" "data extraction" "data visualisation" "data visualization" "workflow" "rules based analysis" "Margin Matrix" "technology" "technologies" "tech" "material efficiencies" "document management system" "3E" "Epic" "Peoplesoft" "data mining" "data modelling" "artificial intelligence technologies" "data collection plan" "structured data" "structured sources" "unstructured data" "unstructured sources" "data exploration" "hypothesis testing" "statistical modelling" "data analysis" "POCs" "data cleaning" "statistical analysis" "algorithm" "algorithms" "algorithm development" "tableau" "SAS" "big data" "sql server reporting services (ssrs)" "data warehousing" "teradata dba" "transact-sql" "microsoft sql server integration services (ssis)" "microsoft sql" "microsoft c#" ".net" "asp.net" "asp.net mvc" "active server pages (asp)" "statistical analysis" "statistics" "statistical reporting" "microsoft powershell" "data verification" "relational databases" "software engineering" "software development" "system design" "hypertext preprocessor (php)" "sap" "web application development" "nunit" "kanban" "scrum" "c++" "linux" "sql server" "hardware and software installation" "enterprise resource planning (erp)" "cognos impromptu" "microsoft sharepoint" "visual studio" "microsoft active directory" "data manipulation" "data management" "data quality" "metadata" "database design" "data collection" "extensible markup language (xml)" "object-oriented analysis and design (ooad)"

Word clouds of skills of legal job ad in the legal sector

Skills in legal job postings in legal sector without digital skills

Skills in legal job postings in legal sector with digital skills

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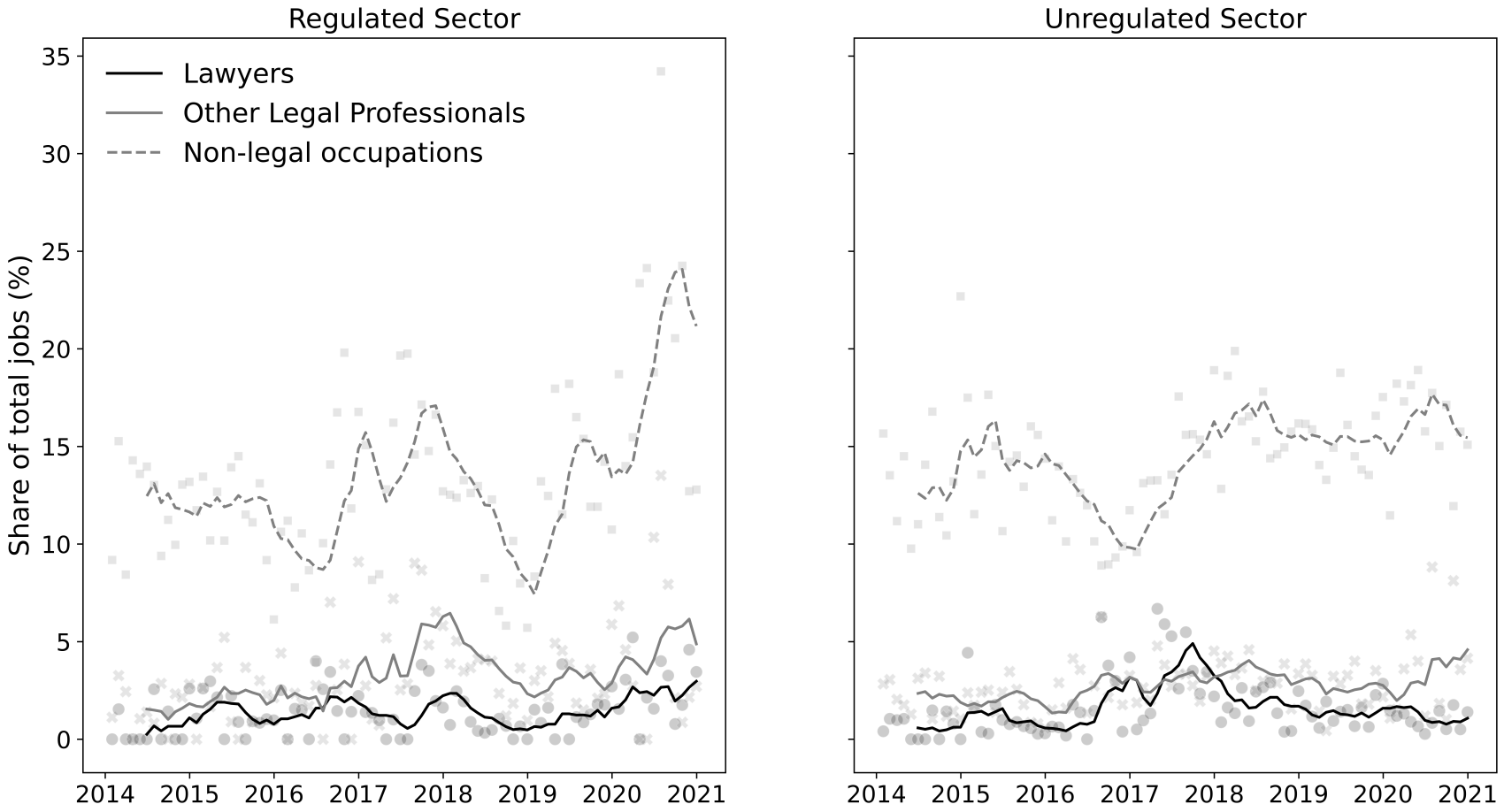
Key findings

Job postings for lawyers and other legal professionals have similar % requiring digital skills (H1a not supported)



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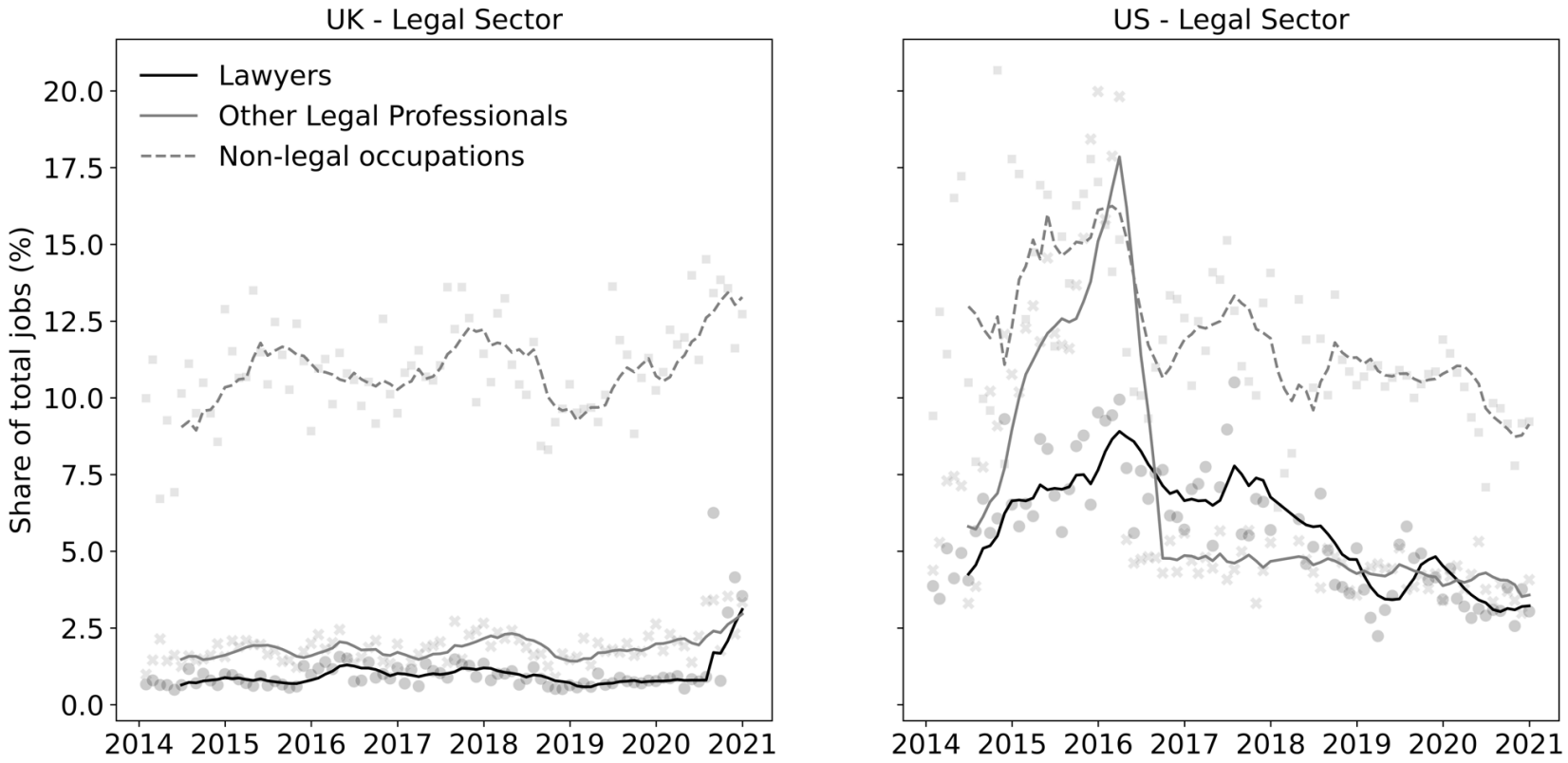
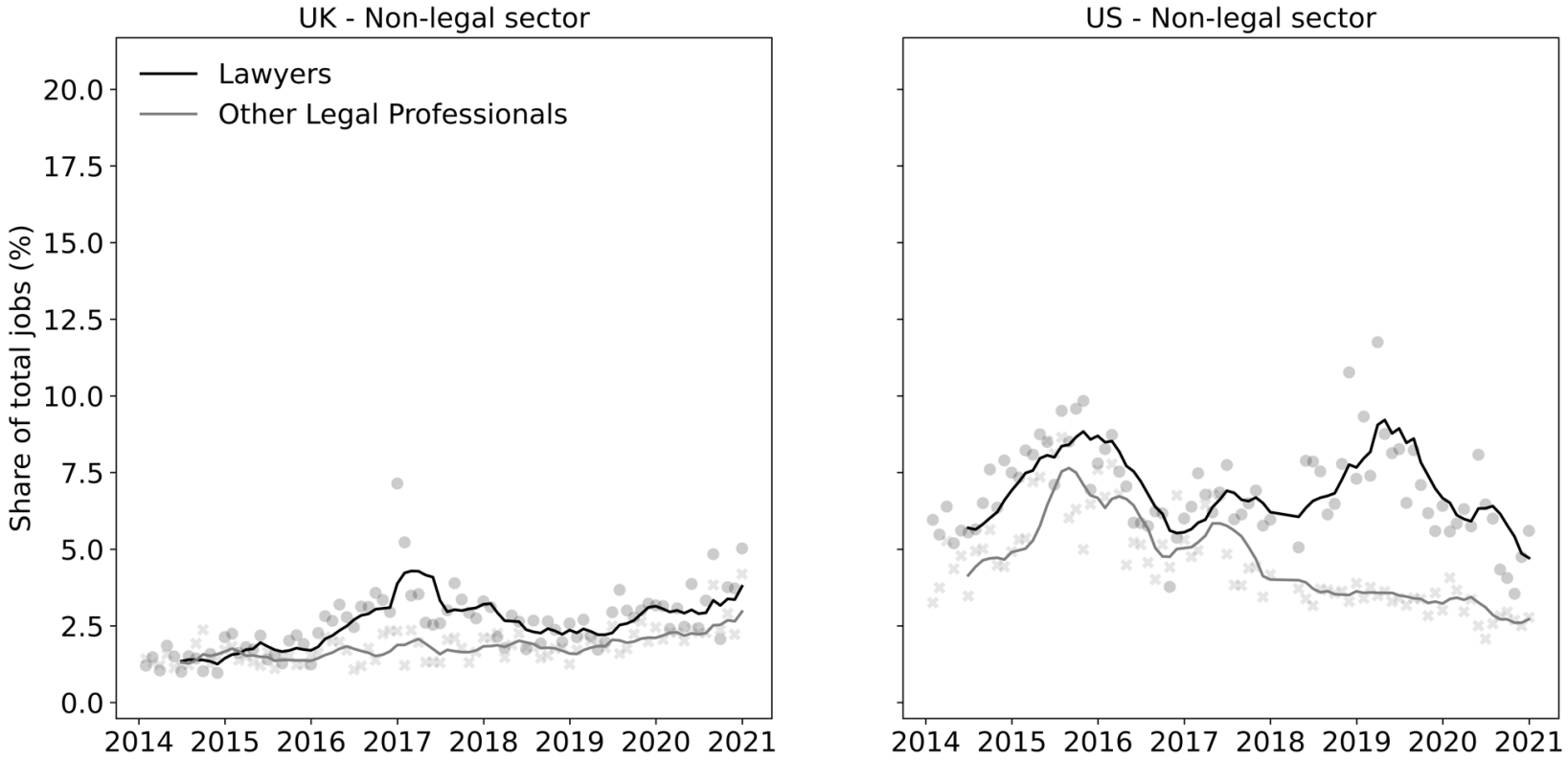
In legal sector, job postings for lawyers and other legal professionals have a higher % requiring digital skills in the US than in the UK (H1b supported)



In non-legal sector, job postings for lawyers and other legal professionals have a higher % requiring digital skills in the US than in the UK (H1b supported)



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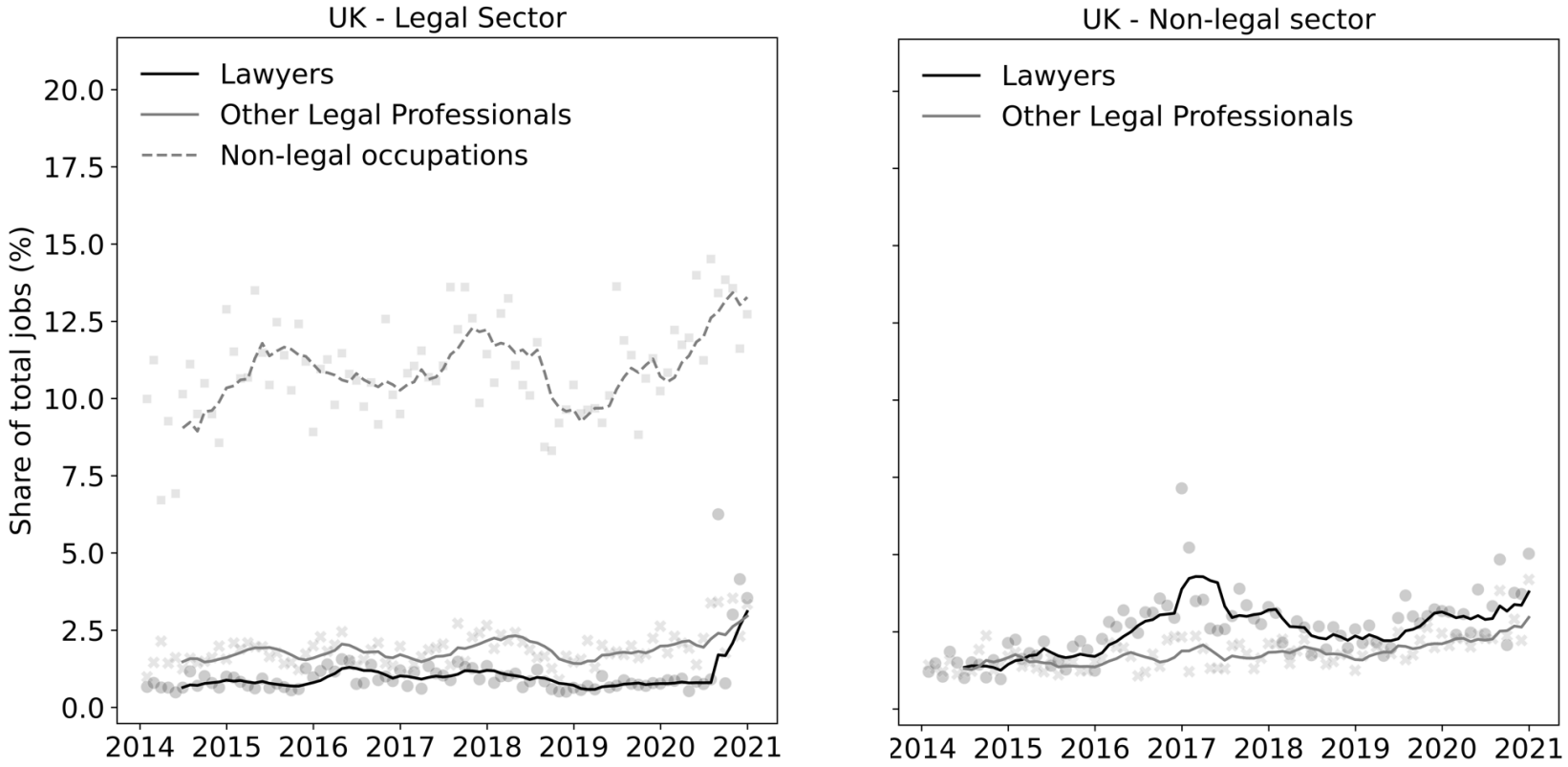
In UK non-legal sector, job postings for lawyers and other legal professionals have a higher % requiring digital skills than in the legal sector



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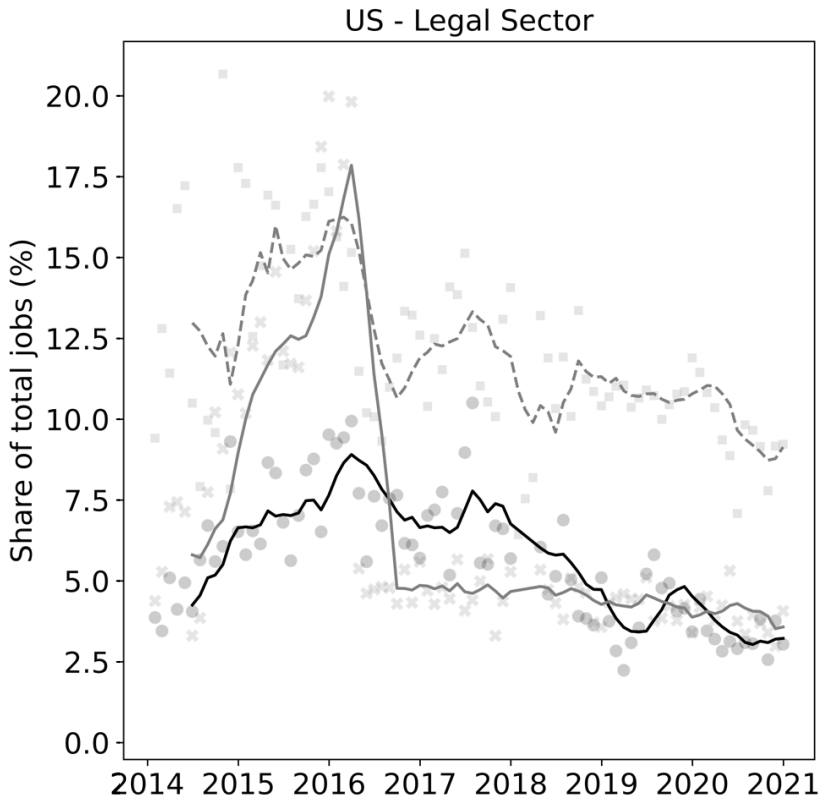
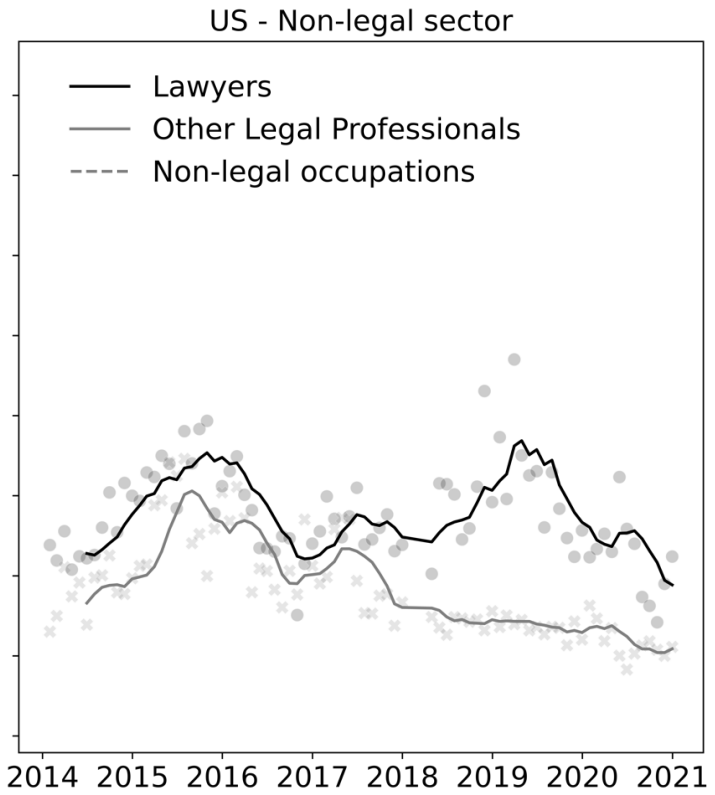
In US non-legal sector, job postings for other legal professionals have a higher % requiring digital skills than in the legal sector (H1c partially supported)





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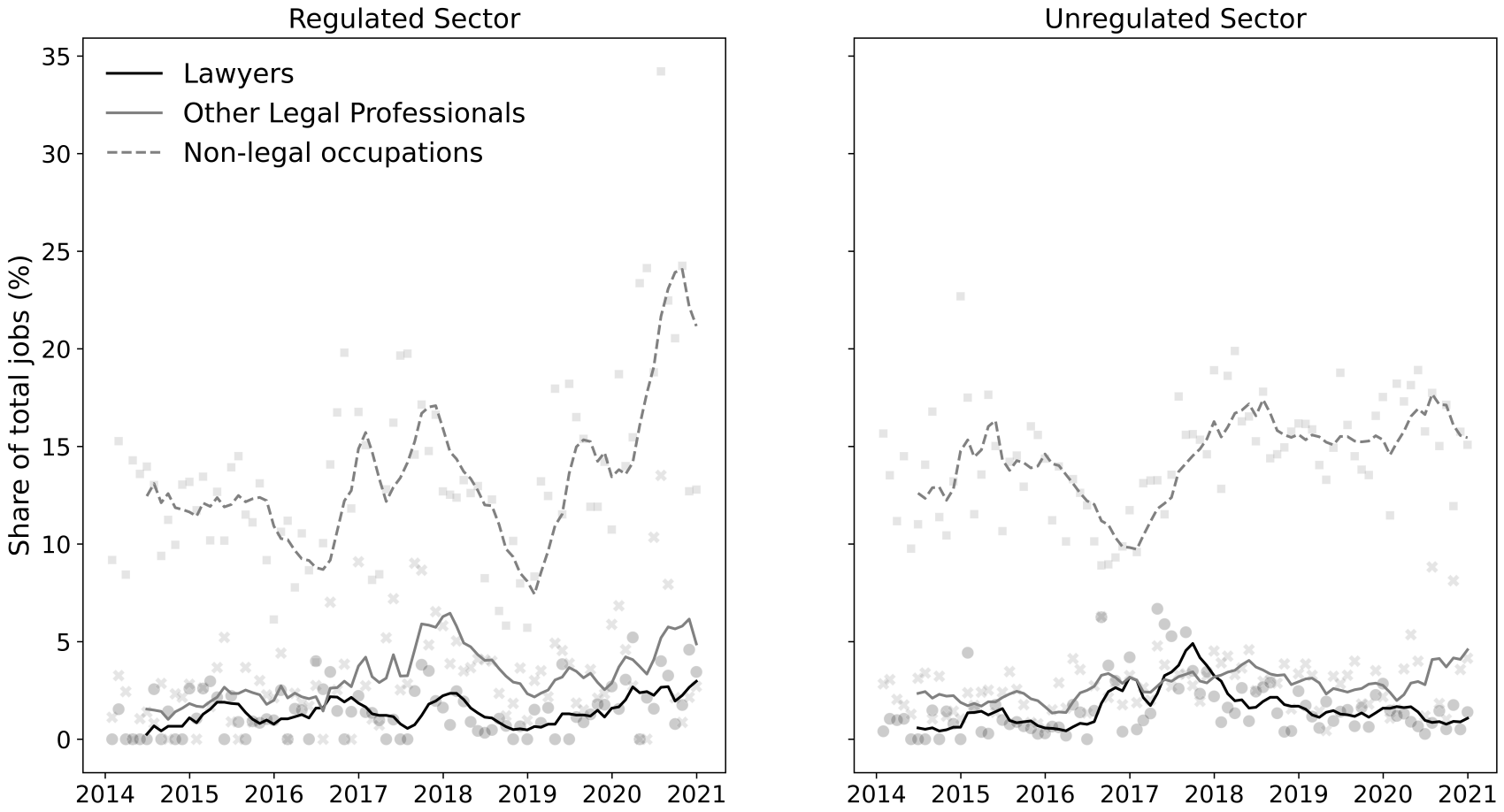
In UK regulated sector, job postings for non-legal occupations have a similar % requiring digital skills than in the unregulated sector (H2a not supported)



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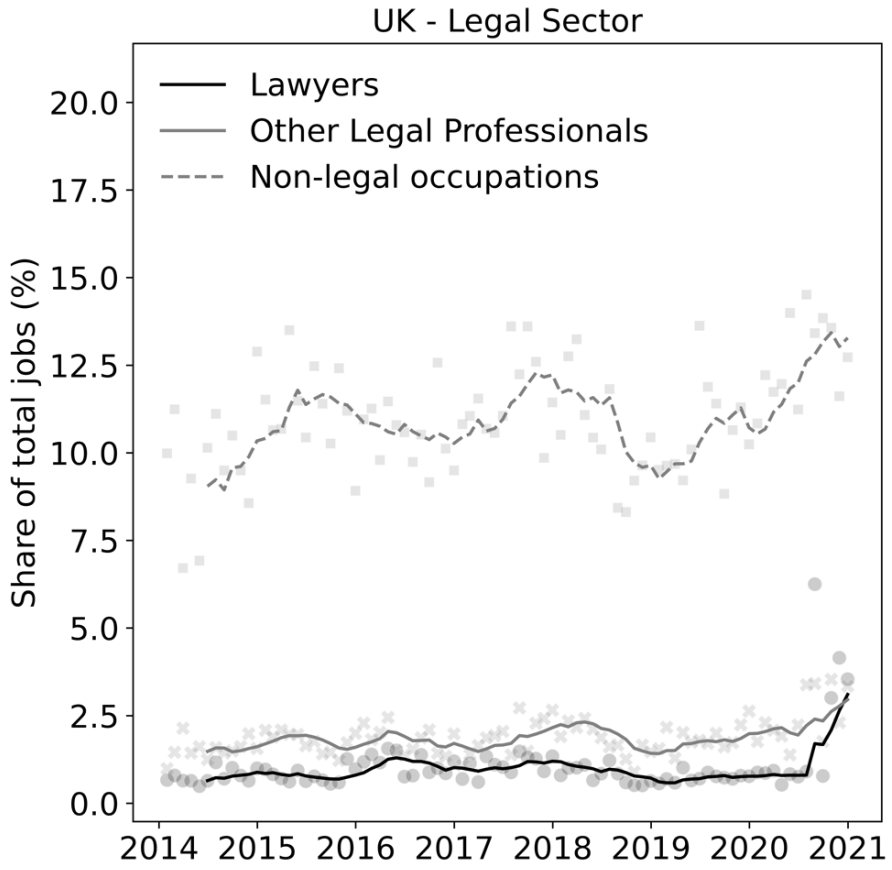
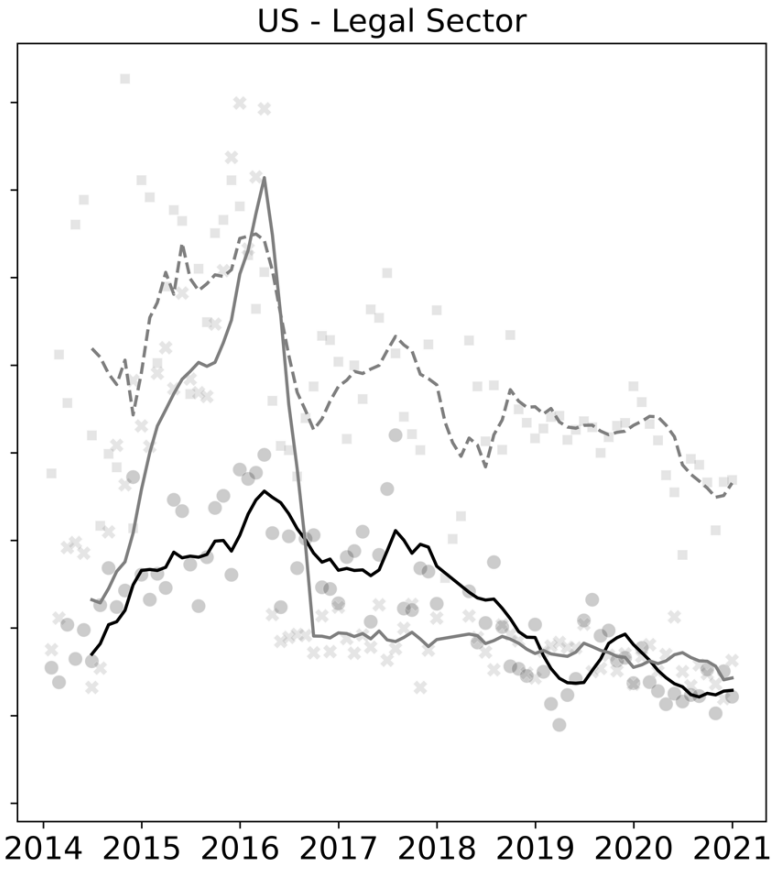
In legal sector, job postings for non-legal occupations have a higher % requiring digital skills in the US than in the UK (H2b supported)





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In UK, job postings with digital skills have a positive pay premia

	(1) Vacancies with digital skills (I)	(2) Vacancies without digital skills (II)	(3) Median Salary (I)	(4) Median Salary (II)	(5) Difference Median Salary (I)-(II)
	United Kingdom				
	Legal sector				
Solicitors	2,875	246,116	£50,000	£45,000	£5,000***
Legal associate professionals	1,542	73,502	£28,000	£22,500	£5,500***
Legal professionals n.e.c.	370	22,542	£42,000	£51,000	-£9,000***
Legal secretaries	117	22,995	£23,500	£21,000	£2,500***
Barristers and judges	22	56	£62,400	£41,210	£21,190
	Non-legal sector				
Solicitors	1,996	93,751	£50,000	£45,000	£5,000***
Legal associate professionals	1,224	58,233	£30,000	£24,000	£6,000***
Legal professionals n.e.c.	487	21,902	£32,000	£38,325	-£6,325***
Legal secretaries	454	47,619	£23,000	£20,500	£2,500***
Barristers and judges	115	1,378	£27,872	£28,728	-£856***

In US, job postings with digital skills have a negative pay premia (H3a supported)

	(1) Vacancies with digital skills (I)	(2) Vacancies without digital skills (II)	(3) Median Salary (I)	(4) Median Salary (II)	(5) Difference Median Salary (I)-(II)
	United States				
	Legal sector				
Lawyers	3,778	43,059	$66,560	$90,224	-$23,664***
Paralegals and legal assistants	5,729	90,166	$52,000	$45,000	$7,000***
Legal secretaries and administrative assistants	785	13,696	$47,500	$45,000	$2,500**
Legal support workers	193	7,607	$26,500	$29,120	-$2,620***
Legal support workers, all others	346	2,950	$52,000	$40,000	$12,000***
	Non-legal sector				
Lawyers	7,081	69,900	$72,993	$84,160	-$11,167***
Paralegals and legal assistants					
Legal secretaries and administrative assistants	1,536	20,446	$42,640	$42,500	$140*
Legal support workers					
Legal support workers, all others	1,842	11,192	$52,500	$44,598	$7,902***

In UK, job postings with digital skills have a lower pay premia in the legal than in the non-legal sector

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In US, job postings with digital skills have a lower pay premia in the legal than in the non-legal sector (H3b supported)

	(1) Vacancies with digital skills (I)	(2) Vacancies without digital skills (II)	(3) Median Salary (I)	(4) Median Salary (II)	(5) Difference Median Salary (I)-(II)
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Conclusion

Our main contributions

Theoretical contribution: Combining the future of work and system of professions literatures

Enable **hypothesis development** to examine the impact of the strength of professional control on task bundling in jobs

Test hypotheses using **large database of job postings** in two countries

Further work planned

Qualitative evidence based on interviews with lawyers in law firms and alternative service providers to be incorporated

Regression analysis with approaches to deal with endogeneity

Feedback please!

What is intuitive, what is counter-intuitive?

Theory: how can we refine?

Data and analysis: what is convincing, what is not?

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