Preliminary draft
Comments welcome

THE EFFECT OF URBANIZATION ON THE TECHNOLOGY OF GOVERNANCE

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Abstract

This paper examines the effect of urbanization on the technological adoption decisions by governments, using the choices made by US states over how the unemployed are able to apply for Unemployment Insurance (UI) benefits. Specifically, we test the extent to which the unemployed are able to apply for UI benefits on-line, or are instead required to apply in person. UI is a good example, because each state makes its own policy choices, although within a Federal programmatic umbrella. Further, the Federal government pays all administrative costs, thus the choices by states reflects either the demands by potential participants, or by the providers of UI the government workers themselves. We estimate the share of UI recipients that apply on-line as a function of urbanization, a measure of the importance of technical change to the state economy, and the urban environment of the providers of government services. We find, using panel data on states from 2000 to 2011, that both the demands by participants, and the influence on the suppliers of government services, both affect the speed of adoption.

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I. Introduction

To survive the congestion of cities, cities have to return benefits to their residents. These benefits are generally in the form of agglomeration economies, which can manifest themselves in a diverse variety of ways including from the speed of technological development to the variety in consumption possibilities. While the impact and speed of technological development on the business community has been widely studied (Henderson, 2000; Bertinelli and Black, 2004), our question in this paper is whether the impact on technological development has occurred in the provision of government services as well. Whether urbanization would affect the technological choices of governments, however, is not nearly as clear as it seems for business. Since governments generally focus on labor intensive service delivery functions such as refuse collection or education, it is difficult for them to evolve technologically. Further, the service delivery functions of government are exempt from many of the market forces that shape firm behavior. Finally, whether or not because of their monopolistic provision, governments are often perceived as not being particularly sensitive to the form of service delivery.

Conversely, to the extent governments are democratic, they should be expected to respond to the demands of their residents. Urban environments offer special challenges to governmental service delivery, both because congestion may make transportation more difficult, and because if residents are more exposed to advanced technologies they may expect their government to offer the equivalent flow of services. In this paper, we investigate this exact issue, by carefully examining service delivery in a single dimension, application for Unemployment Insurance (UI).

UI is interesting because every state has a separate UI program, although under a federal programmatic umbrella. The purpose of UI is to offer income insurance to workers that become unemployed due to "lack of demand."[2] Each state picks their own benefit schedule and eligibility criteria within broad federal parameters. Information on technical change comes from data on whether new recipients apply for UI benefits on-line, by telephone, or in the traditional manner of applying in person in a dedicated UI office. Our study therefore examines the extent to which state UI recipients apply in the traditional manner to individual bureaucrats within an office, or instead use a newer technological form.

The decision to allow recipients to apply in a non-traditional way reflects a reduced form, as state governments need to select whether to offer non-traditional options for UI application by developing the technological infrastructure, and potential recipients need to choose whether to use the newer forms of application or instead rely on the traditional form of personal contact with a bureaucrat. Our examination of the application process at the state level of aggregation encompasses both "supply" factors particular to each state as well as "demand" factors by potential recipients. The demand factors we consider include the level of urbanization within the state, as well as the dispersion of the urban population among the cities. If urbanization has the impact that it does on private technological

[2] There is wide variation in how states define "lack of demand" to determine UI eligibility, see Craig and Palumbo (1989). Our paper here does not address whether households would establish their own precautionary savings.

change, we will expect that it increases the demand to use the new technologies. Holding constant the extent of urbanization, if it is spread more widely across the state then it may increase demand for new application technologies more widely.

We also, however, explore to some extent the supply factors. In particular, the new technologies involve a lower labor component than the traditional form of using a government worker to collate and present the information from an applicant. On average, public sector unionization has been an important source of growth for unions, and union members would be expected to prefer a more labor intensive form of service delivery. Thus if union power is stronger, it might be expected that the transition to newer service technologies would be delayed. The other attribute we explore is whether the state capital city is large. Our hypothesis is that a larger capital city reflects either a larger, or larger in proportion to the private economy, government sector. In this case, and again only if government workers are more in favor of labor intensive technologies, it might be expected that new labor-saving technologies would be delayed.

While state governments are fully responsible for the financial aspects of the standard UI program, the federal government pays the entirety of the administrative costs. Thus the state governments really have no financial stake in the technology of program administration, because the federal government will pay all of the "allowable costs" including those for technological development. Thus the extent to which states choose to administer the program through traditional people in offices, or instead choose to deliver services via telephone or internet, is not subject to the desires of taxpayers. Thus while our basic empirical model is a reduced form, to the extent our supply variables representing the desires of government workers are not confounded by the demands of potential recipients, then we believe we can discern the demands of potential recipients net of the supply factors.

Our model of technological choice presents the share of applicants processed by new technologies as a function of both the level and extent of urbanization, and the supply factors of public unionization and the size of the capital city. Additionally we use variables that may affect the demand for newer information technologies, such as the number of high speed internet connections as well as the number of patents. Further, we include the standard demographic variables that may capture differences in how people view the prospect of using the newer information technologies compared to traditional services.

We estimate our model using panel data on states over time from the US Department of Labor, which administers the UI program, and using US Census data on urbanization. The effect of urbanization on economic growth has been explored in Henderson (2000), and in several works since. The idea of primacy is that the largest city in an economy (state) may be the driver of technological change. On the other hand, the alternative in our context is that all urban populations may be more sensitive to the potential gains from new technologies, and therefore that the dispersion of urban areas is more important for government adoption because these are the areas where demand is created.

Section II of the paper discusses the empirical specification, and Section III presents the data and discusses the data definition issues. The two attributes we desire to test are the extent to which population demand, or instead government willingness to provide, influences the adoption of technologies by the state governments. Section IV presents the results, which show the importance to the government of both the demands of potential recipients but also the incentives facing government provision. Specifically, we find that urbanization creates demand for technical change. Unlike in the private sector, however, we find using both our standard panel data model as well as a linear probability model that population in the largest city impedes technological adoption, because dispersion of the urban population is more important. Surprisingly, we find that one measure of technical change in the private sector, patents, impedes government adoption of technology. Whether this is due to a higher opportunity cost of resources to push technical change, or something more subtle in the industrial composition, is not known. Finally, we show that the supply elements are crucial- we find that public sector unionization as well as the size of the capital city all lead to a retardation of technical change in the government sector. The last estimated equation shows that none of these factors appears significant in explaining the resulting administrative cost of the UI program.

II. Model Specification

Application to the UI program is necessary for two reasons. The first is that the state government needs to understand the reason for the worker to be separated from their employment. While the details are important and vary substantially between each state, the essence of the UI program is to provide income support to workers that have lost their job due to “inadequate demand.” Eligibility also depends on the extent to which a worker is attached to the workforce, for example rules vary substantially between states for part-time work as well as depending on the length of employment. If a worker is determined to be eligible for UI, the second aspect of the UI program is to determine the level of income support for which the worker is eligible. This amount is paid per week for a set number of weeks, the maximum for standard UI is 26 weeks.[3] The level of weekly benefits depends on wages and other forms of compensation, and again the way that alternative compensation forms is treated varies substantially between states. All of these factors represent information that is necessary for UI program administration, and the difficulty in navigating the complexities of the program will affect a potential recipient's willingness to apply for UI with a person, or using impersonal technology.

Our model is a reduced form specification of the share of UI applicants that apply using new technologies compared to the traditional method of applying in person at a state operated office. For our purposes here we define the new technologies as being able to apply for UI either by phone, or by using the internet, which we will abbreviate by saying application is on-line. Clearly, the state government has to construct the infrastructure so that potential recipients can use the new technologies. Once this infrastructure is in place, the state government has the choice of whether to leave the traditional offices open, and in what locations. While we do not have the specific information to measure these separate decisions,

[3] The rules for extended and emergency Unemployment Insurance which extends benefits beyond 26 weeks are identical in terms of eligibility and weekly benefit amount. Differences are the share of UI paid by the federal government, and the allowable duration of the benefits.

we nonetheless have the result from these decisions, which is the share of recipients that apply for UI either in person, or using a newer technology. Thus:

$$Y_{s\,t} \;=\; \beta_1 \;Urban_{s\,t} \;+\; \beta_2 \;Supply \;+\; \beta_3 \;X_i \;+\; FE_{s\,t} \;+\; \varepsilon \qquad (1)$$

where Y is one of the three outcomes we examine for each state s at time t. We first use a linear probability model to examine the length of time before the new technologies are introduced. Second, we examine the intensity of use of the new technologies, as measured by the share of UI applicants that use the new information technologies. The final outcome we examine are the costs per capita to federal government for the total administrative costs. This step also includes separating the total cost into a fixed and a variable component.

The *Urban* variables include the share of the state population which live in urban areas. Additionally, we test for the influence of the dispersion of the city populations by constructing a Herfindahl index. Finally, we test for the influence of the largest city in the state by the share of the urban population which it contains. The *Supply* vector includes two measures, the share of the government workforce which is unionized, and the share of the urban population contained in the state's capital city. The X vector contains two variables which may indicate demand for the new information technologies such as the number of patents, and the number of high speed internet connections in each state. Additionally, the X vector contains state population demographics such as the share of the population under 18, the share over 65, the share in poverty, gross state product per capita, the percent White, the share of the adult population with at least a high school degree, a college degree, working in manufacturing, and the unemployment rate. Finally, we add fixed effects to all of our panel regressions for year and state.

How the state government makes the decision to allow on-line applications, or instead whether to offer traditional personal application, depends on a host of factors. As stated in the introduction, because 100% of the administrative costs are paid by the federal government, there are no financial incentives and thus taxpayers will be indifferent. Residential demands will matter, however, due to the perceived cost on the applicants. Application in person allows a government administrator to assist the applicant in presenting the information, including explaining the terms and the consequences of the answers. Application on-line, however, means that the applicant can apply without transportation to the government office, and without queuing which is a frequent consequence of in-person application. A final consequence of the new technologies is that the accuracy of the administrative result may change, but we leave this possibility to other work.[4]

In addition to the demands of potential UI recipients, the other determinant of the extent to which the state government allows the new or traditional technology may depend on the administrative structure itself. State government politicians face a trade-off when they decide to hire administrators for any program. On the one hand, they get expertise and discerning administration. On the other hand, the administrators may become advocates for a program because they have a stake in its size, and have the ability to manipulate the information available to the politicians. In this way, the administrators of the program who benefit may retard

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[4] See Craig and Hoang (2014), who find that the rate of UI benefit over-payment rises with on-line application.

the creation of new technologies if they perceive that the scope of employment possibilities may shrink. In the case of UI, the new technologies primarily involve an increase in demand for workers in the information technology sector, and a decrease in demand for workers that directly interact with potential recipients. It is probable that the government workers would also forecast lower overall governmental demand for labor, especially as is often the case the information technology work building the infrastructure is outsourced.

We therefore include two variables to capture the potential interest of government workers in technology provision. One is the share of the state government workforce that is unionized. The presumption is that unionization suggests government workers will have a larger influence on state government policy. To the extent unions desire a larger state government workforce, they will presumably advocate for a more labor intensive technology of government services, and thus will want to lower the speed and extent of on-line technologies. The other related variable we use is the relative population size of the state capital city, holding constant the degree of urbanization in the state. Again our presumption is that a larger capital city suggests a more powerful state government, and potentially at least a government that promotes a more labor intensive technology of service production.

The other aspects of technological development we include in our model are those that would be expected to impact private technological change. We model both the relative size of the urban economy, as well as its dispersion. The basic model is that urbanization will cause agglomeration economies, and one of those outcomes will be technical change. This might impact governmental technical change as well, to the extent that state governments face problems similar to those in the private sector. For example as firms learn how to acquire data on-line and to use that data to make administrative decisions, presumably governments could avail themselves of that technology more easily. Offsetting this possibility, however, is that as the private sector desires to push the technological boundaries more quickly and thoroughly, it may be more expensive and/or more difficult for state governments to acquire the resources to develop their own new technology, especially if the problems facing government are rather different than those facing private sector firms.

III. Data

The data for this project is a panel of all 50 US states over the period 2000 through 2011. The key piece of data for this project is of course the technology of UI applicants, and this data is available from the US Department of Labor (DOL). There are three possible technologies, in-person, telephone, and internet. Generally the phone application process was started before applicants could apply on-line, but we have chosen to aggregate these two technologies since both of them are a significant change from applications in-person. Further, the software for the two new technologies is related, and so the two decisions are not really independent.

The start period of 2000 was selected because the availability of the high speed internet subscription data from the Federal Communications Commission

(FCC) starts in the year 2000.[5] The Department of Labor (DOL) data on the three methods of UI application, in-person, telephone, and internet, starts in 1996. We have estimated our model back to 1996 without the connections data, and the results are virtually identical.

We utilize three variables that capture various aspects of urbanization. The first is simply the share of the population in each state that lives in an urban area, which comes from the US Census. The second is the relative population share of the largest city in the state, which captures the extent to which a single city is dominant. The final urban variable is meant to capture the degree to which government employees might influence demand for new technologies, the size of the capital city in the state. In many US states, the capital cities are quite small, in part originally to avoid domination by the center of a state's economy. Over time some of the capital cities grew quickly, while others have remained small. Whether or not the state government actions created the growth, we include the relative dominance of the capital cities by their share of the urban population of the state. A second variable related to the relative strength of the bureaucracy is the extent to which the public sector is unionized. These data are collected by Barry Hirsch (2001). The means of these variables, as well as the means for the socio-demographic data discussed below, are reported in Table 1.

The independent variables cover the demographic characteristics of the states, including the share of the population over 65, under 18, white, with a high school or higher degree, with a college or higher degree, that work in

[5] This data is also missing for Hawaii from 2000-2005, and for Wyoming in 2000. Thus our final model generally is estimated with 593 observations.

manufacturing, and that are unemployed. We also include the per capita Gross State Product. We add two variables to capture technology demand; the number of subscriptions to high speed internet service from the FCC, and the number of patents granted per year from the US Patent and Trademark Office. Both of these variables are meant to capture the familiarity with new technologies, and the extent to which demand exists for new technologies. They may further capture the ability to create new software technologies.

The administrative cost data are available from the DOL based on the federal grants to states for this purpose. We deflate the various years using the CPI to that they are all in 2011 dollars.

IV. Estimation Results

We estimate the effect of the urban environment on the technology of UI application by estimating three different specifications. First, we estimate a model showing the impact of urbanization on the decision to build an application infrastructure outside of the classic system of applying in-person at a state government UI office. Second, we estimate a model showing the extent to which the infrastructure is utilized by recipients, which depends on both where offices are open and the quality of the computer based infrastructure. Finally, we estimate a model showing the relative costs of the new technology.

Each model we estimate shows a slightly different aspect of how urbanization affects the choices over technology. All of the estimates are a reduced form, as the ultimate government decisions require an assessment of demand by potential recipients, as well as a decision about how the bureaucracy of the state government is impacted. The reduced form captures how the decisions depend on the interests of both the potential private sector employee demanders, as well as the interests of the current employees of the state government that will have their work change, or who could even end up with radically different responsibilities. As discussed earlier, however, the taxpayers are not generally affected as the federal government is responsible for the actual administrative cost outlays. The dichotomous variable estimation of the decision to begin to construct the new technologies might be expected to be different than the marginal decisions between using a created infrastructure and using the existing office network. In both cases the government workers are able to affect the decisions by potential recipients by affecting the ease by which the new technology can be used, and by how extensive is the existing network of office locations. The Federal government also can affect these trade-offs based on how administrative expenditures are approved.

The first results are presented in Table 2, which are linear probability estimates of how urbanization impacts the choice to initiate new application technologies in UI. There are four sets of variables which show different aspects in the reduced form decision undertaken by the state government. The first variable is the extent of urbanization itself, presented here as the share of the population in urban areas. This variable appears to have no net effect on the decision to initiate a new technology. The second variable is the relative impact of various attributes of the urbanization. The share of the urban population contained in the state's largest city is the primacy measure introduced by Henderson (2000). The related variable we have constructed is based on the Herfindahl index of cities, thus it represents the relative degree of dispersion of the urban population across cities. Only with both variables included, as shown in column (3), do they independently matter. We find that in both instances a less dispersed urban population (larger big city share or larger Herfindahl) leads to a slower adoption of the new technology. This finding is consistent with the expected political influence, that is, a more dispersed demand causes a higher share of legislators to be interested in the new technology. What is interesting about this finding is that it is different than in the private economy where political support is unnecessary for inventing new technologies (Henderson, 2000). A result in a similar vein is that the number of new patents issued in a state is seen to lead to a slower introduction of the new technology. This result is opposite to what is generally found in the private sector, and may be because of the competition for resources. On the other hand, this is a weak explanation because the state governments are not financially responsible for UI administrative costs.

The final urban variable we explore is also predicated on the political environment, but in this case we are trying to capture the relative importance of government bureaucrats. Specifically, we include the relative size of the state capital city, measured here as the share of the urban population in the capital. While not statistically significant at conventional levels, we nonetheless find that a larger capital city is associated with a slower adoption of new technology. An important attribute is that the new technology is less labor intensive than the traditional method of taking UI applications in person. Weak statistical support for the view that the demand for technology by the population has a marginal amount of influence can also be seen by the insignificant but positive coefficients for earlier adoption on the young, and on a more educated population.

Estimation results for the model showing how the new technology is used are presented in Table 3. These results are interesting for the spectrum of evidence they present to the theories that have been advanced on the determinants of technical change in the government sector. The left hand side variable is the share of UI applicants that use the newer technologies of telephone or internet. These choices will depend both on the interests of the applicants, but also the choices of the UI administrators such as the location and availability of UI staffed offices. First, we find that basic urbanization is important for the rate of technical usage by state governments. The resulting estimate is elastic, where an increase of 10% in the urban population share results in over a 14% increase in the share of the unemployed that apply on-line depending on the exact specification. This result may be seen as either an increase in familiarity with on-line applications, or as a consequence of the increased congestion costs of moving within a city. A final possibility is that the state government may be more likely to close UI offices in the cities, but if so this would be likely to be a consequence of the greater likelihood that urban populations would utilize the newer technologies.

The second result from the usage test for new technologies is that primacy, as captured by the population share of the largest city, is not found to have any independent effect. Instead, we present evidence that suggests it is the dispersion of the urban population across the state that creates demand for technical adoption by state government. That is, column (3) shows the two variables cannot be disentangled despite that they are individually significant as shown in the first two columns. Additionally, the Herfindahl variable does not depend solely on the large city population that is the Herfindahl index can change even if the largest city size were constant, though a change in the largest city size would affect the Herfindahl.

A factor additional to examining government demand, as opposed to private demand for technical adoption, is that the supply variables are found to be important. Specifically, the size of the state government capital, and the share of the government workforce that is unionized, are both found to slow adoption of technologies that go against the traditional labor-intensive application process. Finally, we find that the rate of technical adoption in the private sector, as indicated by the number of patents, is found to slow the rate of technical adoption by government. The exact channel by which the result is generated is not apparent in our work here. It seems unlikely to be costs, because the incidence of administrative costs is on the Federal government. It could be that private sector technological improvements are concentrated in the largest cities, in which case the government's disproportionate response to urban dispersion may result in a lower overall rate of technology adoption.

The final table of results we present are the administrative cost regressions. In some sense, finding a systematic pattern might be surprising since the incidence of costs is not on the state governments. On the other hand, if the size and dispersion of the urban population affects costs, we might be expected to see it here. Column (1) of Table 4 presents the regression showing how total costs are influenced by the urban structure. Aside from finding decreasing returns to scale, here total administrative costs per capita rise by 2% for each 10% increase in the unemployment rate, none of the variables we have tested show any definitive pattern.

We then disentangle administrative costs into a fixed and variable component. Specifically, we run a regression of total administrative costs on the number of UI recipients. We use the coefficient on recipients to calculate total variable costs, while the remainder we call fixed costs.[6] The rationale for doing this is that creating the new technology is likely to entail significant fixed costs, but the variable costs of using the new technology for UI applicants may be lower.

This disaggregation of costs shows that the fixed costs as calculated here do not show any pattern influenced by the degree of urbanization. On the other hand, we see that variable costs are responsive to several features of the state-wide demographic and urban landscape. Specifically, a more concentrated urban environment, as measured by the relative population size of the largest city in the state, is associated with higher variable costs per capita. That is, as the share of the urban population in the largest city rises, the per capita variable costs of the UI program rise. Our data cannot discern whether this is because of the effect of higher input prices, because a more dispersed urban population is less expensive, or whether it is because of the usage pattern.[7]

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[6] That is, $Y = \alpha_0 + \beta_1 \, UI\ Rec + FE_{st} + \delta$. The variable costs are $\beta_1 * UI\ Rec$ while the fixed costs are $\alpha_0 + \delta + FE_{st}$.

[7] When the Herfindahl and the largest city are entered into the regression separately, each are statistically significant. When combined, the result is the opposite of what we found for usage, that the largest city is significant.

The other result we find is that the relative population size of the capital city is associated with lower per capita variable costs. Since the population of the capital city of most states is rather small, one could view this result as consistent with the large city result. On the other hand, neither the Herfindahl index nor the overall urbanization rate are significant. Another possibility is that the size of the capital city reflects the size of the state government, as we assumed when discussing new technology usage, in which case we may be seeing that larger governments actually have efficiencies that are manifested in cost savings for more comprehensive service systems.

V. Summary and Conclusion

This paper examines whether urban areas are the spur to technological adoption by governments in the same way that they have been key to progress in the private sector. This is an interesting question, because in many ways it is more difficult to raise the productivity of service industries than it is to raise productivity in manufacturing (Baumol, 1969). We test the extent to which urbanization has affected the adoption of new technologies for a specific service by state governments, in particular the technology by which people apply for UI. UI is an excellent example, because adoption of new technologies are choices by the state government agency in charge of UI, and which have no financial consequence to state governments because the federal government pays 100% of the administrative cost of the UI program. Thus the choice of technology by the state reflects two primary forces, the demand by those likely to use the service, and the supply by the bureaucratic structure of the state.

Using a panel data set of UI states over the recent period, we find that urbanization leads to increases in both the speed of technological adoption as well as the intensity by which it is used. Despite this finding, we surprisingly do not find that aspects which have been found to influence technology adoption elsewhere are important. That is, we generally do not find that neither the number of high speed internet connections, nor the number of patents issued in a state impact the speed or extent of technological adoption. What we do find has influence, in stark contrast to the private sector, is that the relative influence of the state government bureaucracy is important. That is, larger state capital cities, as well as greater public sector unionization, are found to lead to slower adoption and utilization of the newer technologies. That is, the traditional system consists of a UI applicant going to a state-run UI office and applying in-person has created a constituency for providing this service in this way, and newer technologies must overcome this barrier before they are adopted. Given the potential intensity of bureaucratic control, in some senses it is surprising that the new technologies have evolved at all. Thus US state governments show a resilience that might be surprising given the traditional view that bureaucracies are not connected to the people they serve.

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Table 1: Data Means, 2000-2011

LHS Variables	Mean	Std
%Office UI Claims	21.8	32.2
%Internet+Telelphone Claims	69.6	37.2
Total UI Administrative Cost per capita	12.7	9.1
Variable UI Admin Cost per capita	3.9	1.5
Fixed UI Admin Cost per capita	11.8	5.8
RHS Variables	**Mean**	**Std**
Patents	1,987	3,500
High Speed Connection Per Capita (Subscriptions)	0.28	0.24
Urbanization Rate	72.7	14.6
Share of Largest City Population in Urban Population	27.6	17.0
Herfindahl Index	0.15	0.14
Share of Capital City Population in Urban Population	12.9	12.0
%Public Sector Union Workers	33.3	17.8
Share of Manufacturer Workers	10.4	4.1
Unemployment Rate	5.7	2.1
GSP per capita	47,701	9,705
Poverty Rate	12.3	3.2
Share of the population under 18 in total population	25.0	1.8
Share of the population over 64 in total population	12.7	1.8
Share of the population white in total population	75.6	15.5
Share of the population with a college degree in total population	19.0	3.9
Share of the population with a high school degree in total population at least 25 years old	87.2	3.8

Notes: Monetary variables are deflated using the CPI (2011=100).

TABLE 2: DICHOTOMOUS CHOICE FOR NEW TECHNOLOGY

Ln(Indep Var)	internet+telephone=1 0 otherwise	internet+telephone=1 0 otherwise	internet+telephone=1 0 otherwise
Patents	-0.10*	-0.11*	-0.09
	(0.06)	(0.06)	(0.06)
Connections	0.09	0.09	0.09
	(0.06)	(0.06)	(0.06)
Urban	-0.38	-0.40	-1.16
	(0.73)	(0.76)	(0.85)
Big City Share	-0.21		-1.43***
	(0.20)		(0.50)
City Herfindahl		0.00	1.59***
		(0.24)	(0.57)
Capital City Share	-0.50*	-0.47	-0.47
	(0.30)	(0.29)	(0.29)
Public Unions	-0.03	-0.03	-0.05
	(0.08)	(0.08)	(0.08)
% Manuf Workers	-0.15	-0.12	-0.15
	(0.22)	(0.22)	(0.22)
% Unemploy	0.11	0.10	0.10
	(0.10)	(0.10)	(0.10)
GSP per capita	0.07	0.06	-0.05
	(0.17)	(0.17)	(0.16)
% Poverty	0.02	0.02	0.04
	(0.07)	(0.07)	(0.07)
% Young	0.35	0.34	0.37
	(0.28)	(0.29)	(0.29)
% Old	0.10	0.11	0.11
	(0.16)	(0.16)	(0.16)
% White	-0.33	-0.29	-0.22
	(0.23)	(0.23)	(0.23)
% College	-0.14	-0.13	-0.12
	(0.19)	(0.19)	(0.19)
% HS	1.27*	1.35*	1.07
	(0.72)	(0.72)	(0.73)
Observations	593	593	593
R-squared	0.28	0.28	0.29
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is zero before any ability to apply for UI by telephone or on-line; one after such a possibility. The alternative is in-person. Data is by state for 2000-2011. Robust standard errors in parentheses.

Table 3: Share of UI Applications Via New Technologies

Ln(Indep Var)	Ln (%UI Internet + Telephone Claims)	Ln (%UI Internet + Telephone Claims)	Ln (%UI Internet + Telephone Claims)
Patents	-0.12**	-0.13**	-0.13**
	(0.05)	(0.05)	(0.05)
Connections	-0.01	-0.01	-0.01
	(0.04)	(0.04)	(0.04)
% of Pop Urban	1.44**	1.84***	1.67**
	(0.57)	(0.58)	(0.65)
Big City Share	-0.69***		-0.32
	(0.18)		(0.44)
City Herfindahl		-0.84***	-0.48
		(0.20)	(0.53)
Capital City Share	-0.60**	-0.61***	-0.61***
	(0.24)	(0.23)	(0.23)
Public Unions	-0.18***	-0.17***	-0.18***
	(0.06)	(0.06)	(0.06)
% Manuf Workers	-0.32*	-0.31*	-0.32*
	(0.16)	(0.16)	(0.16)
% Unemploy	0.02	0.03	0.03
	(0.07)	(0.07)	(0.07)
GSP per capita	-0.19	-0.13	-0.16
	(0.18)	(0.18)	(0.18)
% Poverty	-0.10	-0.11	-0.10
	(0.07)	(0.07)	(0.07)
% Young	0.45	0.44	0.44
	(0.28)	(0.28)	(0.28)
% Old	0.11	0.10	0.10
	(0.18)	(0.18)	(0.18)
% White	-0.03	-0.07	-0.06
	(0.24)	(0.24)	(0.24)
% College	-0.12	-0.13	-0.12
	(0.14)	(0.14)	(0.14)
% HS	0.24	0.36	0.30
	(0.60)	(0.60)	(0.61)
Observations	593	593	593
R-squared	0.67	0.67	0.67
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Notes:
Data is by state for 2000-2011.
Robust standard errors in parentheses.

TABLE 4: EFFECTS ON TOTAL, FIXED, AND VARIABLE ADMINISTRATIVE COSTS

Ln(Indep Var)	Ln (Tot UI Admin) Cost)	Ln (Tot UI Admin Cost)	Ln (UI Fixed Cost)	Ln (UI Variable Cost)
%Office Claims	-0.02	-0.02	-0.19	-0.06
	(0.03)	(0.03)	(0.14)	(0.04)
Patents	0.01	0.01	-0.14	-0.04
	(0.04)	(0.03)	(0.16)	(0.05)
Connections	-0.00	0.01	0.08	-0.04
	(0.02)	(0.02)	(0.07)	(0.03)
% of Pop Urban	0.36	0.64	0.69	-0.47
	(0.91)	(0.90)	(1.69)	(0.62)
Big City Share	0.39	0.39	0.12	0.88*
	(0.62)	(0.60)	(1.61)	(0.49)
City Herfindahl	-0.52	-0.58	0.03	-0.41
	(0.63)	(0.62)	(2.61)	(0.44)
Capital City Shr	-0.01	0.03	0.38	-0.79***
	(0.19)	(0.18)	(0.53)	(0.24)
Public Unions	0.01	0.00	-0.22	0.01
	(0.06)	(0.06)	(0.23)	(0.05)
% Manuf Wrkers	-0.24*	-0.17	0.93	-0.13
	(0.12)	(0.12)	(0.62)	(0.15)
% Unemploy		0.19***	-0.11	0.51***
		(0.05)	(0.32)	(0.08)
GSP per capita	0.24	0.44	-1.64	0.54**
	(0.27)	(0.28)	(1.44)	(0.22)
% Poverty	-0.00	-0.05	-0.16	-0.09*
	(0.05)	(0.05)	(0.15)	(0.05)
% Young	0.13	0.21	-0.48	-0.58**
	(0.36)	(0.36)	(0.94)	(0.25)
% Old	-0.07	-0.07	1.24	-0.27
	(0.18)	(0.16)	(1.22)	(0.32)
% White	0.13	-0.14	2.18	-0.17
	(0.34)	(0.35)	(1.96)	(0.26)
% College	0.01	0.03	-0.25	0.33***
	(0.09)	(0.09)	(0.30)	(0.09)
% HS	-0.56	-0.57	0.71	-0.83*
	(0.44)	(0.43)	(1.46)	(0.44)
Observations	593	593	593	593
R-squared	0.99	0.99	0.08	0.99
State Fixed Effs	Yes	Yes	Yes	Yes
Year Fixed Effs	Yes	Yes	Yes	Yes

Robust standard errors in parentheses.