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Remote Work Disrupts State Occupational Licensing: The \$1.6 Trillion Regulatory Federalism Challenge

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Abstract:

States regulate professional services using occupational licensing regimes instituted pre-1900 when services were completely internal commerce of states. Now, services flow digitally across state lines along national internet infrastructure, raising new Constitutional questions of state vs. federal regulatory jurisdiction. Using state administrative data and occupational digitizability indicators, we estimate that a mean across the 50 states of 35% of state-occupationally-licensed workers can remotely deliver their services with value totaling \$1.6 trillion in 2024. This threatens state policy-maker jurisdiction over occupational regulation and spotlights the digital era federalism conflict between state sovereignty and national regulatory coherence in an increasingly de-spatialized economy.

Keywords

Occupational licensing, remote work, de-spatialization, digitalization, economic regulation, trade in services, intergovernmental relations, federalism

Introduction

In *Gibbons v. Ogden* (1824), the Supreme Court granted the U.S. federal government the power to regulate commerce among the states by upholding a federal license granted to the captain of a packet boat carrying goods by river across state lines, superseding a state-issued intrastate right to operate. Two hundred years later, it is packets carrying data that travel by digital networks across state lines. Included in that traffic are digitized and remotely-delivered services by professionals and skilled workers who currently, like packet boat captains pre-1824, are regulated by the states via licensing. The technological potentiation and expansion of a continental (and global) flow of “atmospheric rivers” of digitized services upend the longstanding assumption that services are completely internal to the states and, therefore, raise Constitutional questions about their regulation in the federal system. The threat of the loss of state jurisdiction to federal authorities over interstate commerce in services has the potential to shift the political equation for state decision-making about the regulation of services commerce and professional and skilled services providers, creating new urgency for transformational reform of state occupational regulation.

Occupational licensing is the principal means by which U.S. states regulate the production and delivery of services by professional and skilled trade workers to their residents. Such services were delivered face-to-face when state legislatures instituted occupational licensing regimes more than a century ago. The occupational licensing statutes of the fifty states have since remained largely static despite transportation, communications, and technology revolutions, leading to a functional mismatch between antiquated regulatory regimes and the current economic context where remote work and remote delivery of work products are standard in many occupations. Further, de-spatialization has led to a mismatch between the intrastate

jurisdictional reach of state occupational licensing regulators and the interstate geographic scope of services labor and consumer markets (Edisis 2025).

In 2025, New York refused to extradite a physician who complied with New York state regulations but violated Louisiana statutes when providing remote medical services to a Louisiana-based patient – a high profile case illustrating jurisdictional conflicts.¹ Services in despatialized occupations can be (a) digitally delivered in the form of digital documents or other advisory communications that represent the purchased work product of a professional or skilled service provider in one state delivered digitally to a consumer/beneficiary in another state, or (b) remotely delivered in the form of a remote synchronous appointment or asynchronous connection between the provider in one state and consumer/beneficiary in another state during which a service is provided.²

There is a gap in data and scholarship about the scope and implications for states of digital- and remote-deliverability of services across state lines. Scholars who study trade in services across OECD sub-national jurisdictions lament the absence of data on interstate remote services in the United States (Head and Mayer 2021; Anderson et al. 2014). A significant gap exists in scholarship on occupational licensing's effects on commerce "among the several states," despite extensive research on its intrastate labor and consumer market impacts.

Based on a novel dataset generated using data from state administrative sources and employing widely accepted characterizations of the digitizability of occupations, we estimate that 20.7% to 49.5% of state-occupationally-licensed service providers in each state could digitally or remotely deliver interstate services. Variation across states is due to highly heterogeneous state occupational licensing regulations and industrial structures. We calculate

that the upper bound value of the potential flow of services via “digital atmospheric rivers” across geographic jurisdictions was approximately \$1.6 trillion in 2024, or 5.4 % of U.S. GDP.

A novel contribution in addition to our estimates is our introduction of a framework developed in the international trade in services arena to broaden and shift the discourse from “state occupational licensing” to “interstate commerce in services”. Further, we draw on both occupational licensing empirical research and Constitutional commerce clause and dormant commerce clause legal scholarship to assess the grounds for federal takeover of regulation of interstate commerce in services and corollary preemption of state occupational licensing regimes. We conclude with the implications of remote work and remote delivery of services for state governments and for regulatory federalism scholarship.

Part I: Empirical Analysis Data, Method, and Results

We hypothesized, based on examination of state published information on occupations subject to state occupational licensing, that there would be considerable overlap between the set of occupations that are state licensed and the set of occupations that can be produced and delivered digitally or remotely. We further hypothesized that the totality of services that can be produced and delivered digitally or remotely and are subject to state occupational licensing represents a substantial economic effect. Research questions that the research initially sought to answer empirically are:

Q₁: Is there a positive association in the U.S. between workers in occupations that can be digitally/remotely delivered and workers in state-licensed occupations?

Q₂: How do the proportions of workers in state-licensed occupations that can be digitally/remotely delivered vary across states?

Q₃: What is the magnitude of the value of digitally/remotely-deliverable services produced by workers in state-licensed occupations?

Q4: *How does the value of digitally/remotely-deliverable services produced by workers in state-licensed occupations vary across states?*

Unanticipated empirical results led us to add the following:

Q5: *What is the mean percentage of workers who hold a state occupational license across the U.S. states? What percentage of workers holds a state occupational license in each state?*

Data: Digital- or Remote-Deliverability of Professional and Skilled Services

The Bureau of Transportation Statistics gathers data on interstate goods transit that allow analysis of interstate commerce in goods.³ The Bureau of Economic Analysis (BEA) balance of payments division tracks international trade in services.⁴ No U.S. federal agency generates data on interstate commerce in services (Head and Mayer 2021; Anderson et al. 2018). A BEA Digital Economy initiative harmonized with OECD/UN standards to measure digital services' contribution to U.S. GDP was canceled (Highfill and Surfield 2022; Mourougane 2021). The gaps in data on interstate commerce in services and the U.S. digital economy mean we are unable to estimate the value of observed digitally- or remotely-delivered professional and skilled services by state or nationally.

Measuring the Digitally- or Remotely-Deliverable Services Sector of U.S. States

The BEA employs a “more broadly defined concept of *potentially* ICT-enabled services, which includes services that *can* predominantly be delivered remotely over ICT networks, without identifying the services that *are* delivered over ICT networks” for its measures of U.S. international trade in services as a result of data capture limitations (Allen et al. 2020).⁵ Due to the absence of data on interstate commerce in services that would allow estimation of the value of services by state that *are* delivered remotely, we follow the BEA’s practice. We estimate the scope and value of what *can* be remotely- or digitally- delivered over ICT networks that is

subject to state occupational licensing. In other words, we quantify the upper bound of the flow of interstate services along “digital atmospheric rivers.” This approach of estimating remote- or digital- deliverability yields a value that becomes useful in discussion of Dormant Commerce Clause case law.

Why We Do Not Predict Digitally- or Remotely-Delivered Services without Licensing

We do not attempt to predict what the value of services delivered interstate across ICT networks would be if state occupational licensing regulations or other restrictions on interstate commerce in services were rolled back. The reason is uncertain “gravity” effects. The concept of “gravity” in trade refers to an endogenous preference to buy local. International trade research shows that services trade flows decline with geographic distance between buyer and seller, but the degree of gravity effect varies based on characteristics of the product, confidence in the exporting jurisdiction, and risk aversion in the importing jurisdiction (Carrère et al. 2020; Gervais and Jensen 2018; Lendle et al. 2016). Whether and what effect consumer preference for services by geographically closer providers may have on U.S. interstate commerce in services in the aggregate, or by service industry or occupation, has not been tested or estimated (Head and Mayer 2021; Anderson et al. 2014). Hence, instead of estimating the value of services in a counterfactual scenario without state licensing, we estimate the upper bound, measured in number of jobs and value of production, nationally and by state, of services that are remotely- or digitally- deliverable interstate across ICT networks based on technological feasibility and occupational characteristics.

Indicator of Digital- or Remote- Deliverability of Services by Occupation

In order to estimate this upper bound of the magnitude of professional and skilled services that can technologically be remotely- or digitally-delivered interstate, and that are subject to state occupational licensing, we required an indicator of digital-deliverability of services. Federal and researcher surveys produced novel estimates of teleworkability and remote work participation to anticipate and track labor market changes in response to government stay-at-home orders or employer emergency protocols during the Covid-19 pandemic, (Pabilonia and Vernon 2025; Adrjan et al. 2023; Barrero et al. 2023; Brynjolfsson et al. 2023; Barrero et al. 2021).

We employ as our indicator the widely accepted index of “teleworkability” developed by Dingel and Neiman (2020), which identifies what occupations could be delivered remotely given occupational characteristics and current technology, without regard to statutory prohibitions. Services that are “teleworkable” – that can be produced by professionals or skilled workers from home, or other distant employer alternative site or off-site locations -- are evidently digitizable and/or deliverable remotely to any location served by ICT infrastructure, whether the recipient is across the street or across state lines (Kosteas, Renna and Scicchitano 2022).

A Supplementary Indicator of Growth in Digital- and Remote- Deliverability of Services

Given the above-noted absence of data on interstate commerce in services in the United States, we constructed a set of indicators to gain insight into longitudinal trends. We categorized and aggregated annual U.S. employer expense data from the Census Bureau’s Service Annual Survey and Administrative Data.⁶ We compared trends in private sector employer expenses that support the capacity development and conduct of delivery of services across ICT networks to

trends in private sector employer expenses on traditional modes of supply of services across jurisdictional borders, such as by document shipping and by travel to the client's location to deliver in-person services.⁷

Data: Services Workers Subject to State Occupational Licensing

The heterogeneity of occupational licensing statutes and implementation structures across states makes collection and aggregation of state-level data challenging. The number and list of which occupations require a license to practice, the requirements to obtain and maintain a license, and the portability of licenses vary dramatically across states. We secured data from a consortium of state and local administrators, the Analyst Resource Center (ARC), which maintains a data repository that includes state licensing data by occupation codes derived from administrative licensure data submitted by states.⁸

The ARC directly adopts the Bureau of Labor Statistics (BLS) definition that characterizes occupational licenses as government-issued credentials mandated for specific occupations through authorized entities, including state licensing boards and administrative agencies. ARC applied this conceptualization to develop a standardized occupational license classification system for state submission of consolidated administrative data despite heterogeneity in state regimes, including by drawing on work by the Knee Center for the Study of Occupational Regulation, the National Conference of State Legislatures (NCSL), and the Institute of Justice Right to Work Initiative. While state participation is voluntary, all states submitted data to ARC for the October 2024 release this study employs.⁹ Limitations of the data stem from the decentralization of occupational licensing administrative authority within states across an array of agencies, departments within agencies, and quasi-independent boards. We are

unable to ascertain the degree of overcounting (for example, due to failure by an administrative unit to exclude recently inactivated licenses) or undercounting (for example, due to non-reporting by disengaged boards) or their relative effects.

The BLS Current Population Survey (CPS) generates the most widely-cited estimates of the prevalence of occupational licensing in the United States. One reason we employed ARC data instead is that CPS estimates include federal, state, and local government-issued licenses. Further, while CPS methodology for its occupational licensing prevalence estimates is exemplary, three limitations may affect accuracy. First, this measure does not cover unincorporated self-employed workers, unincorporated sole proprietors, or freelancers, all of which have exhibited growth patterns that accelerated with the pandemic and include professionals subject to licensure.¹⁰ Second, survey takers' accuracy of responses about whether they hold a current occupational license is uncertain. The array of licenses, permits, and credentials related to the conduct of work that are issued by localities, states, the federal government, educational institutions, and professional associations is byzantine. The broad scope of the CPS does not allow follow up questions to the contingent sequence of three occupational licensing survey questions for verification.¹¹ Finally, the CPS sample is designed to be nationally representative. State-by-state coverage and response rates vary while state occupational licensing regimes differ widely by state, which can bias national estimates.

Method: Estimation Procedure

For the first stage of our empirical analysis, we use the binary index developed by Dingel and Neiman (2020) to estimate occupations whose work can be conducted remotely or digitally. Occupations are categorized using Standard Occupation Codes (SOC10) as reported by the BLS

Occupational Employment and Wage Statistics (OEWS) by state.¹² The resulting dataset comprises variables for each state and SOC10 category. For the second stage, given that licensed occupations lack consistency across states and cannot be solely identified by job titles, we utilize categorizations of occupations based on SOC10 codes from the ARC state data repository. We merge the datasets generated through the first and second stages using SOC10 codes and state FIPS codes as matching criteria.¹³

For the third stage, we define and estimate two indicators of the economic value by state of the services produced by professionals and skilled workers in occupations that are licensed by the state and that are remotely- or digitally-deliverable. We first estimate the per annum aggregate income of professionals and skilled workers earned from occupations that are subject to state licensing and “teleworkable” using OEWS wage data.¹⁴ Then, since one approach to measuring national – or, in this case, state – gross domestic product is the income method, we employ BEA State Personal Income data as a measure of state economic output. We calculate the per annum aggregate income of professionals and skilled workers in occupations that are licensed by the state and remotely- or digitally-deliverable as a percentage of State Personal Income of the state. The resulting values are estimates by state of the upper bound of the value of digitally- or remotely- deliverable interstate services commerce originating in each state that is regulated by the state’s occupational licensing regime.

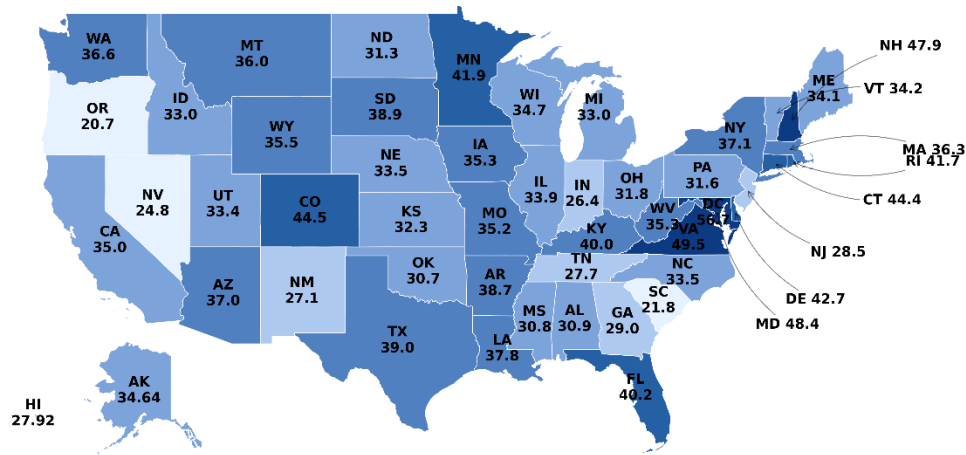
Results

Q1: Is there a positive association in the U.S. between workers in occupations that can be digitally/remotely delivered and workers in state-licensed occupations?

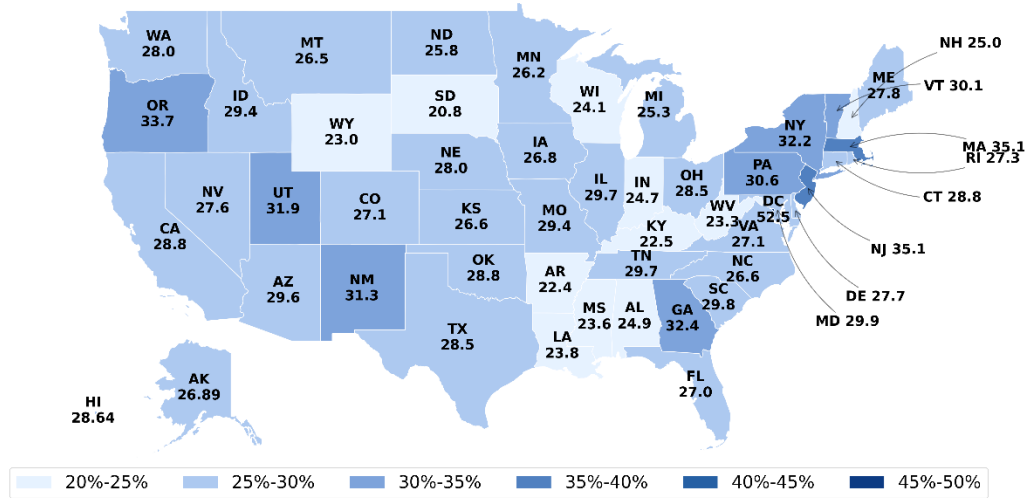
We find that a mean across the fifty U.S. states of 35.3 percent of workers in state-licensed occupations can digitally or remotely deliver their services, given current technology

and occupational characteristics. The percentage of workers in state-licensed occupations who can digitally or remotely deliver services is substantially higher than in occupations not licensed by states who can do so, evident in Figure 1 below. We identified a 7.2 percentage point difference in means with strong statistical support at the >99.9 percent confidence level.¹⁵ Our analysis finds a meaningful association between state-occupationally-licensed and digitally- or remotely-deliverable jobs.

% Workers in State-Licensed Occupations Digitally/Remotely-Deliverable



% Workers in NOT-State-Licensed Occupations Digitally/Remotely-Deliverable



Source: Authors' calculations using data from Employment and Training Administration. 2024. "Workforce Information Database (WID), Occupational Licensing Data." Analyst Resource Center. <https://data.widcenter.org/wfinfodb/License>, and BLS (2024).

Figure 1. State Licensing and Digital/Remote-Deliverability of Occupations

Q₂: How do the proportions of workers in state-licensed occupations that can be digitally/remotely delivered vary across states?

The range across the fifty states of percentages of workers in occupations subject to state occupational licensing that are remotely- or digitally- deliverable is 20.7 to 49.5 percent, with a standard deviation of 6.3 percent. By comparison, the range of percentages of workers in

occupations that are not subject to occupational licensing is 20.8 to 35.1 percent, with a standard deviation of 3.2 percent. In other words, there is greater variability in the relative magnitude of jobs held by professional and skilled workers whose occupations are state licensed and digitally- or remotely-deliverable than whose occupations are not state licensed and digitally- or remotely-deliverable. For state-by-state data, see Table 1.

Table 1: Percent and Value of State-Licensed and Not-Licensed Workers in Digitally/Remotely Deliverable Occupations (D/RDO), by State, 2024

State	Not-State-Licensed Workers	State-Licensed Workers			
	% in D/RDO	% in D/RDO	Agg. Wages of D/RDO (\$B)	D/RDO % of Total Wages	D/RDO % of State Personal Income
Alabama	24.94	30.91	13.17	11.66	4.51
Alaska	26.89	34.64	2.96	13.16	5.32
Arizona	29.58	36.98	19.01	9.18	3.89
Arkansas	22.37	38.67	12.91	19.26	7.01
California	28.76	34.97	202.42	14.17	6.00
Colorado	27.06	44.50	39.08	19.54	7.93
Connecticut	28.83	44.42	28.38	22.77	8.28
Delaware	27.73	42.74	3.99	13.27	5.48
District of Columbia	52.46	56.65	11.88	15.83	15.63
Florida	27.01	40.19	140.14	23.10	8.52
Georgia	32.43	28.97	33.17	11.09	4.75
Hawaii	28.64	27.92	2.90	7.32	2.88
Idaho	29.36	32.98	4.20	8.94	3.39
Illinois	29.68	33.93	85.58	20.96	9.07
Indiana	24.74	26.44	28.29	15.21	6.40
Iowa	26.82	35.27	9.38	10.40	4.55
Kansas	26.62	32.29	14.81	17.93	7.33
Kentucky	22.53	39.99	18.56	16.91	7.03
Louisiana	23.77	37.79	18.53	17.89	6.57
Maine	27.79	34.07	3.75	9.62	3.92
Maryland	29.91	48.43	38.06	18.54	7.74
Massachusetts	35.10	36.28	70.85	23.96	10.57
Michigan	25.27	33.02	59.24	21.47	9.24
Minnesota	26.17	41.94	40.03	20.07	9.22
Mississippi	23.59	30.81	4.07	7.23	2.66
Missouri	29.38	35.16	15.11	8.85	3.74
Montana	26.47	35.97	3.29	11.53	4.28
Nebraska	28.02	33.49	8.28	13.72	5.75
Nevada	27.58	24.81	7.14	8.14	3.18

New Hampshire	24.98	47.91	8.86	20.25	7.59
New Jersey	35.12	28.47	65.69	20.61	8.22
New Mexico	31.31	27.06	8.02	16.10	6.53
New York	32.24	37.12	88.61	11.63	5.20
North Carolina	26.58	33.53	63.85	21.31	8.91
North Dakota	25.76	31.26	2.22	8.74	3.93
Ohio	28.53	31.82	38.53	11.33	5.05
Oklahoma	28.83	30.74	11.40	12.41	4.44
Oregon	33.69	20.71	14.14	10.50	4.68
Pennsylvania	30.63	31.60	37.97	9.99	4.08
Rhode Island	27.34	41.67	4.76	14.71	6.12
South Carolina	29.78	21.76	9.49	7.42	2.89
South Dakota	20.78	38.95	3.90	16.07	5.70
Tennessee	29.73	27.68	20.00	10.52	4.26
Texas	28.51	39.04	141.01	16.24	6.63
Utah	31.85	33.37	10.01	9.46	4.30
Vermont	30.13	34.15	2.31	12.11	5.07
Virginia	27.14	49.47	46.35	16.21	6.82
Washington	28.01	36.64	36.61	12.85	5.48
West Virginia	23.33	35.31	4.20	11.07	4.30
Wisconsin	24.08	34.65	26.42	14.76	6.56
Wyoming	23.02	35.52	1.64	10.14	3.25

Source: Authors' calculations using 2024 data from Analyst Resource Center Workforce Information Database (WID) Occupational Licensing Data, U.S. Bureau of Labor Statistics Occupational Employment and Wage Statistics, and U.S. Bureau of Economic Analysis State Personal Income Statistics.

The states with the highest proportion of professional and skilled workers in occupationally-licensed jobs that are digitally- or remotely-deliverable are concentrated in the Mid-Atlantic and New England: Virginia, Maryland, New Hampshire, Colorado, Connecticut plus DC.

These five states and DC are among the top 15 states in percentage of workers who hold at least a bachelor’s degree (U.S. Census Bureau 2025).¹⁶ Location quotients calculate the concentration of an occupation or industry in the state relative to its concentration in the United States as a whole.¹⁷ Virginia, Maryland, Colorado, and DC exhibit a pattern of notably high location quotients on an annual average employment basis in the professional, scientific, and

technical services sector (NAICS 54). New Hampshire shares with them a high location quotient in the computer systems design subsector (NAICS 5415). The Connecticut case is different, with the finance and insurance services sector (NAICS 52) exceptionally concentrated (U.S Bureau of Labor Statistics 2024).

The states with the lowest proportion of professionals and skilled workers who are working in occupationally-licensed jobs that are digitally- or remotely-deliverable are geographically dispersed: Oregon, South Carolina, Nevada, Indiana, and New Mexico. These five states share high location quotients in services sectors in which many occupations require in-person work. New Mexico, Nevada, and South Carolina have high concentrations of services employment in accommodation and food services (NAICS 72), while Nevada and Indiana have high concentrations in transportation and warehousing services employment (NAICS 48-49). Oregon and Indiana exhibit high location quotients in their equipment repair and maintenance services subsectors (NAICS 811) that support their exceptionally concentrated agricultural and manufacturing sectors, respectively. With regard to statewide aggregate workforce education levels, four of the five states with the lowest proportion of workers in occupationally-licensed jobs that are also digitally- or remotely-deliverable are among the 17 states with the lowest percentage of workers with at least a bachelor's degree.

States require occupational licensing for lists of occupations that are highly heterogeneous state to state, which may account for some of the variation in our findings across states. We do not observe a clear pattern of close correspondence of our results with rankings in a recent index of occupational licensing burden based on assessment of features of state occupational licensing regimes (Trudeau and Timmons 2024). Our exploratory comparisons of location quotients above suggest that differences in the industrial structures of the services

sectors of the states account for some of the wide 20.7 to 49.5 percentage band. States with a high intensity of technology, scientific, or other professional services occupations that require specialized expertise fall in the upper range while states with a high intensity of services occupations that are more likely to require in-person work and/or less likely to require higher education qualifications fall in the lower range.

Q3: What is the magnitude of the value of digitally/remotely-deliverable services produced by workers in state-licensed occupations?

We estimate that the value of the aggregate income of workers in jobs that are state occupationally licensed and can be digitally or remotely delivered interstate was \$1.59 trillion in 2024 in the United States. For comparison, 2024 U.S. GDP was \$29.18 trillion in current dollars.¹⁸ An estimated mean across the fifty states of over 14 percent of all worker income is earned in services occupations that are digitally- or remotely- deliverable interstate and subject to state occupational licensing regulations. The value of services subject to state occupational licensing and that are digitally- or remotely- deliverable across state lines via “digital atmospheric rivers” represented an approximate mean across the fifty states of nearly 6 percent of state total economic output in 2024.

Q4: How does the value of digitally/remotely-deliverable services produced by workers in state-licensed occupations vary across states?

The current dollar value of income earned by workers in jobs that are state occupationally licensed and are digitally- or remotely-deliverable is over \$100 billion per year each in California, Florida, and Texas. States where the estimated percentage of State Personal Income (as a measure of state economic output) generated by workers in occupations that are state occupationally licensed and are digitally- or remotely-deliverable is higher than 9 percent are Massachusetts, Michigan, Minnesota, and Illinois, plus DC. States with the lowest percentage, at

under 3 percent, are South Carolina, Hawaii, and Mississippi. For further state-by-state data, see Table 1.

Our exploratory comparisons suggest patterns in the industrial structures of the cohorts of states with highest and lowest percentages of economic value produced in the state by occupations that are state occupationally licensed and digitally- or remotely-deliverable. The states -- Massachusetts, Michigan, Minnesota, and Illinois plus DC -- with the highest percentages share high location quotients on a total annual wages basis in finance and insurance (NAICS 52) and/or health care (NAICS 62) services sectors. DC has an extraordinarily high location quotient for legal services (NAICS 5411), for which Illinois has a moderately high location quotient. By contrast, the states -- South Carolina, Hawaii, and Mississippi -- with the lowest percentages have notably low location quotients in the finance and insurance; information; and professional, scientific, and technical services sectors. States with the highest percentages of State Personal Income produced by workers in occupations that are state occupationally-licensed and remotely- or digitally- deliverable consistently rank in the upper half of states by percentage of workers with at least a bachelor's degree, while states with the lowest proportions rank in the lower half of states by percentage of workers with at least a bachelor's degree.

Why Digital and Remote Delivery of Services Can Be Expected to Increase

Figure 2 above, presenting supplemental analysis using employer expense data from the U.S. Census Bureau's Service Annual Survey and Administrative Data, shows an increasing trend across sectors in spending relevant to potentiation and conduct of digital and remote delivery of services via the internet and other remote communications media.¹⁹ Further, it is vastly outstripping the slight increase in spending related to physical document transit. The trend

in spending on transit of professionals and workers is inconsistent and shows an unsurprising drop during the pandemic, with the degree of recovery uncertain. In summary, we observe an increasing cross-sector trend in expenses on capacity and conduct of digital delivery of services relative to expenses supporting traditional modes of services delivery. These data show a persistent growth in investment by employers in their digital capacity for the conduct of business that supports the digital or remote conduct and delivery of service. With these investments, the potential and capacity for digitally transmitted interstate commerce in services can be anticipated to continue to grow, such that states can reasonably expect stability or an increase in capacity for services digitally- or remotely-deliverable via “digital atmospheric rivers.”

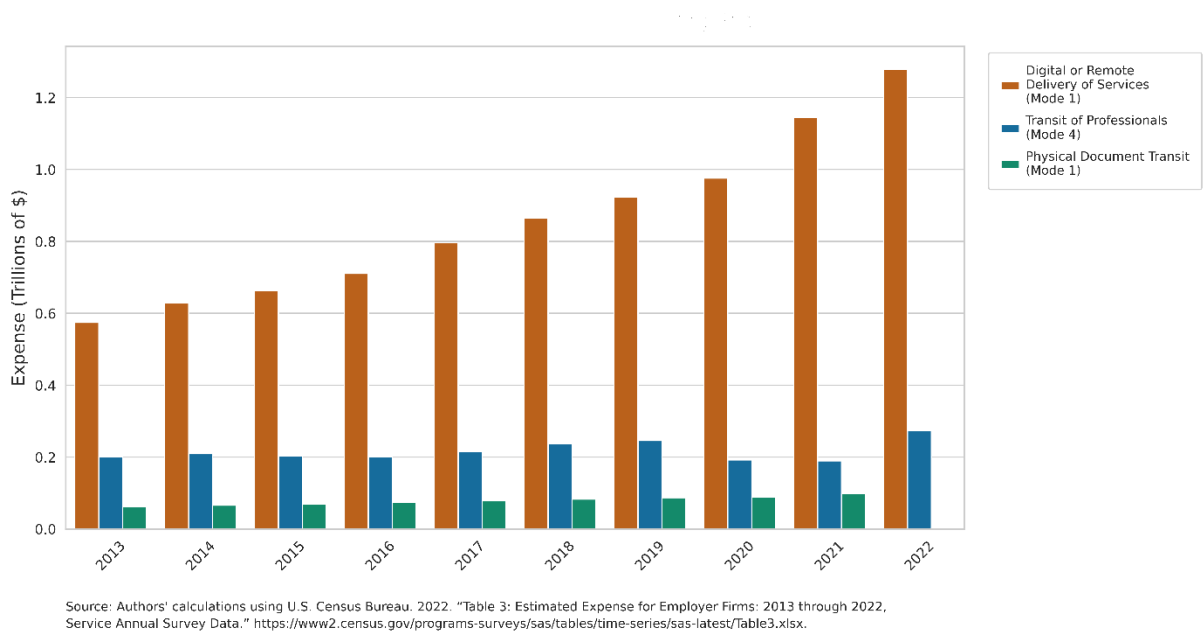


Figure 2. Expenses by service delivery mode.

Source: Authors' calculations using U.S. Census Bureau (2022).

Occupational Licensing Prevalence Estimates (Q5)

Based on counts of active state occupational licenses in 2024 originating from state agencies, described in the Data section above, we estimate that a mean of 27.5 percent of workers across the fifty states and District of Columbia held a state occupational license in 2024. The BLS estimated based on CPS survey data that 21.6 percent of civilian employed workers held an occupational license in 2024. Our estimate is notably higher even though we employ data that count only state government occupational licenses, whereas the CPS data includes all government-issued occupational licenses. We estimate that forty-one states and DC had prevalence in the state of state occupational licenses that was greater than the BLS national estimate. The economies of only three of the nine states with estimated prevalence below the BLS national estimate -- Arizona, Missouri, and South Carolina -- are in the upper half of states ranked by GDP.

One reason that the ARC administrative data-based estimates exceed the CPS survey data-based estimates may be the unit of measurement. State agencies count licenses, while the CPS counts workers who respond whether they do or do not hold a license. A worker could concomitantly hold more than one license – for example, one for work as an employee and another for gig work. Limitations of the CPS national survey data and ARC state administrative data on occupational licensing are detailed in the Data section above.

Part II: Discussion of Implications for Digital Era Regulatory Federalism

The magnitude of our estimates – that a mean across states of 14.2% of all worker income, totaling \$1.6 trillion of income per year in the United States is generated by professionals and skilled workers in services occupations that could engage in interstate commerce digitally or

remotely and are subject to state occupational licensing – raises a red flag about state jurisdiction over interstate commerce in services in the U.S. federal system. When state occupational licensing statutes were promulgated roughly a hundred years ago, service delivery was face-to-face and, hence, local within the internal economy of the state (Edisis 2025). Engaging recent Constitutional Commerce Clause and Dormant Commerce Clause scholarship, we discuss how the expansion of the internet as a national (and supranational) channel for trade during the 20th century, advances in digital technology in the 21st century, and surge in remote work catalyzed by the pandemic have new bearing on the respective roles of the federal and state legislatures and on the decisions of federal courts regarding regulation of interstate commerce in services and of occupations.

Regulation of Commerce in the U.S. Federal System

The basic outline of the schema for regulation of economic production and commerce – that the U.S. Constitution empowers the federal government to regulate commerce among the several states, with the regulation of its internal economy reserved to the state – persists. The service sector of the economy to which this schema is being applied, however, has fundamentally changed. Three exogenous shifts – two secular trends and one shock – have radically reshaped the services sector and services commerce in the United States since state occupational licensing regulations were introduced. First, international trade liberalization and globalization of production contributed to a migration of the U.S. economy away from goods manufacturing toward services production. Second, the ICT revolution increased the predominance of services production in the U.S. economy (Buera and Kaboski 2012). Marginal transportation and replication costs for information and communications and for services transiting the internet fell to zero, making remote production and delivery of services cost-effective (Goldfarb and Tucker

2019). Traditional distinctions between goods and services blurred – “servicification of manufacturing” - with services embedded in goods and interdependent services and goods packaged for consumers (Lanz and Maurer 2015, 1).

Third, in response to the Covid-19 pandemic shock and shutdowns, businesses and professionals invested in technological and organizational capacity for remote work. The pandemic demonstration effect, moreover, led to a shift toward services producer preference and consumer acceptance of remote work and remote delivery of services (Pabilonia and Vernon 2025; Mariani et al. 2023; Thornton et al. 2021).

Federal and Multilateral Definitions of Modes of Trade in Services

The federal government took a lead role in initiating and negotiating the multilateral General Agreement on Trade in Services (GATS), signed by the U.S. in 1995, which codified cross-border trade in services through four modes defined by producer and consumer location at the moment of service delivery (UN 2012). Applied to U.S. states: Mode 1 (Cross-Border Supply) involves services delivered remotely (e.g., digital documents, virtual consultations) between providers and consumers in separate states; Mode 2 (Consumption Abroad) occurs when consumers travel to the provider’s state (e.g., medical tourism); Mode 3 (Commercial Presence) entails providers establishing in-state branches (e.g., foreign affiliates); and Mode 4 (Presence of Natural Persons) refers to providers traveling to the consumer’s state (e.g., on-site consulting). The BEA began categorizing and measuring international services trade by mode in 2019 (Mann and Cheung 2021), while scholars over the last decade identified Mode 5 (“services in a box”) for services embedded in goods (Cernat and Kutlina-Dimitrova 2014).

Services delivered across U.S. state lines via ICT networks count as Mode 1 (Cross-Border Supply) interstate commerce in services. Services that can be digitally-ordered (“e-commerce”) but cannot be digitally-delivered across state lines do not constitute Mode 1 (Cross-Border Supply). For example, contracting through a national platform such as Angie’s List or Booksy, for a service that must take place in person, such as tree removal or braiding, is not included if both the provider and consumer are domiciled in the same state.²⁰

We use this trade in services framework to expand from a narrow focus on legacy state occupational licensing regimes to a broader conception of regulation of services commerce. While *trade* is the standard term in the international arena, consistent with language enshrined in the U.S. Constitution, we use the term interstate *commerce* to refer to trade across state lines within the U.S.

States’ Regulation of Commerce in Services by Occupational Licensing

Currently, each state seeks to regulate the production and delivery of services provided to its residents by requiring professionals in designated occupations to obtain state licensure. In occupations with technological feasibility to digitally or remotely deliver services, whether a professional can legally provide services to a client in another state is directly dependent on the occupational licensing regime of the state where the client is located. While the client’s state’s regulations rule, the provider’s state’s occupational licensing regime is not irrelevant. If the service is categorized as output of an occupation for which the provider’s state has a reciprocity agreement with the client’s state, or if the provider’s state has “Universal Licensing Recognition” that covers the occupation and meets multiple criteria, discussed further below, interstate provision may be legal.

Whether the state where the client is located can successfully and cost-effectively enforce non-provision to its residents by professionals or skilled workers located in another state is uncertain. Geolocation has improved providers' ability to identify a client's state at the time of service delivery. However, returning to the example in the introduction, is it possible for Louisiana to successfully and cost-effectively punish a New York resident provider of services to a Louisiana resident consumer, particularly given New York's refusal of the extradition of its resident provider? Whether a state wants to enforce – to disallow a resident in their state who wishes to procure and benefit from a service from a provider in another state from doing so – is another question beyond the scope of this analysis.

Effectiveness of States' Regulation of Commerce in Services by Occupational Licensing

The purported intention of state occupational licensure according to professional associations that lobbied state legislatures for the institution of licensing of their occupations in the late 19th and early 20th early twentieth century was “consumer protection” of residents within their state jurisdiction (Edisis 2025). Retrospective analysis of the historical record suggests that professional associations, such as attorneys, lobbied state legislatures for the institution of state occupational regulation to codify rules beneficial to incumbents (Carollo et al. 2025; Morris and Neeley 2001).

U.S. states defending their economic regulations commonly rely on arguments based on the police power of states to regulate health, safety, and morals (Goldsmith and Volokh 2022). Recent research estimating within-state effects of state occupational licensing regulations in the 21st century, however, undermines the assertion that state occupational licensing serves to protect the health or safety of state residents. Results of robust empirical analyses consistently demonstrate that state occupational licensing regimes do not increase social welfare in states and

have a negative effect on consumer welfare in nearly all occupations analyzed (Blair and Chung 2025; Yelowitz and Ingram 2024; Farronato et al. 2024; Kleiner and Soltas 2023; Chung 2022; Bowblis and Smith 2021; Xia 2021; Carollo 2020; Kleiner and Xu 2020; Larsen et al. 2020; Meehan & Stephenson, 2020; Ingram 2019; Gittleman, Klee and Kleiner 2018; Timmons and Mills 2018; Kleiner and Krueger 2013). States require occupational licensure to practice dozens or even hundreds of service occupations. In only a few high risk-to-consumer and high human-capital-investment-required occupations, such as medical doctors and engineers, does empirical research indicate that occupational licensing benefits consumers (Blair and Chung 2025; Carollo 2020).

Pandemic-Catalyzed Legislative Actions by States

A few states enacted modest to moderate reforms to their occupational licensing regimes from 2013 through the start of the Covid-19 pandemic in response to intrastate shortages of workers in licensed occupations and concerted initiatives by state associations to communicate scholarly empirical research results and facilitate reforms (Deyo 2022; Thornton et al. 2021). As Governor-issued emergency edicts during the Covid-19 pandemic allowing telehealth and increased portability of licensure in “essential” occupations expired, some state legislatures passed enabling statutes to allow continued enhanced portability of licensure in medical fields.²¹ Since 2019, a small number (≤ 7) of states joined established interstate compacts for nursing, medicine, and EMS; nearly half of states joined an established psychology interstate compact; and over half of states joined new interstate compacts in audiology, counseling, occupational therapy, and physical therapy.²² Efforts to enact occupational licensing reforms, or even join an occupation-specific interstate compact, stalled in roughly half of the states.

“Universal Licensing Recognition” (ULR) legislation has been a tool to address the constraints on interstate mobility – commerce in services Mode 4 (Presence of Natural Persons) – of professionals and skilled workers in occupations not subject to occupation-specific interstate compacts. A variant of ULR enabling legislation was passed by 26 states as of 2024. Meaningful limitations of ULR statutes are that they exclude entire sectors and/or large occupations; supersede some but not all relevant occupational licensing statutes and rules; and/or require a substantial equivalency of licensing requirements or a similar definition of scope of practice in the state of license origin (Bae and Deyo 2024).

A further limitation as a vehicle to alleviate constraints to commerce in services Mode 1 (Cross Border Supply) across ICT networks is that 8 of the 26 state ULR statutes have residency requirements, effectively preventing remote or digital delivery of covered licensed services to clients within those states. Because ULR legislation passage has been concentrated in smaller economy states, the 18 states with Universal Licensing Recognition without residency requirements such that ULR may alleviate digital Mode 1 (Cross Border Supply) limitations represent only 28% of U.S. GDP.²³ In the remaining half of the states, representing nearly three-quarters of U.S. economic production, ULR legislation has not made it to the floor or has failed in state legislatures.

Ongoing Federal Executive Branch Critiques of State Occupational Licensing

Four consecutive presidential administrations have exhorted states to enact reforms to state occupational licensing regimes.²⁴ Federal objections include not only intrastate inefficiencies but also negative national effects of state occupational licensing. State restrictions impede professionals and skilled workers in licensed occupations from moving interstate from regions of low opportunity to regions of high opportunity in response to regional shocks or to uneven

effects of national economic downturns, thereby impeding national macroeconomic adjustment. Research demonstrates empirically that burdensome licensing reduces cross-state mobility (Jackson 2023; Chung 2022; Johnson and Kleiner 2020; Kleiner and Xu 2020; Hermansen 2019; Carpenter et al. 2018, 2015; Molloy et al. 2017).

Restrictive licensing also correlates with reduced entrepreneurship and fewer establishments in licensed fields (Plemmons 2022; Dove and Trudeau 2024). Conversely, states that signed the Interstate Medical Licensure Compact have seen significant growth in the provision of services to out-of-state patients by physicians located in the state (Deyo et al. 2024). States recognizing out-of-state licenses for military spouses see increased inflows (Shakya et al. 2024). Federal concerns have centered on constraints to Mode 4 (Presence of Natural Persons).

The discussion here of state occupational licensing barrier to interstate commerce in services Mode 1 (Cross Border Supply) over ICT networks is a novel contribution to the policy and research discourse. Neither the federal executive branch offices and agencies nor researchers have focused on state occupational licensing as a barrier to professional and skilled worker interstate remote and digital delivery of services. Another novel consideration is that state occupational licensing requirements inhibiting interstate digital or remote delivery of services may constrain professionals and skilled workers in licensed occupations from staying in their home states. Research has demonstrated a common home state attachment consistent with a preference to stay (Jacobs and Munis 2020). However, the inability to access markets in other states from a provider's home state due to occupational licensing restrictions in those other states to supplement in-state clientele may reduce the financial viability of staying.

Potential Congressional Action under the Commerce Clause of the Constitution

The Commerce Clause of the U.S. Constitution – Article 1, Section 8, Clause 3 – gives the U.S. federal government the power to regulate commerce among the several states. In *Gibbons v. Ogden* (1824), the Supreme Court established that Congress could regulate the channels of interstate commerce, overturning a New York Legislature-granted monopoly over commercial navigation in favor of a shipping enterprise that sought to navigate waterways across state boundaries. It was not only the Commerce Clause, but also a Coasting License Act passed by Congress allowing free passage along U.S. navigable natural and constructed waterways that was determined to preempt the New York legislature’s grant of monopoly. The Supreme Court decision gave the federal government the power to regulate channels of interstate commerce. Over time, this grant of power extended from waterways to newly invented and newly constructed modes of transportation of goods and factors of production across state lines, including railroads, roads, and aviation.

The basic internet is a U.S. federal government agency-originated national network that has become an interstate channel of transportation of services and factors of production. Federally DARPA-funded researchers developed and codified the basic internet’s still-standard transmission control protocol/internet protocol (TCP/IP) operating protocols. The TCP/IP packet-switching basic internet infrastructure underlies layers of user-familiar technologies such as browsers, search engines, interactive websites, digital platforms, and social networks (Goldfarb and Tucker 2019). Service transmissions are broken down into packets of data that are shipped across the internet to a designated recipient, with transit routes across states variable based on capacity availability. Network packets now traversing “digital atmospheric rivers” are roughly analogous to shipping packets traversing waterways during the nineteenth century. State

occupational licensing regulations that have the effect of blocking transmission of digitized inputs and digital or remote services along the internet across state lines could likewise be considered analogous to the state regulation that had blocked delivery of inputs and goods along waterways across state lines.

Historically, since the 1905-1937 *Lochner* era, the Supreme Court has held that if a state statute has a “substantial economic effect” on interstate commerce or if the cumulative effect of a state statute could be influential on interstate commerce, the federal government is empowered to act to preempt such a statute. In its 2005 *Gonzalez v Raich* decision, the Court established that Congress could regulate an entirely in-state economic activity if Congress could rationally believe that it might have a substantial economic effect on interstate commerce, even without empirical proof of substantial effects (McGoldrick 2019). This is relevant given the current inability to provide airtight empirical evidence due to gaps in data. The estimation here of the scope of the services that are remotely- or digitally-deliverable interstate subject to state occupational licensing provides an indicator to support a rational belief that state regulations are substantially influential on interstate commerce.

Currently, the federal government only licenses occupations engaged in the operations of interstate commerce channels like the Federal Aviation Administration licenses pilots and aviation-related professionals; the Coast Guard licenses ship captains; and the Federal Communications Commission licenses commercial radio transmitter operators. The Congressional Veterans Auto and Education Improvement Act of 2022 (H.R. 7939), which requires that states allow portability of occupational licenses across state lines for military spouses, represented a first Congressional foray into preemption of state occupational licensing

regulation. Congress has demonstrated an increased willingness to preempt state authority (Conlon 2017).

Potential Federal Court Action under the Dormant Commerce Clause

The federal courts, in parallel, have demonstrated declining judicial support for state autonomy (Dinan 2017). Federal court-generated case law under the Dormant Commerce Clause could shift regulatory oversight over digitally- or remotely-deliverable services from the states to the federal government, even if Congress does not act. Federal lower court decisions on state regulations affecting internet platforms and the Supreme Court’s *National Pork Producers vs Ross* (2023) ruling have re-animated policy-maker interest in federal vs. state regulatory authority under the Dormant Commerce Clause. The Congressional Research Service was asked to produce a report updating members of Congress on the Dormant Commerce Clause in 2023.²⁵

Legal scholarship analyzing the Dormant Commerce Clause and economic regulation in the U.S. federal system, including the potential role of the Dormant Commerce Clause as an instrument to force interstate cooperation (McGoldrick 2019; Knoll and Mason 2017; Klass and Rossi 2015), reveals five potential justifications for federal courts to overturn state occupational licensing regulations: extraterritoriality, undue cost and mismatch cost burdens, the rational basis test, and economic protectionism.

- The “extraterritoriality” argument claims that a state is applying its regulation beyond the jurisdiction of the state. Lower federal courts have recently increased use of the extraterritoriality argument under the Dormant Commerce Clause to overturn state regulatory statutes in order to protect gains from trade among the states (Feldman and Schor 2022; Epstein 2022). With “digital atmospheric rivers,” a dramatically increased and important number of professional and skilled service providers are extraterritorial to

the state where the service is delivered, yet they continue to be ostensibly governed by the regulations of the state where the service is delivered.

- Under the “undue cost burden” argument, the court can strike down a state regulation if it imposes a burden on commerce that is “unduly costly” relative to putative benefits to residents of the state (Post 2022; Knoll and Mason 2017). Given the vast scope of interstate commerce in services that can be delivered remotely or digitally, plaintiffs in various occupations could newly seek to make a case that state occupational licensing regimes have become an “undue burden”. Growing evidence of the ineffectiveness of occupational licensing in protecting consumers in most occupations threatens the argument of putative benefits to residents, while here we show a burden on economically substantial interstate commerce in remotely- or digitally- deliverable professional services of state occupational licensing, suggesting possible new outcomes from court balancing of costs to interstate commerce against intrastate benefits.
- In addition to the undue cost burden of a single state’s regulation, courts also can rule based on “mismatch burden on commerce” costs from regulatory diversity across states. Many occupational services that are homogeneous or effectively indistinguishable across states have long been subject to extremely heterogeneous regulatory requirements by states. The increase in remote- and digital- deliverability of professional services means that costs of compliance with “mismatched” state occupational licensing regimes constitute a growing “burden” on an expanded cohort of professional and skilled workers who are able and wish to provide services remotely to consumers across multiple states. Knoll and Mason (2023) note the concern that striking down a state’s regulation since mismatched with those of other states can de facto lead to the one state having to adopt the regulations of other states, such that the courts are effectively legislating, but assert that “failing to restrain regulatory mismatches would threaten the smooth functioning of the national marketplace and undercut important federalism values” (2023, 1).
- When a business or association plaintiff with standing challenges a state regulation in the lower courts, if a state can provide a defense that presents a legitimate government interest as “a rational basis” for its state regulation, then the regulation can be upheld (Brown 2022; Goldsmith and Volokh 2022). Technology-driven changes in economic conditions and research evidence negating state claims of health and safety benefit from

state licensing of most occupations present new challenges to the rational basis for state occupational licensing regulations.

- “Economic protectionism” is an illegitimate state objective under the Dormant Commerce Clause. Concern that state occupational licensing regulations may be acting to secure protection for professional associations and incumbent professionals or skilled workers from legitimate competition under the guise of a health and safety rationale has been raised (Brown 2022; Edlin and Haw 2013). The same state professional associations that originally lobbied for licensing regulations to be applied to their occupations have often been tasked by states to take a leading role in oversight, with “foxes and henhouses” effects (Allensworth 2017; Carollo et.al 2025). In a 2015 decision, the Supreme Court ruled against the North Carolina State Board of Dental Examiners in *North Carolina State Board of Dental Examiners v. Federal Trade Commission* (2015) for engaging in monopolistic behavior.

With technological and organizational advances making possible remote- and digital-interstate commerce in many professional and skilled services, it can be contended that occupational licensing regulations now constitute economic protectionism from out-of-state competition even if they did not at the time of their promulgation (Edlin and Haw 2013). The Supreme Court’s 2005 *Granholm v Heald* decision held that states cannot discriminate against out-of-state enterprises (wine producers that could not ship directly to residents) in favor of in-state enterprises (wine producers that could ship directly to residents). Recent lower court decisions have followed by recently ruling various states’ requirements of residency to secure a cannabis business license unconstitutional economic protectionism that state regulatory power of states based on health, safety, and morals protection does not override (Dickson 2024).²⁶ The resultant case law makes state occupational licensing residency requirements particularly vulnerable to judicial challenge.

Conclusions

The current ready and increasing flow of digitalized and remote services across geographically based jurisdictional boundaries challenges the legacy operating assumption that services are “completely internal commerce of the state.” The estimate here that \$1.6 trillion of income per year in the United States is generated by professionals and skilled workers in services occupations who could engage in interstate commerce digitally or remotely and are subject to state occupational licensing is economically appreciable. Across the 50 states, an estimated mean of over 14 percent of all worker income is earned by professionals and skilled workers whose occupations are subject to occupational licensing and are digitally- or remotely- deliverable, representing an estimated mean of nearly 6 percent of total state annual output. Whether occupational licensing regulations outright prohibit, make costly, or bureaucratically slow down professionals or skilled service workers from providing services interstate varies by occupation and by state (Trudeau and Timmons 2024). Conclusions drawn are relevant to state government legislators and administrators and to federalism scholarship.

For State Governments

There are now multiple legal premises for Congressional or federal court intervention given the cumulative result of technological advances and market evolutions leading to remote- and digital-deliverability of services. Estimates of the magnitude of the scope of digitally- and remotely-deliverable services subject to occupational licensing regimes that could be construed as (i) restraining commerce among the several states (ii) that is transacted across national infrastructure originally funded by the federal government that serves as a critical channel of commerce and (iii) that provides a rational basis for substantial economic effect, each and all raise the specter of Congressional action to preempt. Further, the Supreme Court decision supporting a Federal Trade Commission challenge to a North Carolina occupational licensing

rule was a federal court “shot across the bow.” The prospect of losing state authority under their watch over regulation of services salient both to consumers and to professional providers resident in their jurisdictions could newly motivate elected officials.

To take advantage of the opportunities remotely- and digitally-delivered services offer their residents as consumers or beneficiaries or patients, states could consider statutory or institutional changes aimed to support state residents as consumers seeking access to needed interstate services. As an economic development stratagem, states could consider statutory or institutional changes to support state resident professional or skilled services providers who wish to remotely or digitally export their services to consumers in other states in order to increase the economic viability of staying in their home state. Moreover, state regulatory efficiency and/or institutional supports for interstate commerce in professional and skilled services could become a positive source of state competitiveness in attraction or retention of residents and businesses. Edisis (2025) proposes that states shift away from relying only on the blunt tool of authoritative mandates that occupational licensing represents toward programs of support for the advancement of a thriving services sector through a policy mix of information, incentive, and authoritative tools commensurate with occupational risk to more effectively regulate increasingly de-spatialized economic activity by professional and skilled service providers.

For Digital Era Regulatory Federalism Scholarship

The technological feasibility of digital and remote delivery of services across U.S. state lines mean that many professional and skilled services are no longer “completely internal commerce of the state,” which in turn implies that it is possible that their regulation is no longer reserved to the states under the Commerce Clause, challenging longstanding assumptions about the division of regulatory authority in the U.S. federal system. Scholars have recently asserted

the importance of study of the distribution of regulatory authority in federalist systems, including the implications of interstate variation in regulations and the effects of increasing federal activity in response (Sorens 2022; Fiorino and Weted 2021; Fowler 2018). The current analysis affirms the need for further research on intergovernmental regulatory relations.

The governance challenges arising from the mismatch between Westphalian boundaries and natural resource geographies have long been recognized. Digital era advances that have enabled the emergence of a de-spatialized services sector similarly mismatched with spatially delimited political boundaries have likewise generated governance challenges. In the United States, a fundamental conflict has arisen between state sovereignty and the need for regulatory coherence in an increasingly de-spatialized digital interstate economy, where the traditional boundaries of state-based professional regulation clash with the realities of modern remote work and cross-border service delivery. The changes in the landscape for regulation of services, where many professionals and skilled workers can now digitally or remotely produce and deliver their services via “digital atmospheric rivers,” make empirical, legal, and theoretical research on interstate commerce in services, regulation of de-spatialized services occupations, and regulatory federalism salient.

There is a gap in data and scholarship on interstate commerce in the digital era in the U.S., in contrast to established international trade in services scholarship and emergent scholarship on commerce among sub-national units in OECD countries other than the U.S. While extensive literature on intrastate effects of state occupational licensing regimes and their relative stringency has developed since the Bureau of Labor Statistics introduced questions on licensing and certifications in its Current Population Survey in 2015, the empirical analysis of *interstate* effects of state occupational licensing regimes is limited. Research has sought to quantify the

constraining effects of occupational licensing on worker mobility – e.g., workers providing services in other states by moving physically to those states (Trade in Services Mode 4) but has not yet paid attention to the constraining effects of occupational licensing on cross-border provision of services across ICT networks (Trade in Services Mode 1). Complementary to existing empirical research estimating whether state occupational licensing prevents workers from exercising their preference to move across state lines to greater professional opportunity, there is a gap in research estimating whether occupational licensing inhibits workers' ability to exercise their preference to stay within a state (or locality) with a smaller market for their services by preventing them from developing a supplementary or primary digitally- or remotely-delivered services practice.

U.S. state reorientation away from legacy occupational licensing regimes aimed at gatekeeping toward institutional support for thriving consumer and labor markets for services will require state legislative action and executive agency change in the face of politically organized interests of incumbent intrastate professional organizations and well-institutionalized state agencies. Reforms thus far have been circumscribed in most states that have enacted legislative changes to state occupational licensing regimes, and have proceeded unevenly across states, with half of the states representing more than three-quarters of U.S. GDP inactive. This institutional lag problem is acute in federalist contexts, where multiple jurisdictions must coordinate reforms simultaneously, suggesting that federal intervention might be expedient not to supplant state authority permanently, but to create conditions for more adaptive, responsive state-level institutions. We hope that future research will advance empirical and theoretical analysis of digital era federalism frameworks that recognize how de-spatializing technological change

requires new models of intergovernmental cooperation that preserve state (or other sub-national unit) expertise while ensuring national market coherence.

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NOTES

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- ¹ <https://lailluminator.com/2025/02/13/new-york-extradition/>
- ² Since we analyze U.S. state data, we refer throughout to “state” as a shorthand for U.S. state. Many observations and discussion points are relevant to subnational jurisdictions in other nations with federal systems.
- ³ Bureau of Transportation Statistics Freight Analysis Framework <https://www.bts.gov/faf> and Commodity Flow Survey <https://www.bts.gov/cfs>
- ⁴ <https://www.bea.gov/data/intl-trade-investment/international-trade-goods-and-services>
- ⁵ <https://apps.bea.gov/scb/issues/2020/10-october/1020-international-services.htm#updating>
- ⁶ Beginning with the 2023 reference year, the Business Expense Survey—previously conducted as part of the Service Annual Survey (SAS)—is now incorporated into the Annual Integrated Economic Survey (AIES). The first AIES data release covering 2023 is scheduled for summer 2025. As a result, only data through 2022 are currently available. SAS data up to 2022 can be found at <https://www.census.gov/programs-surveys/sas.html> while forthcoming AIES data will be published at <https://www.census.gov/programs-surveys/aies/data/tables.html>
- ⁷ For detailed information on data sources, methodology, and additional results, please contact the authors.
- ⁸ While we used comprehensive datasets obtained from ARC, publicly-available data are found at <https://www.careeronestop.org/Developers/Data/occupational-licenses.aspx>
- ⁹ Although submission dates varied across states, all states had provided data for the relevant year by the time of analysis, ensuring that such variation does not compromise the study’s findings.
- ¹⁰ Self-Employed, Unincorporated: BLS CPS Labor Force Statistics Table A-8 Employed Persons by Class of Worker and Part Time Status <https://www.bls.gov/webapps/legacy/cpsatab8.htm> and Table 16. Employed persons in nonagricultural industries by sex and class of worker <https://www.bls.gov/cps/cpsaat16.htm>; Sole Proprietors: US Census Economic Survey NonEmployer Statistics <https://data.census.gov/table/NONEMP2020.NS2000NONEMP?q=NONEMP2020.NS2000NONEMP>; Freelance Workers: Upwork Freelance Forward Survey 2022 <https://www.upwork.com/research/freelance-forward-2022>
- ¹¹ <https://www.bls.gov/cps/certifications-and-licenses-faqs.htm#questions>
- ¹² As not all SOC10 codes have an associated teleworkability indicator, we employ an iterative empirical approach based on the assumption that jobs within proximity in the sub-categories defined by the four, three, and two-digit SOC10 codes are likely to share similar teleworkability measures.
- ¹³ The matched observations represent occupationally licensed SOC10 codes for which OEWS data is available in the 2022 survey. Unmatched OEWS observations correspond to unlicensed SOC10 codes, while unmatched observations from licensed occupations are disregarded.
- ¹⁴ We utilize the 2023 Occupational Employment and Wage Statistics (OEWS) data for Colorado, as data quality issues associated with the state’s modernization of its unemployment insurance (UI) system precluded the use of the latest 2024 data.
- ¹⁵ With DC included, this difference is 7.1%.
- ¹⁶ Worker educational attainment data are from <https://lehd.ces.census.gov/data/qwi>.
- ¹⁷ For all state location quotient discussion, we relied on Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) 2 digit NAICS services sectors and selected 4 digit NAICS services subsectors location quotients based on average annual employment estimates at <https://www.bls.gov/oes/>.
- ¹⁸ U.S. Bureau of Economic Analysis Table 1.1.5. Gross Domestic Product (last accessed 07/22/2024).
- ¹⁹ After 2022, the Business Expense Survey—previously conducted as part of the Service Annual Survey (SAS)—was incorporated into the Annual Integrated Economic Survey (AIES). The first AIES data release covering 2023 postdated publication so that only data through 2022 are included. SAS data up to 2022 can be found at <https://www.census.gov/programs-surveys/sas.html> while forthcoming AIES data will be at <https://www.census.gov/programs-surveys/aies/data/tables.html>. For further detail on data and calculations, please contact the authors.
- ²⁰ <https://crsreports.congress.gov/product/pdf/IF/IF12347>
- ²¹ <https://www.fsmb.org/siteassets/advocacy/pdf/state-emergency-declarations-licensure-requirements-covid-19.pdf>
- ²² <https://telehealth.hhs.gov/licensure/licensure-compacts>
- ²³ Author’s calculations using U.S. Bureau of Economic Analysis 2024 state GDP estimates, <https://www.bea.gov/data/gdp/gdp-state>
- ²⁴ https://obamawhitehouse.archives.gov/sites/default/files/docs/licensing_report_final_nonembargo.pdf; <https://www.dol.gov/newsroom/releases/eta/eta20180625>; <https://www.whitehouse.gov/briefing-room/presidential->

[actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/;](https://www.ftc.gov/system/files/ftc_gov/pdf/memorandum-chairman-ferguson-re-labor-task-force-2025-02-26.pdf)
https://www.ftc.gov/system/files/ftc_gov/pdf/memorandum-chairman-ferguson-re-labor-task-force-2025-02-26.pdf

²⁵ Relevant Congressional Research Service reports: *Congress's Authority to Regulate Interstate Commerce* (IF11971, 2021), *Supreme Court Narrows Dormant Commerce Clause* (LSB11031, 2023), and *Constitution Analysis* (ArtI-S8-C3-6-4). Available at crsreports.congress.gov.

²⁶ Illinois, Maine, Michigan, Missouri, New York

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