Blue Laws*

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Abstract

This paper investigates the economics of ”blue laws” or restrictions on shop-opening hours, usually imposed on Sunday trading. In the presence of communal leisure or ”ruinous competition” externalities, retail regulations can have real effects in a simple general equilibrium model. We look for these effects in a panel of US states and in individual CPS data in the period 1969-1993. We find that blue laws 1) significantly reduce employment both inside and outside the retail sector, 2) have little effect on relative annual compensation and labor productivity and 3) do not significantly affect retail prices. Employment reduction appears to come at the cost of part-time employment.

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1 Introduction

Most cultural and religious traditions have holidays and weekly days of rest to allow for leisure, family activities, or scholarly contemplation. While it is easy to think of economic reasons why God might have commanded us to stop working from time to time, it is not clear why He commanded us all to rest at the *same* time.[1] Indeed, standard models generally tell us little about *when* leisure should be enjoyed. On the one hand, it is evidently desirable to coordinate leisure with our fellow humans; positive externalities can arise from resting or enjoying free time collectively. This external effect may apply to members of an immediate family as well as to a community or nation at large. At the same time, negative externalities may result from coordinated leisure or synchronized economic activity. Anyone who has visited Central Park or the Jardin du Luxembourg on a sunny weekend can appreciate this claim.

The dilemma of coordination applies most acutely to retail trade and other consumer service sectors: almost by definition, these activities require some to work while others do not.[2] While the desynchronization of retail hours and production schedules reduces congestion in stores, it does so at the cost of reduced coordination of leisure, posing elements of potential conflict in society. More generally, the recent acceleration of the trend towards a service economy necessarily implies that some must work while others consume or enjoy leisure.

The coordination of leisure time as a public policy concern is the subject of the current paper. As a particular example, we investigate the theoretical rationale and empirical effects of so-called "blue laws" or restrictions on shop opening hours, usually imposed on Sunday trading, but also on evening trading in a number of European countries.[3] Although these laws have been abolished in many US jurisdictions over the past three decades, they remain on the books of a number of states in some form. In Canada and many European countries, these regulations retain greater legal importance and are considered relevant

[1]Similarly, it is difficult to explain the existence of the weekend, which unlike days, months and years, has no basis in solar or lunar cycles, yet evidently coordinates activity all over the world. For an exposition of the origins of the weekend, see Rybczynski (1991).

[2]In the case of retail, goods themselves can be stored and held at home while shops are closed; but the provision, marketing and sale of goods – the primary activities of the retail sector – cannot.

[3]According to Laband and Heinbuch (1987), the origin of the term "blue laws" is ambiguous. According to one source, the first codification New Haven Colony's laws appeared on blue-colored paper; another account links "blue" to the strictness of devotion with which these laws were observed by North American Puritans.

for the policy debate concerning unemployment and job creation. The issue is also relevant in the United States, where discussion of whether “quality time“ is possible in two-earner families has once again surfaced.[4]

While the regulation of shop opening times may enjoy support of the public, it has costs in terms of productive efficiency: a store forced to close earlier suffers from excess capacity, since real capital assets (floor space, inventory, check out counters, cash) are not fully utilized. Opening-hour regulations are widely suspected of repressing the development, if not the absolute level, of output and employment in retail trade, banking and other personal service sectors. They may affect the labor force participation of females by restricting the availability of part-time jobs. These efficiency losses must therefore be balanced against the putative advantages of coordinated leisure and other public policy objectives.

To evaluate these issues, we construct a simple general equilibrium model with an explicit retail sector in which consumers value ”communal” or *social* leisure (i.e., free time they spend with others) differently from *solitary* leisure. This introduces a shared leisure externality among economic agents which can serve as the rationale for the existence of blue laws. On the production side, we formalize the idea that blue laws might affect the technology of providing retail services in the form of a Marshallian congestion externality, in which longer opening hours result in ”wasteful competition” by attenuating the average productivity of the representative retailer. Our model thus allows for both positive (synchronization) and negative (congestion) effects of blue laws. In the context of that model, we explore the effects of shop-closing regulation on variables such as hours, relative prices, wages, and output in retail and manufacturing. While we do not address welfare explicitly, we are able to point out the costs of such regulation in terms of jobs, output, and other observable variables, with which any putative gains from blue laws can be compared.

Using a unique data set of US states for the period 1969-93, we estimate the effect of state shop-closing laws to relative employment, compensation, productivity, prices, value added and other variables. The large number of states, time periods, and law changes in the US allow estimation of the economic effects of liberalization with more precision than when done with a single country. This exercise is thus less feasible for the economies of Europe, which have

[4]Putnam (1995) has invoked the image of ”bowling alone” to describe the secular decline of communal and social activities conducted jointly with others. Among others, one reason for the deterioration of social capital could be the increasing costliness of coordinating individuals’ time schedules.

either rarely changed their laws or done so only recently. The exercise is complicated by the predictions of the model: if blue laws are implemented in the public interest, then they will not be exogenous in an equation predicting their effects on observable outcomes. The careful choice of instruments enables us to avoid, in theory at least, simultaneous equation bias.

The paper is organized as follows. Section 2 presents our model of coordinated leisure, which we use in Section 3 to analyze the economic effects of blue laws. The model's predictions is confronted with US data in Section 4 and these results are then discussed in the context of existing work on the subject. The conclusion summarizes and outlines directions for future research.

2 A model of coordinated leisure

This section formulates the foundations of a theory of blue laws in the context of a simple general equilibrium model. The effect of blue laws derives from two externalities: coordinated leisure and retail congestion. This highly stylized model is a metaphor for the asynchronization of work and leisure time which occurs among economic agents as well as "ruinous competition" stemming from search externalities among retailers. First, we examine optimal labor supply and consumption choice of households. We then turn to the firms' profit maximization problem, and characterize the regulated competitive equilibrium.

2.1 Households, preferences and the structure of time

Consider an economy comprised of two types of households. The first type, manufacturing families (M-households), work in the manufacturing sector and produce a single, nondurable intermediate good Y. The second type, retail families (R-households) are in the business of retailing the output of the manufacturing sector to the entire economy, i.e., of transforming the intermediate good into a consumption good denoted by C. For simplicity, we assume that families cannot choose whether to be manufacturers or retailers. The family type can thought of as representing a specific and observable ability at birth: some people are just born manufacturers, and others are born retailers. Consumers, however, are identical within families.

Economic activity takes place during the unit interval [0,1]. To focus attention on one particular equilibrium, we assume that production of the manu-

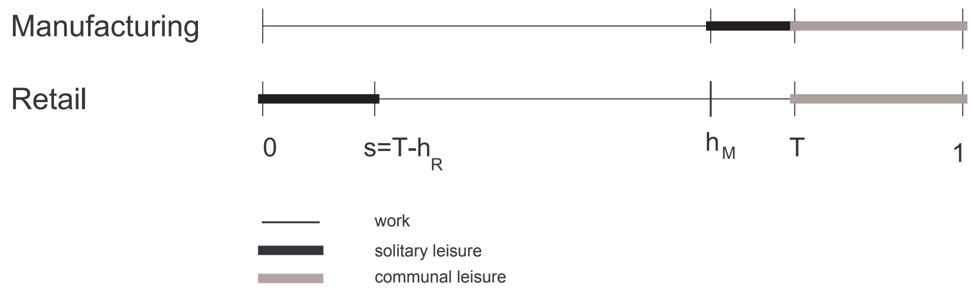

Figure 1: Retail and manufacturing hours

facturing good begins daily at time 0; consequently, M-households choose only the *length* of the workday h^M, and not its starting time. R-households, in contrast, can freely choose the starting time s of their working day as well as their shift length h^R.[5] They face, however, a regulatory constraint (a "blue law") stipulating that shops must close precisely at time $T \in (0,1]$ (e.g. at 8:00 pm or on Sundays), so that retailers face the constraint $s + h^R = T$.[6] The structure of time is summarized in Figure 1.

Manufacturing and retail families are assumed to have the same preferences. The utility of a family of type $i = M, R$ is given by

$$\phi U(C^i) + V(\mathscr{L}^i),$$

where U and V are increasing and concave functions,[7] $\phi > 0$ is a parameter which will be used to shift the taste for the consumption good, C^i is consumption of the retailed good, and $\mathscr{L}^i$ is an aggregate of *solitary* leisure ℓ_s^i and of *common* leisure ℓ_c^i defined by

$$\mathscr{L}^i = \mathscr{L}(\ell_s^i, \ell_c^i). \tag{2.1}$$

The distinction we are making between two types of leisure is novel, and is designed to capture in a stylized way the idea that agents might value the syn-

[5]This important distinction has been stressed by Clemenz (1990), Stehn (1987), and Inderst and Irmen (2005) in their discussions of liberalizing shop-closing regulations. For a treatment of related issues in the context of production externalities, see Weiss (1996).

[6]More realistically, closing times could be modelled as the latest possible time a store may be open, leaving open the possibility of non-binding blue laws. This modification would however add little and unduly complicate the analysis.

[7]Separability is assumed for simplicity; it is also consistent with balanced growth paths.

chronization of leisure. People might enjoy differently time spent on an empty and on a crowded beach; they might prefer going to the movies with others than alone. In our model, we envisage the possibility that consumers might value idle time which they spend with people of their own type differently than the free time they spend with families of the other type. By a slight abuse of language, we denote call the two types of leisure as solitary and common, with the understanding that solitary leisure refers in our model to leisure time spent with one's own type, and common leisure is idle time spent with the other type of household. In the absence of blue laws, the taste for common leisure introduces through preferences an externality in private consumption/leisure decisions.

Consistent with the balanced growth literature, we assume that

$$U(C) = \log C. \tag{2.2}$$

As we will see discuss below, this specification makes labor supply in both sectors wage inelastic in our model. This simplification enables us to focus more sharply on the effects of leisure coordination by eliminating differences that otherwise would stem from unequal wages across sectors.[8] Furthermore, to rule out corner solutions, we assume the usual Inada condition: $V'(0) = +\infty$.

The leisure aggregator function $\mathscr{L}(\cdot,\cdot)$ is increasing and concave in each of its arguments, and we assume that $\mathscr{L}(\cdot,\cdot)$ exhibits constant returns to scale. The reason for this specification is that it is required to nest within our framework the standard consumption/leisure choice model, since the latter obtains in the special case $\mathscr{L}(\ell_s, \ell_c) = a\ell_s + b\ell_c$ with $a, b > 0$ which exhibits constant returns to scale.

We assume that, while retail workers can shop on the job, manufacturing household must shop *after* they stop working and *before* retailers close. This ensures that M-households always choose, given T, a shift length $h^M < T$.[9] Thus the period between closing time h^M in manufacturing and closing time T in retail constitutes solitary leisure by manufacturing families. Furthermore, retail workers are assumed to be able to shop on the job. Finally, we assume that both households face fixed costs of going to work that are large enough to guarantee that they work a solid block of time rather than disconnected shifts throughout the day.

[8] The appendix briefly characterizes the elastic case.

[9] Their consumption would otherwise be zero, which cannot be optimal under our specification for $U(\cdot)$ since the marginal utility of zero consumption is infinite.

The resulting structure of days for manufacturing and retail workers is depicted in Figure 1. Factories open at time 0 and close at time h^M, so that manufacturers work h^M units of time. Retail stores open at time $T - h^R$ just after factories do, and close at time $T > h^M$ (i.e., right after factories close), so that retailers work h^R hours. Leisure for each family decomposes into common and solitary time according to

$$\ell_s^M = T - h^M,$$
$$\ell_s^R = T - h^R,$$
$$\ell_c^M = \ell_c^R = 1 - T.$$

Solitary leisure, common leisure and hours worked of course sum to 1 (the normalized length of a period) in each sector:

$$\ell_s^i + \ell_c^i + h^i = 1. \tag{2.3}$$

The optimal choice of work consumption and work schedules for an household of type $i \in \{M, R\}$ is thus:

$$\max_{C^i, h^i} \phi \log C^i + V[\mathscr{L}(T - h^i, 1 - T)].$$

such that

$$pC^i = w^i h^i,$$
$$C^i \geq 0,$$
$$0 \leq h^i \leq T,$$

where p is the price of the final good (choosing the intermediate good as numéraire), and w^i is the (intermediate good) wage rate in sector i. The first-order condition for an interior solution[10] is

$$\phi / h^i = V'[\mathscr{L}(T - h^i, 1 - T)]\mathscr{L}_s(T - h^i, 1 - T), \tag{2.4}$$

for $i = M, R$, where $\mathscr{L}_s$ denotes the derivative of the leisure aggregator function with respect to its first argument, i.e., with respect to solitary leisure. Equation (2.4) implies that

$$h^M = h^R = h. \tag{2.5}$$

[10] Inada conditions ensure that inequality conditions are never binding, and that the solutions are interior.

The equality of optimal hours across the two sectors stems from the assumption that agents have the same preferences, and from restriction (2.2) which ensures, by making labor supply wage inelastic, that differing wages in manufacturing and retail do not drive hours apart.

Equation (2.4) implies that hours h are a function of the taste parameter ϕ and of the mandated closing time T. Given our assumptions on V and ℓ, it is straightforward to show that a stronger taste for the consumption good always leads consumers to work more. However, a relaxation in the mandated retail closing time (a higher T) has differing effects on hours worked depending on the degree of substitutability between the two types of leisure in the aggregator ℓ. We postpone a discussion of these effects to the next section which explores the equilibrium effects of blue laws.

2.2 Firms

We now turn to the production side of the economy, and describe how manufacturing and retail firms operate.

2.2.1 Manufacturing

Manufacturing firms produce an intermediate (raw) good that is transformed by the retail sector into the final good consumed by our households. The manufacturing good Y is produced competitively with labor according to the linear technology

$$Y = h^M. \tag{2.6}$$

This linear technology implies that the wage rate in manufacturing, expressed in unit of the intermediate good, is constant and equal to 1:

$$w^M = 1.$$

2.2.2 Retail

The retail good C is produced competitively by combining the manufacturing good Y and labor according to a production function that exhibits *private* constant returns to scale in the intermediate good and hours:

$$C = Ah^R f(Y/h^R), \tag{2.7}$$

where $A > 0$ is a multiplicative productivity term taken by the individual firm as given, and $f(\cdot)$ represents the production function in intensive form, with $f' > 0$ and $f'' < 0$. Y can be thought of as inventories, or unpackaged and unretailed output. The decreasing marginal returns assumption captures the notion that more goods in the shops become increasingly difficult to sell without additional manpower, while low inventories with too many shopkeepers also result in low levels of service and value added per worker.

Firms maximize profits (in units of the manufacturing good numéraire)

$$pAh^R f(Y/h^R) - Y - w^R h^R.$$

The first-order condition for competitive profit maximization is thus

$$pAf'(Y/h^R) = 1. \tag{2.8}$$

Since returns to scale are constant from the point of view of the firm, and because of perfect competition, the wage rate in retail is the excess of output per retail hour over factor payments to the manufacturing good input:

$$w^R = p[Af(Y/h^R) - (Y/h^R)f'(Y/h^R)]. \tag{2.9}$$

While total factor productivity A is taken as given by individual retailing firms, we allow for the possibility that it may depend *negatively* on the actions of other agents in equilibrium via a Marshallian externality:

$$A = A(H^R), \qquad A' \leq 0. \tag{2.10}$$

where H^R represents the *average* number of hours worked in retail. We adopt this specification in order to formalize and explore implications of the idea, advanced most frequently by critics of deregulation, that longer opening hours in retail are counterproductive and attenuate productivity in that sector. More specifically, this externality is meant to capture "business poaching" or "ruinous competition" which might arise from an inelastic supply of customers to the retail sector. For instance, we may think that A stands for the probability of making a successful contact with a customer. If the pool of customers is fixed but stores can vary opening hours, or more generally their search intensity, then A will depend negatively on the activity levels of all other retailers, holding own activity constant.[11]

[11]This "business-poaching" effect can be thought of as a congestion-type externality found in matching and search models. See Diamond (1982), Pissarides (1991).

2.3 Equilibrium

We have shown above that, because we have specified labor supply to be wage inelastic, hours are equal to h in both manufacturing and in retailing. Labor market clearing, together with equations (2.5) and (2.6), then implies that equilibrium manufacturing output is

$$Y = h. \tag{2.11}$$

Moreover, since all retail firms are identical, $H^R = h^R$ in equilibrium. As a result, using equations (2.5), (2.7) and (2.10), equilibrium retail output and consumption are equal to

$$C = hA(h)f(1), \tag{2.12}$$

while the equilibrium retail price and wage satisfy, from equations (2.5), (2.8), (2.9) and (2.10),

$$p = \frac{1}{A(h)f'(1)}, \tag{2.13}$$

$$w^R = \frac{f(1) - f'(1)}{f'(1)}. \tag{2.14}$$

The price of retail output thus depends negatively on hours, due to the congestion externality, while the retail wage rate in terms of the numeraire is constant and does not depend on the taste shifter ϕ or on blue laws T.[12]

3 The economic effects of blue laws

In the model of the previous section, blue laws deprive consumers of choice over the amount of communal leisure they can take. In doing so, they remove the preference-based leisure coordination externality. Our objective in this paper is however not to study the welfare case for blue laws or to characterize optimal blue laws. Instead, we wish to confront with the data the theoretical predictions our model makes about the effects of a relaxation of blue laws on hours, consumption and the price of the final good.

[12] If hours were wage elastic and differed across sectors, the equilibrium p and w^R would also depend on the input ratio $Y/h^R = h^M/h^R$ which would be affected in equilibrium by a change in ϕ or T. The direction of this effect is ambiguous.

3.1 Hours

We have argued in the previous section that a relaxation of the mandated retail closing time (an increase in T) which reduces common leisure ℓ_c, has differing effects on hours worked depending on the degree of substitutability between the two types of leisure in the leisure index ℓ.

Intuitively, the reduction in common leisure entailed by a postponement of the retail closing time induces workers to reduce solitary leisure if solitary and common leisure are *complements*. Since $h = T - \ell_s$, this reduces hours.[13] By contrast, when solitary leisure if solitary and common leisure are close *substitutes*, an increase in T, which reduces common leisure, raises solitary leisure. The magnitude of that increase depends on how valued common leisure is relative to solitary leisure. If it is not very valuable, ℓ_s only needs to rise a little to substitute for the fall in ℓ_c, so that $h = T - \ell_s$ rises. If instead common leisure is valuable relative to solitary leisure, ℓ_s must rise a lot to compensate for the decline in ℓ_c, so that hours $h = T - \ell_s$ rise.

To formalize this reasoning, it is useful to log-differentiate the first-order condition (2.4). This yields:

$$\hat{\phi} - \hat{h} = -\nu\hat{\mathscr{L}} + \hat{\mathscr{L}}_s, \tag{3.1}$$

where $\hat{x} \equiv d\ln x/dx = dx/x$ denotes the log-differential of a variable x; $\mathscr{L}$ and $\mathscr{L}_s$ are shorthand, respectively, for $\mathscr{L}(T-h, 1-T)$ and $\mathscr{L}_s(T-h, 1-T)$; and

$$\nu = -\frac{V''(\mathscr{L})\mathscr{L}}{V'(\mathscr{L})} > 0 \tag{3.2}$$

is the Arrow-Pratt measure of concavity of the utility derived from the leisure index (i.e., the elasticity of marginal utility).

The appendix establishes that constant returns to scale of the leisure aggregator ℓ implies that

$$\hat{\mathscr{L}} = \lambda\hat{\ell}_s + (1-\lambda)\hat{\ell}_c, \tag{3.3}$$

while

$$\hat{\mathscr{L}}_s = -\frac{1-\lambda}{\rho}(\hat{\ell}_s - \hat{\ell}_c), \tag{3.4}$$

where $\lambda \in (0,1)$ is the *elasticity of the leisure aggregator* with respect to solitary leisure, and $\rho > 0$ denotes the *elasticity of substitution between solitary and common leisure* in the leisure aggregator.[14]

[13] T rises and ℓ_s falls.

[14] The former is a constant if $\mathscr{L}(\cdot,\cdot)$ is Cobb-Douglas, and the latter is constant if $\ell(\cdot,\cdot)$ is CES.

Using these two implications of constant returns to scale, we can rewrite the first-order condition (3.1) as

$$\hat{\phi} - \hat{h} = -\nu[\lambda\hat{\ell}_s + (1-\lambda)\hat{\ell}_c] - \frac{1-\lambda}{\rho}(\hat{\ell}_s - \hat{\ell}_c). \tag{3.5}$$

To complete the characterization of the consumer optimum, we need to log-differentiate the time budget constraint (2.3) to obtain

$$\ell_s\hat{\ell}_s + \ell_c\hat{\ell}_c + \ell_h\hat{h} = 0. \tag{3.6}$$

Equations (3.5) and (3.6) constitute a system of two linear equations in two unknowns $\hat{\ell}_s$ and $\hat{h}$. Its solution depends on the taste shock $\hat{\phi}$ and on changes in the blue law which can be measured directly by $\hat{T}$ or indirectly by $\hat{\ell}_c = -(1-T)^{-1}\hat{T}$. Thus, a relaxation of the blue laws, which forces retail stores to stay open longer ($\hat{T} > 0$), amounts to a mandated decrease in common leisure ($\hat{\ell}_c < 0$).

The appendix provides a detailed solution of equations (3.5) and (3.6). It confirms our intuition about the elasticities of solitary leisure and hours with respect to the taste parameter and the blue law:

- Given blue laws, an increase in the taste for the consumption good always reduces solitary leisure and raises hours: $\partial\hat{\ell}_s/\partial\hat{\phi} < 0$ and $\partial\hat{h}/\partial\hat{\phi} > 0$ for all parameter values.

- When the elasticity of substitution between solitary and common leisure is low, a decrease in common leisure lowers solitary leisure and raises hours: $\partial\hat{\ell}_s/\partial\hat{T} < 0$ and $\partial\hat{h}/\partial\hat{T} > 0$ when ρ is close to zero.

- When the elasticity of substitution between solitary and common leisure is high, a reduction in common leisure raises solitary leisure: $\partial\hat{\ell}_s/\partial\hat{T} > 0$ when $\rho \to +\infty$. The effect on hours depends, however, on λ, the elasticity of the leisure aggregator with respect to solitary leisure which measures how valuable solitary leisure is (or, equivalently since ℓ exhibits constant returns to scale, how little consumers care about common leisure):

  - When common leisure is not very valuable to consumers relative to solitary leisure (λ large), ℓ_s rises little to substitute for the fall in ℓ_c, so that hours rise: $\partial\hat{h}/\partial\hat{T} > 0$ when $\rho \to +\infty$ and $\lambda \to 1$.

- When common leisure is very valuable to consumers relative to solitary leisure (λ small), ℓ_s rises a lot to substitute for the fall in ℓ_c, so that hours fall: $\partial\hat{h}/\partial\hat{T} < 0$ when $\rho \to +\infty$ and $\lambda \to 0$.

These results are collected in Table 3.1.

	$\partial\hat{\ell}_s/\partial\hat{\phi}$	$\partial\hat{h}/\partial\hat{\phi}$	$\partial\hat{\ell}_s/\partial\hat{T}$	$\partial\hat{h}/\partial\hat{T}$
$\rho = 0$	$-$	$+$	$-$	$+$
$\rho = +\infty$, $\lambda \to 1$	$-$	$+$	$+$	$+$
$\rho = +\infty$, $\lambda \to 0$	$-$	$+$	$+$	$-$

Table 1: Effects on solitary leisure and hours of a taste shock and of a change in blue laws

To summarize, we can say that a relaxation of blue laws lowers solitary leisure unless solitary and common leisure are close substitutes, and that it raises hours unless solitary and common leisure are close substitutes *and* the elasticity of the leisure index with respect to solitary leisure is small.[15]

3.2 Consumption and price of the final good

Thanks to our simplifying assumption (2.2) that makes hours wage-inelastic and equal to each other across the two sectors, the elasticities of Y, C and p with respect to hours are easy to sign. Using equations (2.11), (2.12), (2.13), (2.14), we find that

$$\hat{Y} = \hat{h}, \tag{3.7}$$

$$\hat{C} = (1-\alpha)\hat{h}, \tag{3.8}$$

$$\hat{p} = \alpha\hat{h}, \tag{3.9}$$

where

$$\alpha = -\frac{A'(h)h}{h} \geq 0.$$

is the negative of elasticity of the business poaching externality with respect to hours, i.e., a measure of the strength of the (negative) business-poaching retail externality. Hence intermediate output depends positively on hours. Retail

[15] The appendix provides the precise definition of "close" and "small."

output moves with hours only if the "business poaching" externality is not too strong ($\alpha < 1$), while the price of retail goods rises or falls together with hours as long as $\alpha > 0$. In a more general model in the absence of externalities, the effect on regulation is likely to increase retail prices relative to the market allocation, which is always Pareto optimal.

Combining these results with those of the previous subsection, we conclude that, unless solitary and common leisure are close substitutes *and* the elasticity of the leisure index with respect to solitary leisure is small, a relaxation of blue laws raises intermediate output and has the following effects:

- It raises final output consumption if the business poaching externality is not too big.
- It increases the price of final output if there is a business poaching externality, with the magnitude of the effect depending positively of the strength of the externality;[16]

These results are important when contrasted to the public policy debate on shop-closing regulations. Stützel (1958, 1970) claimed that retail opening hours regulations do not have first-order effects on the real demand for final goods, because consumers respond to restrictions on shopping hours by simply concentrating the purchases in a shorter time interval. This argument is frequently advanced by trade unions and small shop owners to resist liberalization of shopping hours regulations. Equation (3.8) shows that "Stützel's Paradox" does not in general hold in our model. In point of fact, unless solitary and common leisure are close substitutes *and* the elasticity of the leisure index with respect to solitary leisure is small, a relaxation of blue laws boosts retail output even in the presence of a small (but moderate) productivity externality.[17]

[16] It is interesting to note that recent surveys in Germany, Switzerland and Italy have revealed fears among consumers that deregulation of the currently severe shop closing regimes (by US standards) would lead to price increases, which is consistent with the existence of a negative retailer externality. See Ifo-Institut (1995, 2000).

[17] These predictions can be compared with those of Gradus (1996), who studies a more conventional demand/supply framework with increasing returns at the firm level. He predicts a decrease in retail prices and margins resulting from regulation, as well as an increase in sales, and an ambiguous effect on employment. However, in his model, the socially optimal policy is 168 hours (round the clock opening hours), which suggests that his model does not consider all general equilibrium channels.

3.3 The economic rationale for blue laws

Why would governments implement blue laws? Until now, we have sidestepped that question, primarily because we are more interested in the empirical *effects* of blue laws on observable economic outcomes. The existence of shop closing regulations might reflect lobbying efforts by retailers or trade unionists, or other groups interested in issues of coordination. They may even originate for reasons which have little to do with the issues addressed in this paper. In this section we briefly characterize the optimum as seen from the perspective of a social planner who can explicitly account for consumption and production externalities assumed in the model. If private markets are unable to attain this allocation for reasons of transactions or coordination costs, or if markets in shared leisure are ruled out, then blue laws might be seen as a second or third best solution to the problem of societal coordination.[18]

In the appendix, we sketch the social optimum in our economy, which is simply the solution to a maximization of the unweighted sum of the two households' utilities subject to the given resource constraints. Comparison of first order conditions for the planner and the decentralized market in the absence of blue laws ($T = 1$) shows that the market replicates the planner's optimum only by chance. One case is when $\gamma = 0$ and if T is chosen such that $V_2^M = V_3^M$. Even if it were in R-family's interest to induce this outcome strategically, sufficient instruments are generally unavailable to do so. Evidently, the failure of the market to achieve the social optimum lies in the fact that conditions necessary for the first and second welfare theorems do not obtain. Communal leisure is a nonrival "good" which is not traded in a market, presumably due to the difficulty in assigning property rights. Just as in the vision of Marshall, infinitesimally small traders do not internalize the congestion externality they inflict on each other.

One could imagine a number of institutions – clubs, religion and slavery for example – which could solve the coordination problem at some level for some group of agents. Retailer's associations, shopping malls and Wall-Marts might be thought of as attempts to solve the Marshallian externality. To the extent that Pigovian taxes are unavailable, a shop closing regulation can be seen as an attempt for the state to move the economy towards more shared leisure or restrained competition; it should be noted however, that one instrument will generally be inferior in achieving the planner's objectives. To the extent that

[18] Because the two representative families are thought of as stand-ins for an infinitely large set of atomistically small families, simple side payments will not be feasible. Some form of societal coordination will be necessary.

coordination was undersupplied in the first place, blue laws achieve the first best only when $\gamma = 0$. More generally, when $\gamma > 0$, we are in a second best world, and the blue law regulation T will be insufficient for dealing with two different market failures.

4 Evidence for economic effects of blue laws in US states

4.1 Empirical Strategy: An Overview

In this section, we entertain the hypothesis that restrictions on retail activity – here in the form of Sunday closing or "blue laws" – have an effect on employment, wages, retail prices, and other variables, and use data from the US states to test those implications. The model elaborated in the preceding sections allows us to identify qualitative predictions for the effects of blue laws on observable variables. Under assumptions of separability of utility with respect to consumption and unit elasticity of utility with respect to consumption, the effect of a deregulation ($\hat{T} > 0$) can be summarized as follows:

- The strength of the common leisure externality determines the direction of the net effect of blue laws deregulation on employment.
- If the elasticity of substitution between solitary and common leisure (ρ) is low, a deregulation raises employment unambiguously.
- If the elasticity of substitution between solitary and common leisure (ρ) is high, the effect of deregulation will depend on how much the household values solitary leisure given its overall valuation of leisure in utility (λ). If this valuation is high - put differently, the valuation of common leisure is low - , hours rise in response to a deregulation; if it is low however, hours can actually decline.
- The existence of the Marshallian congestion effect, summarized by γ, can be tested by the reaction of retail price to employment. Since the model in the text rules out income effects, employment and the price of value added in retail will move in the same direction. Note that in the standard model without externalities, retail prices are likely to rise in response to regulation.

- The real wage will move in the opposite direction to employment.
- Stützel's Paradox - meaning that the volume of consumption is constant despite a deregulation of opening hours - obtains on a set of measure zero. To the extent that hours increase, the relative price of retail should be higher, meaning deregulated regimes will exhibit higher retail prices.

We now investigate these hypotheses from several different perspectives on a number of data sets. Rather than specifying and estimating a structural model, we focus on nonparametric, fixed-effect models ("difference-in-difference") specifications which attribute all other temporal influences to a single, common trend. The discussion of the last section suggests, however, that it may be necessary to take the issue of endogeneity of regime seriously when attempting to identify the effects of the laws in aggregate date, since authorities acting in the public interest are likely to implement regulations in those regions in which the gain from harmonizing leisure are greatest. This will necessitate a careful search for instruments, which can be guided by the predictions of the model. Finally, we examine the influence of blue laws on individual labor market outcomes using the CPS (Current Population Survey of the US) to verify the effects of the model at the individual level.

4.2 Blue Laws in the United States

The central element of the empirical analysis is a unique dataset of blue laws regulation in the US states for the period 1969-1993.[19] The collection of these data involved a tedious review of state legislative records to identify and track changes in regulatory regimes. Because it is difficult to accommodate every nuance in state legislation, a set of eight dummy variables were defined over the sample.[20] Most important among these are the dummy variables SEV (severe), MOD (moderate) and MILD, which describe the law in place during the year in a particular state. SEV describes a state regime in which Sunday sales is severely regulated, with exemptions represent exceptions rather than the rule. Trade in food, tobacco, liquor as well as hardware, clothing and other goods are prohibited. MOD refers to regimes which exempt food explicitly from the SEV

[19] The period for analysis stops in 1993, to avoid complications that arise from the growing use of internet in retail activity.

[20] Descriptive statistics of these variables can be found in the Appendix.

regime, while MLD adds a number of additional exceptions to food, including hardware, dry goods, or appliances, but continue to rule out trade in some products, especially alcoholic beverages. These dummy variables are defined incrementally, so all state-years with a value of 1 for MOD also take the value of 1 for MLD, etc. An extended set of additional laws were encoded for the analysis consists of states with Sunday prohibition of motor vehicle sales (MVR), Sunday closing regulations applying solely to large establishments (LBS), common labor restrictions prohibiting hiring on Sundays (CLR), and devolution of authority to regulate Sunday trading to local communities (LOC). Descriptives of these variables are displayed in Table 1.

In the complete sample of fifty US states (Washington DC was excluded) over the period 1969-1993, 40.9% of the state-year observations had some form of blue law on the books in the narrow sense, meaning either SEV, MOD or MLD equaling one; this rises considerably if one includes restrictions on motor vehicle sales (MVR: 39.8% of all observations), devolution of regulatory discretion to local authorities (LOC: 20.6% of all observations), limitation on large retail businesses (LGB: 5.9%) and common labor restrictions (CLR: 2.6%). The last regulation is particularly interesting because it survives in some European countries (e.g. France) Both time and cross-sectional variation is clearly evident in the data. An analysis of variance shows that while the legal variables do indeed exhibit some time variation, more than 85% of the total variance of the dummy variables is due to between-state differences. At the same time, heterogeneity among states within regions and over time appears to be significant, for example, in Vermont, Florida, Washington, Arkansas and Tennessee.

4.3 Macroeconomic Evidence from the US states

In this section we examine the impact of blue laws on observable outcomes: employment, compensation, productivity, prices and related variables in a balanced panel of US states.

4.3.1 Data

A primary source of US state level aggregate data is the Regional Economic Information Service (REIS) of the Bureau of Economic Analysis, U.S. Department of Commerce. Also known as the Regional Economic Accounts, this data set consists of annual observations of US states of annual full and part-time employment, aggregate annual compensation of full and part time employment and salaried employees, sectoral nominal and real value-added, and other variables. These data were available for the SIC 620 classification (retail trade in the broad sense), while employment and total compensation per employee were also available for at the three-digit level of sectoral disaggregation .The data are available respectively from 1969-1993 (employment and compensation) or 1977-1993 (REIS value added data). Subject to data availability, we construct a panel of the fifty US states over the period extending from 1969-1993. Because many variables are available for only a subsample of this period or only sporadically, however, the estimation period will generally be shorter. Summary statistics of the data used is presented in Table 1 for the entire sample as well as those state-years with a value of 1 for MLD, MOD, or SEV.

A second source of data used in studying the effects of blue laws on labor markets involves the US Current Population Survey (CPS), the national labor market survey which serves as the basis for the most important official US labor force statistic measures. For outgoing March rotation groups in the period 1977-1993, we constructed the following data generated by running state counts on CPS data and constructing the following estimates for each state i and year t:

- the proportion of all workers employed in retail (SIC 520, or 620 in the revised enumeration)
- the proportion of all workers in part-time employment (self-reported, defined as less than 30x hours weekly)
- the proportion of all employed workers in both retail (SIC 520, 620 in the revised enumeration) and part time
- the proportion of all employed workers employed in department stores and mail order business.
- the nominal hourly wage, in retail and in the overall economy.

Since these variables are used in the empirical analysis solely as regressands, sampling error is an issue of estimation efficiency, but not consistency.

4.3.2 An econometric model of the effects of blue laws: OLS estimates

We will consider the following reduced form statistical relationship implied by the theoretical model, which determines the outcome of some variable of interest y in state i in sector j and in year t , y_{ijt}, is given by the following linear reduced form model:

$$y_{ijt} = a' x_{ijt} + b' T_{it} + \varepsilon_{ijt} \quad (4.1)$$

where T_{it} stands for a vector of blue law dummy variables, a and b denote coefficient vectors, and x_{ijt} is the value taken by state i for variable x in year t. Constants are suppressed for simplicity.

The first step in the empirical analysis consists of OLS estimates of (4.1) for FPT employment, FPT compensation, value added per FPT employed, value-added share, as well as labor market indicators extracted from the CPI. Employment variables are expressed as natural logarithms of the fraction of the total state population. This normalization was preferred to one relative to an estimate of labor force or working age population for two reasons. First, consistent labor force data from individual states are unavailable before the mid-1970s; second, a participation estimate based on working age population may neglect full and part-time employment of teenagers and statutory retirees. The vector x consists of time and regional fixed effects, which effectively means that analysis attributes deviations of state realizations of the variables of interest from the regional and temporal averages to the blue laws. As noted above, within state variance is a modest component of total variance. Each line in the table represents a single OLS regression of the variable of interest, where T is a composite dummy variable (BLUE) which takes the value 1 if any of the blue law regimes is in place. The spatial nature of the data set and the differing proximity of states implies potential neighboring state effects. We control for these effects by constructing a dummy BLUEREL, a weighted average of the simple blue law regime measure in contiguous states, using each state's individual share in the total border with contiguous US states. Robust (that is, White-heteroskedasticity consistent) standard errors are reported. To save space, we report only estimated coefficients and significance levels, as well as the F-statistic that all coefficients on the blue law variables are jointly zero.

The first two columns of Table 2 present the first set of empirical results for the impact of blue laws on "macro" US state FPT employment and salary/compensation data. For full and part time salaried FPT employment, the results are uniform and negative, with the exception the apparel sector, with the presence of a blue law restricting Sunday trade having between -1.87 and -10.6 log points on the log fraction of the population employed as a salary workers in three digit sectors. Blue laws are also negatively associated with overall salaried employment, which is consistent with our theoretical model as well as a broader measure which includes the self-employed. Evaluated at the overall sample mean for the fraction of state population in salaried FPT non-food retail employment (4.9%), the point estimate for overall non-food retail (-0.0439) implies an average effect of 0.211 percentage points of the population, or about 10,300 jobs in the average US state over the period. The overall effect for salaried employment (42.59% of the population) implied by our point estimate (-0.0103) is 0.436% or about 21,300 jobs per state. Blue laws are positively, albeit weakly, associated with wage outcomes in the same sectors, where the wage is measured as annual compensation, less so when measured as retail hourly wage relative to the state average. For non-food retail, the existence of a blue law is associated with 1.68 log points lower annual compensation, measured relative to average state compensation per FPE overall. This translates at sample means to 1.2% less annual compensation relative to the state average, or about $179 annually.

Table 2 also presents estimated effects of blue laws on other GSP variables for the retail sector as well as the state retail variables estimated using the CPS. A central implication of the model, which discriminates it from a conventional market economy in which the welfare theorems hold, is the effect of blue laws on the price of retail (the price of value added in the retail sector). The results presented in Table 3 show a weak and negative association of Sunday closing with retail prices. The price effect ranges to -0.4 to -0.9 log points, although these are not always statistically significant. Blue laws are significantly associated with lower productivity and the share of value added in total state GSP (insignificantly). The OLS estimates on CPS data reveal that the blue law is associated with 4.2 percentage points lower employment in retail (measured as a fraction of overall CPS employment) as well as in 5.1 percentage points lower part-time. Given the respective percentages in the sample (17.9% and 23.1%), these are very large effects. It is interesting to note that while we estimate a significant relative wage hourly wage effect on retail, we do not estimate an overall real wage effect.

4.3.3 Differentiated measures of blue laws

In Tables 3 and 4 we present estimates using more differentiated measures of blue law regulations. The results are not qualitatively different from the simple ones, although it appears that the degree of severity of the law affects our variables of interest in a nonlinear and possibly a non-monotonic fashion. For FPT employment, the effect of the law in the mild form (MLD) is negative for the apparel sector, while the miscellaneous group is negative but not statistically significant at conventional levels. For the MLD regime which allows trade in food and some other product, a significant impacts ranging from -1.26 to -8.73 log points were estimated. In three three-digit sectors, a positive coefficient on MOD implies that a more extensive prohibition (except food) undoes some but not all of this effect; for the others the negative effect is actually intensified. Only in home furnishings are we not able to reject the irrelevance of blue laws for employment.

For compensation, the differentiated treatment of blue laws strengthens the case that relative compensation is higher in mild regimes. This is undone to some extent as the law reaches maximal severity. Indeed, the sum of the point estimates for MLD, MOD, and SEV is positive with only two exceptions (621, building materials and garden equipment and 623, food and grocery stores). For the price variables, the effect of MLD is positive, more than offset by MOD, but then neutralized by the severe regime; this pattern holds for two independent sources of data (the GSP deflator for retail and a weighted average of SMSA consumer price indexes constructed by Marco Del Negro). Overall, we cannot reject the hypothesis that the laws are neutral with respect to retail prices. Our findings for the CPI state aggregate data are consistent with those for the simple blue law indicator, yet these effects appear to be highly nonlinear.

4.3.4 Endogeneity of Blue Laws and Instrumental Variable Estimation

Because a trend towards deregulation is evident in many states and because systematic differences exists between and within US regions, it is probably inappropriate to assume an exogenous regulatory environment in the econometric estimation. While we eschewed an explicit welfare analysis, we argued informally that blue laws could represent the optimal choice of agents. In particular, differing tastes for consumption ϕ_i, differing preferences for coordination of leisure ρ or λ, or strong Marshallian effects in retail γ (perhaps because the business stealing effect is strong) could give rise to regulation restricting opening hours. The problem is a common one: in democracies, public institutions, including regulatory regimes, tend to reflect the popular will, which can vary over time and space. In a panel context, endogeneity of policy may never emerge over time, but could still be reflected between units in the data set; the predominance of variance between states in the blue law dataset alerts us to this potential problem. If blue laws are indeed endogenous, OLS estimates will suffer from simultaneous equation bias.

To see this, suppose that the model is now

$$y_{ijt} = a' x_{ijt} + b' T_{it} + u_{ijt} + \varepsilon_{ijt} \tag{4.2}$$

where u_{ijt} is an unobservable taste variable. Blue laws themselves are determined by

$$T_{ijt} = c' x_{ijt} + d' z_{it} + e u_{ijt} \tag{4.3}$$

where x_t and z_t represent factors which motivate state legislatures to pass blue laws, and c and d are coefficient vectors. Because the vector x_{ijt} appears in equation (4.2) as well, only z_t, the excluded determinants of T, allow us to identify statistically the elements of b. Most important of these factors is the "taste" for retail, which was represented in the model as ϕ, which determines the marginal utility of consumption. States with high values of ϕ (strong preferences for consumption) or are indifferent towards communal leisure or preferences for shopping while others are working, should be less likely to have blue laws ($e < 0$). Since tastes are unobservable, an econometrician estimating (4.2) using OLS will necessarily include tastes in the error term, leading it to be correlated with T. If $b < 0$, estimates of it will be positively biased.

Our ability to estimate the effect of blue laws consistently will thus depend on the availability of instruments, that is, variables z which are correlated with, or causal for T but also orthogonal to u, i.e., uncorrelated with household tastes for leisure and consumption? In effect, we seek factors which have led to the institution of blue laws which are independent of direct impact on retail variables predicted by the model. In particular, our strategy will be to isolate factors associated with the existence of blue laws which are nevertheless independent of the determinants of retail outcomes, as predicted by mechanisms described in the paper. These will tend to be those factors which limit a state's ability to implement retail restrictions, or its desire to coordinate household activity, even if its inhabitants would want these restrictions. From this perspective we considered the following candidates for instruments:

- the log of state land area
- the log of state population
- urban density
- the fraction of Democrats in the state legislature (as fraction of the sum of Democrats and Republicans)

- weighted influence of adjacent states' regimes, with weight adapted for "average distance to the border"
- religious affiliation, summarized by the US Census decennial survey of Christian adherents.

The rationale for these instruments is as follows. Geographically vast states tend to be ethnically more diverse, suggesting less demand for coordination and common leisure (who in southern California cares what northern Californians are doing); at the same time, larger states present more difficulties in coordinating individual's schedules as well. Holding land mass constant, more populated states will have more potential interactions (by sheer nature of the combinatorics) and should exhibit greater demand.for leisure coordination, ceteris paribus. Urban density (fraction of population living in urban areas) reflects the expectation that cities are areas of more intense economic activity with individuals who have a high valuation of their leisure time and thus need to shop on Sundays. The fraction of Democrats represents "pro-labor" views, which are generally associated with "more humane" work schedules.[21] The influence of regimes from neighboring states represents a restriction on a given states ability to conduct an independent blue law policy. Finally, Christian population represents the demand for the blue law in order to enforce the Sabbath on Sundays.

The first stage regressions for the instruments are presented in the appendix. Without exception, the instruments have the sign we predict in the discussion above. Taken together with the fixed effects, the instruments are capable of "explaining" about 48% of the state-year variation in the simple blue law variable. Table 5 presents IV estimates for simple models estimated by OLS in Table 2. These results are qualitatively consistent with the results presented above, but do not exhibit the same degree of statistical significance [22] Employment is significantly affected by blue laws, while wages and prices are not. The point estimates for the effects on employment are from three to ten times larger than in the OLS case. Productivity is negatively effected, which signals that economic efficiency is attenuated by regulations. The "Marshallian" mechanism provided by our model is not supported by the evidence.

[21] In Europe, labor unions actively defend not only Sunday closing but also end of day closing - for example in 2005 the shop closing law in German (Ladenschlußgesetz) requires store to close after 8:00 pm as well as Sundays and public holidays, with only minor exceptions.

[22] This is due to the use of IV estimation as well as robust standard error estimates which are clustered by US state.

4.4 Microeconometric Evidence

4.4.1 Data

To provide some further independent validation of the effects we isolate, we employ directly information contained in the CPS March rotation groups in the period 1977-1993. By merging blue laws data with information on employed individuals (including state of residence), it is possible to estimate the impact of blue laws in reduced forms in which the individual observation is an individual in the CPS. The individual CPS data can thus provides ”independent” verification of the macro US state results.

For the pooled sample consisting of all March files from 1977-1993, we considered the following variables on individual workers in employment : (1) log nominal and (2) real weekly gross earnings, (3) log weekly hours (4) log nominal and (5) real hourly wages. We dropped all workers earning less than $1 or more than $100 per hour. In a standard ”Mincer-style” specification used for earnings equations, we regressed the log of the dependent variable on potential experience, its square, education in years and its square, sex, sex interactions with all of the aforementioned covariates, 15 sectoral dummies, 8 occupational dummies, and the regional and national time fixed effects. The blue laws were included as the levels of the three state blue law variables MLD, MOD and SEV, plus an interaction of these three with affiliation with the retail sector - defined *without* eating and drinking establishments.

4.4.2 Results

The results support the conclusion that Sunday closing regulation affects labor market outcomes negatively. While the level effects of the dummies are rarely significant, they are strong and significant in their interaction with the blue laws. For example, we estimate that a retail worker in a SEV regime state earns about 5 log points less per week than a comparable worker in a state without any blue laws. As with the macro data, there appears to be a nonlinear effect, with the effect initially negative, then less so, then finally strongly negative (the sum is frequently significantly different from zero at the 0.01% level of significance). Workers in a SEV regime in retail work about half-an hour less than in unregulated states. The net real wage effect is positive and significant, at 2.8 log points - although it decreases with the milder regimes and increases sharply in the SEV regime. This is consistent with the macro results if the net effect of blue laws is to concentrate employment in the form of full time employees, who receive more lump sum compensation than their equivalent in part-time workers. The net result is to increase compensation per FPT employee, even while hours and employment are declining.

4.5 Summary of Results and Relation to Previous Work

The preponderance of the aggregative and individual evidence indicates that blue laws have a significant negative effect on employment but a milder, ambiguous effect on relative and real wages. This is more strongly borne out by the microeconometric evidence, which indicates that earnings are lower, ceteris paribus, in blue law states but especially for those individuals working in the narrowly defined retail sector. The effect appears to arise primarily from a negative effect on hours, but also real wages.

While the evidence for the evolution of full and especially part-time employment appears incontrovertible, there is little robust evidence that shop-closing regulations reduces prices in US states, measured as the relative price deflator of retail sector output relative to overall state value-added. Our model would have allowed for this, and would also have predicted a negative effect of blue laws on prices as long as inefficient business-stealing was curtailed in the process. Even if they did reduce prices, however, it would not be clear that they did for reasons suggested by our model. Thus the evidence for the first type of externality survives, while second one finds little support. This stands in contrast to existing research in this area: Tanguay et al. (1995) find that prices increased at large department stores after deregulation in Quebec. Recent discussion of liberalization in Europe is accompanied by consumer fears that deregulation will be associated with price increases.[23]

While the theoretical literature on retail trading restrictions address a variety of important issues, they have generally ignored macroeconomic, general equilibrium effects on product and especially labor markets. Most work has focused on the effect of shop trading laws on retail industrial organization, or the search-theoretic aspects of uniform closing times. De Meza (1984) shows that, in the Salop model with imperfect competition, shop regulation can ac-

[23]A second interpretation is that retail's contribution to national value-added is mismeasured. If the quality of retail output improves over time, fixed current weight deflators will overestimate price and underestimate quality changes. To the extent that regulation retards improvements in retail service quality and lower price changes are measured, regulation will be "credited" with keeping prices in stores down, although the quality of retail output will be inferior.

tually induce more competition and result in lower travel costs as well as lower prices. In contrast, Clemenz (1990) concludes that deregulation is associated with more search, better price information, while leading possibly to higher shopping costs. Tanguay et al. (1995) study the reaction of prices to shopping hours liberalization when smaller stores are closer, but larger, cheaper stores are farther away. Morrison and Newman (1983) show that smaller, inefficient firms have the most to gain from retail operation restrictions. In a spirit similar to our model below, Bennett (1981) provides an analysis of the peak load aspects of shop opening times, invoking arguments by Becker (1965). Gradus (1996) studies the effects of shop liberalization using a partial equilibrium supply-demand model with parameters estimated from a Swedish study.

5 Conclusion

A fundamental problem in a society whose members value shared or communal leisure is how to coordinate activity.[24] Even with an explicit assignment of property rights, it would be difficult to imagine trade in coordinated, shared leisure. Yet mechanisms exist which could move an economy towards first-best; country clubs, athletic associations, traditional siestas, organized mass spectator sports and religion all represent potential vehicles of leisure synchronization.[25] Yet in heterogeneous societies with widely different marginal valuations of leisure and consumption, these mechanisms may not be sufficient; moral or ethical inducements such as religion might be more cost-effective. The social value of religion will depend on the extent that leisure is coordinated, with likely ”superstar” effects. In that sense, it may matter less whether the Sabbath is Friday, Saturday or Sunday, as long as we mostly agree that there is one, and keep it.[26]

[24] While this concern appears less pronounced in the United States, it is an important element of the European policy discussion. For example, in their extensive survey of shop-closing regulations, the Ifo-Institute paid particular attention to public opinion surveys placing more value on ”social” free time on Saturdays compared to weekday evenings (Ifo-Institute 1995: 254-6).

[25] Among other things, this may explain why the service sector is more developed in ethnically heterogenous economies (the US, Canada, UK) compared with more homogeneous societies of northern Europe and Scandinavia.

[26] Besides the public interest approach, the more cynical ”political economy” view of shop closing laws would attribute regulation to special interest lobbying and regulatory capture. Our study has distanced itself from this idea but our empirical results can be interpreted as showing the consequences which can be expected from deregulation. For an interesting contribution to

The empirical evidence suggests however, that shop closing regulations may be a high price to pay for societal coordination, especially as the shadow value of time rises over time and makes search increasingly costly. The large and significant effects on employment we estimate must be put be compared with any putative gains from synchronized leisure. European countries currently debating the merits of deregulation of both product and labor market deregulation should be consider significant increase in flexible employment creation linked to deregulated retailing. It is not coincidental that the retail sector has the largest fraction of part-time workers in the US, and that the Netherlands has enjoyed high growth in retail (especially part-time jobs) since deregulating shop closing in the mid-1990s.

To our knowledge, this paper provides the first comprehensive analysis of the effects of blue laws on labor market outcomes in the United States. It should however be stressed that our results - while applicable to a retail sector in which almost a fifth of all workers is employed – can be applied to any service which inhibits joint leisure on the part of agents, including travel agency, banking and insurance brokerage, personal and health care services. The coordination of activity is a fundamental aspect of services, which now dominate growth in jobs and economic activity in most advanced economies of the world: some must work while others consume, enjoy leisure, or both. In a richer model, the problem is likely to be aggravated by complementarities in utility between the two.

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Appendix A Log-differentiation of model

This appendix shows how to log-differentiate the solitary/common leisure model of section 2.

A.1 Computation of $\hat{L}$

Since $\mathscr{L} = \mathscr{L}(\ell_s, \ell_c)$,

$$\hat{\mathscr{L}} = \frac{\mathscr{L}_s \ell_s}{\mathscr{L}} \hat{\ell}_s + \frac{\mathscr{L}_c \ell_c}{\mathscr{L}} \hat{\ell}_c.$$

Since the aggregator function $\mathscr{L}(\ell_s, \ell_c)$ exhibits constant returns to scale,

$$\mathscr{L}_s \ell_s + \mathscr{L}_c \ell_c = \mathscr{L}, \tag{A.1}$$

so that if we define

$$\lambda = \frac{\mathscr{L}_s \ell_s}{\mathscr{L}},$$

with $\lambda \in (0,1)$ because of property (A.1) and the assumption that $\mathscr{L}_i > 0$, we have

$$\hat{\mathscr{L}} = \lambda \hat{\ell}_s + (1-\lambda)\hat{\ell}_c, \tag{A.2}$$

which establishes equation (3.3) in the text.

A.2 Computation of $\hat{\mathscr{L}}_s$

Log-differentiating equation (A.1) yields

$$\lambda(\hat{\mathscr{L}}_s + \hat{\ell}_s) + (1-\lambda)(\hat{\mathscr{L}}_c + \hat{\ell}_c) = \hat{\mathscr{L}}.$$

Using equation (A.2) to eliminate $\hat{\mathscr{L}}$, this implies that

$$\hat{\mathscr{L}}_s = (1-\lambda)(\hat{\mathscr{L}}_s - \hat{\mathscr{L}}_c).$$

Now the elasticity of substitution between solitary and common leisure in the aggregator function $\mathscr{L}(\ell_s, \ell_c)$ is, by definition,

$$\rho = -\frac{\hat{\ell}_s - \hat{\ell}_c}{\hat{\mathscr{L}}_s - \hat{\mathscr{L}}_c} > 0.$$

As a result, we conclude that

$$\hat{\mathscr{L}}_s = -\frac{1-\lambda}{\rho}(\hat{\ell}_s - \hat{\ell}_c), \tag{A.3}$$

which is equation (3.4) in the text.

A.3 Computation of $\hat{\ell}_s$ and $\hat{h}$

Equations (3.5) and (3.6) can be written in matrix form:

$$\begin{pmatrix} \theta_s & -1 \\ \ell_s & \ell_h \end{pmatrix} \begin{pmatrix} \hat{\ell}_s \\ \hat{h} \end{pmatrix} \begin{pmatrix} \theta_c \hat{\ell}_c - \hat{\phi} \\ -\ell_c \hat{\ell}_c \end{pmatrix}, \tag{A.4}$$

where

$$\theta_s = \lambda \nu + (1-\lambda)/\rho > 0, \tag{A.5}$$

$$\theta_c = (1-\lambda)(1/\rho - \nu) = \theta_s - \nu. \tag{A.6}$$

The determinant of the matrix on the lefthand side of (A.4) is

$$\Delta = \theta_s \ell_h + \ell_s > 0.$$

The solution of (A.4) is

$$\hat{\ell}_s \Delta^{-1} [(\theta_c \ell_h - \ell_c)\hat{\ell}_c - \ell_h \hat{\phi}],$$
$$\hat{h} \Delta^{-1} [-(\theta_s \ell_c + \theta_c \ell_s)\hat{\ell}_c + \ell_s \hat{\phi}].$$

The elasticities of solitary leisure and hours with respect to the taste shifter and solitary leisure are thus

$$\frac{\partial(\hat{\ell}^s, \hat{h})}{\partial(\hat{\phi}, \hat{\ell}^c)} = \Delta^{-1} \begin{pmatrix} -\ell_h & \ell_s \\ \theta_c \ell_h - \ell_c & -(\theta_s \ell_c + \theta_c \ell_s) \end{pmatrix} = M.$$

$M_{11} < 0$ and $M_{12} < 0$ for all parameter values. Using the definition of θ_c and θ_s above, it is trivial to show that $M_{21} > 0$ if and only if

$$\rho < \left(\nu + \frac{1}{1-\lambda} \frac{\ell_c}{\ell_h} \right)^{-1},$$

while $M_{22} < 0$ if and only if

$$\theta_s = \lambda \nu + (1-\lambda)(1/\rho) > \nu \frac{\ell_s}{\ell_s + \ell_c}. \tag{A.7}$$

As $\rho \to \infty$, the last inequality is equivalent to $\lambda > \ell_s/(\ell_s + \ell_c)$. For given $\lambda \in (0,1)$, inequality (A.7) is always satisfied if ρ is close to 0.

These computations justify the characterization of the elasticities of solitary leisure and hours with respect to the taste shock and common leisure given in subsection 3.1.

Table 1. Summary statistics on variables employed

Variable, Sector	All observations				Blue law observations			
	Mean	***Std.dev***	***Max***	***Min***	***Mean***	***Std.dev***	***Max***	***Min***
Employment (fraction of state population)								
All FPT employment	0.5090	0.0579	0.6631	0.3721	0.4963	0.0581	0.6594	0.3721
620 Total SIC retail	0.0820	0.0130	0.1197	0.0450	0.0784	0.0140	0.1197	0.0502
All FPT salary employees	0.4259	0.0497	0.5623	0.3077	0.4183	0.0495	0.5402	0.3077
620 Total SIC retail	0.0704	0.0123	0.1072	0.0385	0.0672	0.0132	0.1072	0.0389
620 Total SIC retail less 627	0.0490	0.0065	0.0755	0.0294	0.0483	0.0073	0.0755	0.0324
621 Building materials, garden equip.	0.0032	0.0009	0.0081	0.0006	0.0031	0.0010	0.0081	0.0016
622 General merchandise stores	0.0101	0.0018	0.0174	0.0057	0.0101	0.0016	0.0167	0.0057
623 Food and grocery stores	0.0111	0.0023	0.0207	0.0052	0.0111	0.0026	0.0207	0.0054
624 Car dealers and service stations	0.0090	0.0016	0.0158	0.0046	0.0085	0.0015	0.0158	0.0046
625 Apparel and accessory stores	0.0040	0.0010	0.0090	0.0013	0.0041	0.0010	0.0076	0.0020
626 Home furniture, furnishing stores	0.0028	0.0006	0.0057	0.0011	0.0028	0.0007	0.0057	0.0017
627 Eating and drinking places	0.0215	0.0067	0.0434	0.0061	0.0190	0.0066	0.0400	0.0061
628 Miscellaneous retail	0.0087	0.0022	0.0158	0.0041	0.0084	0.0024	0.0158	0.0041
Annual Compensation per FPT (as fraction of state average, in logs)								
620 Total SIC retail	0.4840	0.0805	0.3279	0.8373	0.4877	0.0861	0.3279	0.7595
620 Total SIC retail salary employees	0.6378	0.0713	0.9119	0.4810	0.6482	0.0772	0.9119	0.4810
620 Total SIC retail less 627	0.7228	0.0702	0.9760	0.5506	0.7228	0.0759	0.9760	0.5506
621 Building materials, garden equip.	0.8855	0.0995	1.1973	0.6328	0.8945	0.1068	1.1883	0.6328
622 General merchandise stores	0.6095	0.0724	0.9259	0.4244	0.6047	0.0762	0.8482	0.4376
623 Food and grocery stores	0.6775	0.1062	0.9357	0.4253	0.6563	0.1001	0.9266	0.4253
624 Car dealers and service stations	0.9279	0.0729	1.2804	0.7018	0.9367	0.0781	1.2804	0.7523
625 Apparel and accessory stores	0.5586	0.0760	0.8243	0.3570	0.5755	0.0787	0.3600	0.8243
626 Home furniture, furnishing stores	0.8446	0.0809	1.1848	0.6324	0.8525	0.0891	1.1848	0.6324
627 Eating and drinking places	0.4377	0.0577	0.7344	0.3168	0.4502	0.0548	0.6210	0.3209
628 Miscellaneous retail	0.6778	0.0779	1.0783	0.5014	0.6983	0.0834	1.0783	0.5122
REIS-BEA-REA								
Prices (relative to state GSP deflator)								
GSP (value added) deflator SIC retail	1.0907	0.0748	1.4332	0.7065	1.1001	0.0707	1.2665	0.9552
State CPI (Del Negro)	1.1267	0.0615	1.2661	0.7573	1.1296	0.0526	1.2661	0.9582
Value Added share, Retail								
Nominal retail value added share	0.0935	0.0119	0.1186	0.0334	0.0932	0.0098	0.1186	0.0657
Real retail value added share	0.0858	0.0105	0.1126	0.0429	0.0850	0.0101	0.1126	0.0584
Productivity (real value added per capita)								
Real productivity retail	0.0854	0.0021	0.0910	0.0838	0.0855	0.0019	0.0910	0.0838
CPS State count estimates	5.7255	1.5228	10.4088	2.8763	5.4789	1.5321	10.0075	2.8763
Employment indicators (percent)								
Workers employed in retail	17.8985	1.6175	23.0961	13.0370	17.4021	1.6621	23.0961	13.3909
Workers employed part-time	23.1049	3.1381	32.7192	15.6589	22.1579	2.8821	32.7192	15.6589
Workers part-time and retail	7.4018	1.1817	11.1009	3.8710	7.1645	1.0981	10.6099	4.0752
Workers in department stores	1.9258	0.5498	0.5319	3.6011	1.9673	0.5249	3.6011	0.5882
Nominal hourly wage in retail relative to state average	0.7192	0.0596	0.9546	0.5491	0.7186	0.0648	0.9546	0.5491
Real hourly wage in retail	7.2929	0.9253	11.3797	5.3301	7.3266	0.9202	10.5698	5.4640

Table 2. Estimated Coefficients on Dichotomous Blue Laws Variables, OLS Fixed Effects Models of Employment and Relative Compensation, 1969-93

Variable, Sector	Blue	Blue Neighbor	F-test
Employment (fraction of state population)			
All FPT employment	-0.0219		
	(-4.7)		
	-0.2140	0.0101	15.4***
	(-4.1)	(0.9)	
620 Total SIC retail	-0.0546		
	(-9.2)		
	-0.0552	-0.0099	45.3***
	(-9.0)	(-0.8)	
All FPT salary employees	-0.0097		
	(-4.0)		
	-0.0103	-0.0111	8.9***
	(-4.2)	(-2.1)	
620 Total SIC retail	-0.0601		
	(-8.2)		
	-0.0626	-0.0472	35.5***
	(-8.4)	(-3.0)	
620 Total SIC retail less 627	-0.0429		
	(-6.3)		
	-0.044	-0.0201	20.13***
	(-6.3)	(-1.4)	
621 Building materials and garden equipment	-0.0448		
	(-3.2)		
	-0.0400	0.0903	12.8***
	(-2.8)	(-3.4)	
622 General merchandise stores	-0.0350		
	(-2.9)		
	-0.0373	-0.0443	8.1***
	(-3.1)	(-2.1)	
623 Food and grocery stores	-0.0187		
	(-2.4)		
	-0.0222	-0.0666	10.5***
	(-2.8)	(-4.3)	
624 Car dealers and service stations	-0.0621		
	(-7.9)		
	-0.0576	0.0842	45.0***
	(-7.2)	(5.1)	
625 Apparel and accessory stores	0.0187		
	(1.5)		
	0.0122	-0.1209	13.3***
	(1.0)	(-4.6)	
626 Home furniture, furnishing stores	-0.0310		
	(-2.5)		
	-0.0322	-0.0219	3.12*
	(-2.5)	(-0.8)	
627 Eating and drinking places	-0.1062		
	(-10.2)		
	-0.1124	-0.1171	60.5***
	(-10.9)	(-5.2)	
628 Miscellaneous retail	-0.0888		
	(-8.6)		
	-0.0919	-0.0588	37.5***
	(-8.6)	(-2.5)	

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 2. Estimated Coefficients on Dichotomous Blue Laws Variables, OLS Fixed Effects Models of Employment and Relative Compensation, 1969-93 (cont.)

Variable, Sector	Blue	Blue Neighbor	F-test
Annual Compensation per FPT (as fraction of state average, in logs)			
620 Total SIC retail	-0.0091		
	(-1.8)		
	-0.0082	0.018	4.2*
	(-1.6)	(1.6)	
620 Total SIC retail salary employees	-0.0113		
	(-2.9)		
	-0.0107	0.0107	5.8**
	(-2.7)	(1.4)	
620 Total SIC retail less 627	-0.0176		
	(-4.3)		
	-0.0168	0.0133	12.3***
	(-4.1)	(1.6)	
621 Building materials and garden equipment	-0.0257		
	(-6.3)		
	-0.0261	-0.0081	20.2***
	(-6.4)	(-1.0)	
622 General merchandise stores	-0.0190		
	(-3.3)		
	-0.0182	0.0138	6.3**
	(-3.1)	(1.2)	
623 Food and grocery stores	-0.0416		
	(-7.7)		
	-0.0383	-0.0614	41.4***
	(-7.1)	(5.5)	
624 Car dealers and service stations	-0.0123		
	(-2.7)		
	-0.0133	-0.0178	
	(-2.8)	(-1.9)	4.3*
625 Apparel and accessory stores	0.0175		
	(2.9)		
	0.0156	-0.0363	
	(2.5)	(-3.2)	10.0***
626 Home furniture, furnishing stores	-0.0089		
	(-1.9)		
	-0.0104	-0.0285	5.7**
	(-2.2)	(-3.1)	
627 Eating and drinking places	-0.0084		
	(-1.8)		
	-0.0111	-0.0496	13.7***
	(-2.3)	(-5.0)	
628 Miscellaneous retail	0.0031		
	(0.6)		
	0.0021	-0.0189	1.8
	(0.7)	(-1.8)	

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 2. Estimated Coefficients on Dichotomous Blue Laws Variables,
OLS fixed effects models of prices, productivity, and other labor market outcomes 1976-93

Variable, Sector	Blue	Blue Neighbor	F-test
REIS-BEA-REA			
Prices			
(relative to state GSP deflator)			
GSP (value added) deflator SIC retail	-0.0043		
	(-1.3)		
	-0.0059	0.0231	5.5**
	(-1.7)	(3.3)	
State CPI (Del Negro)	-0.0063		
	(-2.1)		
	-0.0083	-0.0289	10.6***
	(-2.7)	(-4.5)	
Value Added share, Retail			
Nominal retail value added share	-0.0191		
	(-2.3)		
	-0.0178	0.0185	4.4*
	(-2.1)	(1.0)	
Real retail value added share	-0.0149		
	(-1.9)		
	-0.0119	0.0416	6.7**
	(-1.4)	(2.2)	
Productivity			
(real value added per capita)			
Real productivity retail	-0.0205		
	(-2.2)		
	-0.0222	-0.0256	3.0*
	(-2.3)	(-1.3)	
CPS State count estimates			
Employment indicators (percent)			
Percentage of workers retail	-0.4240		
	(-3.1)		
	-0.4686	-0.6369	6.4**
	(-3.3)	(-2.2)	
Percentage of workers part-time	-0.5051		
	(-2.7)		
	-0.5252	-0.2880	4.6*
	(-2.8)	(-0.9)	
Percentage part-time and retail	-0.0691		
	(-0.8)		
	-0.0778	-0.1252	0.6
	(-0.9)	(-0.8)	
Percentage of workers in department stores	-0.0657		
	(-1.4)		
	-0.0645	0.0174	1.0
	(-1.3)	(0.2)	
Nominal hourly wage in retail relative to state average	-0.0166		
	(-3.6)		
	-0.0174	-0.0111	7.1***
	(-3.7)	(-1.1)	
Real hourly wage in retail	0.0463		
	(0.8)		
	0.0303	-0.2282	2.1
	(0.5)	(-1.9)	

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 3. Estimated Coefficients on Differentiated Blue Laws Variables in OLS Fixed Effects Models of Employment and Relative Compensation, 1969-93

Variable, Sector	Blue Laws			Other Blue Laws					F-test:	
Employment ***(as fraction of state population)***	**MLD**	**MOD**	**SEV**	**CAR1**	**CAR2**	**LBS**	**CLR**	**LOC**	**MLD=MOD=SEV=0**	**MOD=SEV=0**
All FPT employment	-0.0345	0.0266	-0.0235	-0.0100	-0.0014	-0.0282	0.0031	0.0324	14.3***	5.1**
	(-5.8)	(2.9)	(-2.9)	(-1.5)	(-0.3)	(-5.0)	(0.5)	(5.5)		
620 Total SIC retail	-0.0471	0.0324	-0.0104	0.0140	0.0338	-0.0263	0.0070	0.0235	18.0***	9.3***
	(-5.0)	(-3.1)	(-1.3)	(1.7)	(4.8)	(-3.6)	(0.7)	(2.1)		
All FPT salary employees	-0.0126	0.0067	-0.0125	0.0063	0.0013	-0.0108	-0.0066	0.0049	10.8***	3.9*
	(-4.4)	(1.3)	(-2.6)	(2.0)	(0.5)	(-4.0)	(-1.7)	(2.0)		
620 Total SIC retail	-0.0452	-0.0627	0.0054	0.0299	0.0480	-0.0267	-0.0036	0.0239	20.1***	15.5***
	(-3.8)	(-4.9)	(0.5)	(3.2)	(5.8)	(-3.0)	(-0.3)	(1.7)		
620 Total SIC retail less 627	-0.0363	-0.0534	0.0038	0.0370	0.0309	-0.0216	-0.0017	0.0332	16.4***	12.5***
	(-3.4)	(-4.4)	(0.4)	(4.2)	(4.2)	(-2.7)	(-0.1)	(2.6)		
621 Building materials and garden eq.	-0.0347	-0.1268	0.1071	-0.0417	0.0069	-0.0563	0.0397	0.0223	4.5**	5.1**
	(-1.5)	(-3.2)	(2.7)	(-2.1)	(0.5)	(-3.4)	(1.1)	(0.8)		
622 General merchandise stores	-0.0451	-0.0914	-0.0251	0.1244	0.0273	0.0309	0.0459	0.0338	18.7***	23.3***
	(-2.6)	(-2.8)	(-0.8)	(9.7)	(2.2)	(2.3)	(1.9)	(1.9)		
623 Food and grocery stores	-0.0265	-0.0254	0.0275	0.0346	0.0764	-0.0391	-0.0647	0.0400	2.0	10.2***
	(-2.2)	(-1.6)	(2.0)	(3.7)	(8.0)	(-3.9)	(-4.6)	(2.3)		
624 Car dealers and service stations	-0.0533	0.0217	-0.0908	0.0250	-0.0183	-0.0303	0.0791	0.0208	14.5***	20.8***
	(-2.8)	(1.2)	(-5.5)	(1.7)	(-1.9)	(-3.4)	(3.7)	(1.6)		
625 Apparel and accessory stores	-0.0392	0.0347	0.0513	-0.0281	0.0845	-0.0348	-0.0424	0.0563	9.2***	13.8***
	(-2.1)	(1.2)	(1.7)	(-2.1)	(5.9)	(-2.1)	(-1.5)	(3.0)		
626 Home furniture, furnishing stores	-0.0873	0.0177	-0.0115	0.0343	0.0549	-0.0711	-0.0361	0.0279	6.7***	0.4
	(-4.3)	(0.8)	(-0.6)	(2.3)	(3.8)	(-4.6)	(-1.5)	(1.4)		
627 Eating and drinking places	-0.0746	-0.1006	0.0195	0.0129	0.0907	-0.0394	0.0039	0.0052	22.6***	18.8***
	(-3.9)	(-5.7)	(1.3)	(1.0)	(7.5)	(-2.8)	(-0.3)	(0.3)		
628 Miscellaneous retail	-0.0130	-0.1122	0.0117	0.0379	0.0370	-0.0224	-0.0487	0.0392	22.2***	27.7***
	(-1.0)	(-5.5)	(0.6)	(2.8)	(2.7)	(-1.9)	(-3.3)	(1.3)		

Table 3. Estimated Coefficients on Differentiated Blue Laws Variables in OLS Fixed Effects Models of Employment and Relative Compensation, 1969-93 (cont.)

Variable, Sector	Blue Laws			Other Blue Laws					F-test	
Annual Compensation (as fraction of state average)	**MLD**	**MOD**	**SEV**	**CAR1**	**CAR2**	**LBS**	**CLR**	**LOC**	**MLD=MOD=SEV=0**	**MOD=SEV=0**
620 Total SIC retail FPT employment	0.0160 (2.2)	0.0248 (2.4)	-0.0126 (-2.2)	-0.0310 (-4.8)	-0.0551 (-11.3)	-0.0064 (-1.1)	-0.0170 (-1.5)	-0.0409 (4.0)	5.0**	8.5***
620 Total SIC retail FPT salary employment	0.0323 (4.8)	0.0061 (0.6)	-0.0164 (-1.7)	-0.0255 (-4.9)	-0.0190 (-5.1)	0.0125 (2.6)	-0.0029 (-0.3)	-0.0162 (-3.5)	8.9***	2.4
620 Total SIC retail less 627	0.0203 (2.8)	0.0015 (0.2)	-0.0161 (-1.6)	-0.0253 (-4.6)	-0.0136 (-3.4)	0.0128 (2.5)	0.0010 (0.1)	-0.0205 (-4.3)	4.4**	3.5*
621 Building materials and garden equipment	-0.0030 (-0.4)	-0.0049 (-0.6)	-0.0070 (-0.8)	-0.0304 (5.5)	-0.0192 (-4.5)	0.0012 (0.2)	-0.0121 (-1.5)	-0.0103 (-1.2)	1.6	2.1
622 General merchandise stores	0.0354 (3.8)	-0.0372 (-2.9)	0.0139 (1.3)	-0.0254 (-4.0)	-0.0163 (-3.0)	0.0116 (1.3)	-0.0150 (-1.2)	-0.0314 (-3.9)	6.4***	4.5*
623 Food and grocery stores	0.0260 (2.3)	0.0129 (1.0)	-0.0913 (-8.0)	0.0392 (4.9)	-0.0220 (-3.1)	0.0416 (6.4)	-0.0431 (-4.0)	-0.0154 (-2.0)	41.8***	60.7***
624 Car dealers and service stations	-0.0013 (-0.2)	0.0220 (2.4)	-0.0071 (-0.8)	-0.0440 (-1.2)	0.0035 (0.6)	0.0041 (0.7)	0.0059 (0.6)	-0.0128 (-2.1)	2.5	3.7*
625 Apparel and accessory stores	0.0358 (4.9)	0.0004 (0.0)	0.0216 (1.8)	-0.0247 (-3.6)	-0.0197 (-2.8)	-0.0011 (-0.2)	-0.0125 (-1.1)	-0.0021 (-0.3)	10.1***	4.8**
626 Home furniture, furnishing stores	-0.0002 (0.0)	0.0023 (0.2)	0.0046 (0.5)	-0.0318 (-4.8)	0.0094 (1.9)	-0.0057 (-1.1)	0.0364 (3.6)	-0.0253 (-4.9)	0.4	0.5
627 Eating and drinking places	0.0689 (10.5)	0.0113 (1.4)	-0.0143 (-1.8)	-0.0336 (-6.0)	-0.0129 (-2.2)	0.0026 (0.5)	-0.0189 (-2.0)	-0.0109 (-1.7)	38.9***	1.6
628 Miscellaneous retail	0.0314 (4.6)	-0.0045 (-0.3)	0.0150 (1.1)	-0.0420 (-6.8)	-0.0044 (-0.8)	0.0175 (2.7)	0.0186 (1.8)	-0.0328 (-3.7)	11.0***	1.4

Table 4. Estimated Coefficients on Blue Laws Variables in OLS Fixed Effects
OLS fixed effects models of prices, productivity, and other labor market outcomes 1976-93

Variable, Sector	Blue Laws			Other Blue Laws					F-test:	
REIS-BEA-REA	**MLD**	**MOD**	**SEV**	**CAR1**	**CAR2**	**LBS**	**CLR**	**LOC**	**MLD=MOD=SEV=0**	**MOD=SEV=0**
Prices										
(relative to state GSP deflator)										
GSP retail (SIC 620) deflator	0.0165	-0.0296	0.0159	0.0075	0.0146	0.0082	0.0130	0.0066	6.11***	7.9***
	(2.4)	(-3.2)	(1.7)	(1.4)	(4.4)	(0.9)	(2.0)	(2.0)		
State CPI (Del Negro)	0.0154	-0.0362	0.0231	0.0058	0.0127	0.0082	0.0006	-0.0018	9.1***	11.8***
	(2.8)	(-4.3)	(2.8)	(1.3)	(4.1)	(1.1)	(0.1)	(-0.6)		
Value Added share, Retail										
(as fraction of total state GSP)										
Nominal retail value added share	0.0082	0.0152	-0.0614	0.0450	0.0175	0.0120	0.0666	0.0057	8.6***	12.6***
	(0.4)	(0.9)	(-3.8)	(4.0)	(1.6)	(0.6)	(4.6)	(0.6)		
Real retail value added share	-0.0083	0.0448	-0.0773	0.0375	0.0030	0.0039	0.0536	-0.0008	7.4***	10.7
	(-0.5)	(2.4)	(-4.1)	(3.3)	(0.3)	(0.2)	(4.4)	(-0.1)		
Productivity										
(real value added per capita)										
Real productivity retail	0.0435	-0.0594	0.0008	0.0651	0.0408	0.0002	0.0339	-0.0146	6.7***	9.2***
	(3.0)	(-2.8)	(0.0)	(5.8)	(3.3)	(0.0)	(2.4)	(-1.2)		
CPS State count estimates										
Employment indicators (percent)										
Percentage of workers retail	-0.5057	0.2448	-0.6401	0.3960	0.2985	0.0290	-2.8958	-0.4467	5.1**	3.1*
	(-2.2)	(0.8)	(-2.2)	(2.0)	(2.0)	(0.1)	(-4.2)	(-2.6)		
Percentage of workers part-time	0.1688	-4.0045	3.4645	-0.6143	0.1809	1.0057	-1.0387	0.0562	21.6***	32.4***
	(0.6)	(-8.0)	(7.1)	(-2.6)	(0.8)	(2.5)	(-2.4)	(0.3)		
Percentage part-time and retail	-0.4520	-1.1915	1.0990	0.1241	0.2513	0.2244	-0.6676	0.0132	13.2***	13.3***
	(-3.1)	(-5.0)	(4.8)	(1.1)	(2.6)	(1.2)	(-1.7)	(0.1)		
Percentage of workers in department stores	-0.2164	-0.1009	-0.0552	0.3139	0.1284	-0.1115	-0.3055	-0.0334	6.5***	2.5
	(-2.9)	(-0.7)	(-0.4)	(5.6)	(2.5)	(-1.2)	(-1.2)	(-0.6)		
Nominal hourly wage in retail relative to state average	0.0066	0.291	0.0412	-0.0219	-0.0075	0.0081	0.0193	-0.0456	9.9***	3.5
	(0.8)	(3.0)	(-4.3)	(-3.5)	(-1.7)	(1.4)	(1.8)	(-3.3)		
Real hourly wage in retail	0.0992	-0.2713	0.2030	0.1013	0.1813	0.1720	0.0124	-0.2898	1.9	2.7
	(1.0)	(-2.3)	(1.8)	(1.4)	(2.7)	(-2.4)	(0.1)	(-1.6)		

Table 5. Estimated Coefficients on Dichotomous Blue Laws Variables,
IV Fixed Effects Models of Employment Relative Compensation and other Retail Outcomes 1969-93

Variable, Sector	Blue	Blue Neighbor	F-test
Employment (fraction of state population)			
All FPT employment	-0.1197 (-1.8)	0.0112 (-0.2)	1.7
620 Total SIC retail FPT employment	-0.1680 (-2.3)	-0.0343 (-0.7)	3.3*
All FPT salary employees	-0.0781 (-2.1)	-0.0257 (-0.9)	2.4
620 Total SIC retail	-0.2420 (-2.8)	-0.0861 (-1.2)	5.0
620 Total SIC retail less 627	-0.2138 (-2.6)	-0.0570 (-0.9)	3.8*
621 Building materials and garden equipment	0.0050 (0.0)	0.1001 (1.0)	0.6
622 General merchandise stores	-0.2336 (-2.2)	-0.0869 (-0.8)	2.6
623 Food and grocery stores	-0.1142 (-1.4)	-0.0865 (-1.3)	1.4
624 Car dealers and service stations	-0.2624 (-2.4)	0.0398 `(0.5)	2.9
625 Apparel and accessory stores	-0.1291 (-0.8)	-0.1516 (1.3)	0.8
626 Home furniture, furnishing stores	-0.2368 (-1.7)	-0.0662 (-0.6)	1.7
627 Eating and drinking places	-0.3202 (-2.8)	-0.1622 (-1.8)	5.6**
628 Miscellaneous retail	-0.3848 (-3.0)	-0.1222 (-1.1)	6.2**

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 5. Estimated Coefficients on Dichotomous Blue Laws Variables, OLS Fixed Effects Models of Employment and Relative Compensation, 1969-93 (cont.)

Variable, Sector	Blue	Blue Neighbor	F-test
Annual Compensation per FPT (as fraction of state average, in logs)			
620 Total SIC retail	0.0346 (0.6)	0.018 (1.6)	0.2
620 Total SIC retail salary employees	0.0134 (0.4)	0.0159 (0.4)	0.9
620 Total SIC retail less 627	0.0196 (0.5)	0.0212 (0.5)	0.2
621 Building materials and garden equipment	0.0426 (1.0)	0.0067 (0.2)	0.5
622 General merchandise stores	0.1049 (1.6)	0.0405 (0.6)	1.3
623 Food and grocery stores	-0.0343 (-0.7)	0.0623 (1.5)	1.6
624 Car dealers and service stations	-0.0383 (-0.8)	-0.0233 (0.6)	0.4
625 Apparel and accessory stores	0.0989 (1.5)	-0.0183 (-0.3)	1.4
626 Home furniture, furnishing stores	-0.0287 (-0.6)	-0.0325 (-0.9)	0.5
627 Eating and drinking places	-0.0408 (-0.7)	-0.0560 (-1.4)	0.9
628 Miscellaneous retail	0.0496 (1.0)	-0.0086 (-0.2)	0.5

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 5. Estimated Coefficients on Dichotomous Blue Laws Variables,
OLS fixed effects models of prices, productivity, and other labor market outcomes 1976-93

Variable, Sector	Blue	Blue Neighbor	F-test
REIS-BEA-REA			
Prices			
(relative to state GSP deflator)			
GSP (value added) deflator SIC retail	0.0035 (0.1)	-0.0203 (-0.8)	0.6
State CPI (Del Negro)	-0.0181 (-0.5)	-0.0318 (-1.4)	1.0
Value Added share, Retail			
Nominal retail value added share	0.1449 (0.9)	0.0667 (0.6)	0.4
Real retail value added share	0.1414 (1.0)	0.0870 (0.9)	0.6
Productivity			
(real value added per capita)			
Real productivity retail	-0.2832 (-2.2)	-0.1029 (-1.1)	2.6
Real productivity total state economy	-0.4246 (-1.9)	-0.1900 (-1.2)	2.0
CPS State count estimates			
Employment indicators (percent)			
Percentage of workers retail	-1.281 (-1.5)	-0.8776 (-1.2)	1.2
Percentage of workers part-time	2.740 (1.2)	-0.679 (0.4)	0.8
Percentage part-time and retail	-0.0498 (-0.1)	-0.1169 (-0.3)	0.0
Percentage of workers in department stores	-0.2613 (-1.0)	-0.0410 (-0.2)	0.6
Nominal hourly wage in retail relative to state average	-0.0108 (-0.5)	-0.0138 (-0.5)	0.2
Real hourly wage in retail	-0.0584 (-1.2)	-0.0512 (-1.1)	1.2

*=significant at 5%; ** significant at 1%, *** significant at 0.1%

Controls: time and regional fixed effects. N=1250

Table 6. Blue Laws, Earnings and Employment in the March CPS, 1977-1993

Dependent variable (in logs)	OLS estimates of interaction of retail trade* with blue law:						F-test:					
	MLD	MOD	SEV	RTR*MLD	RTR*MOD	RTR*SEV	MLD=MOD=SEV=0	MOD=SEV=0	RTR*MLD=RTR*MOD =RTR*SEV=0	RTR*MOD=RTR*SEV =0	N	R^2
Nominal weekly gross earnings	0.005 (0.7)	0.011 (0.6)	-0.013 (-0.7)	-0.016 (-1.1)	0.076 (2.0)	-0.107 (-2,9)	0.38	0.36	8.54***	8.82***	166236	0.464
Real weekly gross earnings	0.012 (1.9)	-0.005 (-0.3)	0.001 (0.1)	-0.019 (-1.3)	0.078 (2.1)	-0.111 (-3,0)	1.19	0.33	9.43***	9.36	166236	0.421
Weekly hours	0.007 (1.4)	0.015 (1.1)	-0.015 (-1.1)	-0.010 (-0.9)	0.102 (3.6)	-0.119 (-4.3)	1.15	0.63	9.32***	11.67***	159790	0.137
Nominal hourly wage	0.005 (0.9)	-0.011 (-0,7)	0.012 (0.8)	-0.036 (-2.8)	-0.047 (-1.5)	0.055 (1.8)	0.59	0.36	3.71*	1.88	159790	0.376
Real hourly wage	0.006 (1.0)	-0.036 (-2.3)	0.041 (2.6)	-0.040 (-3.0)	0.016 (0.5)	-0.009 (-0.3)	2.90*	3.57*	3.02*	0.47	159790	0.327

*=significant at 5%; ***=significant at 1%; ***= significant at 0.1%

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  log type:  text
 opened on:  16 Sep 2005, 09:00:29

. reg blue region2-region8 y1970-y1993 larea lpop dems religion2 urban bluerel

      Source |       SS       df       MS              Number of obs =    1250
-------------+------------------------------           F( 37,  1212) =   30.23
       Model |  144.998319    37  3.91887348           Prob > F      =  0.0000
    Residual |  157.104881  1212  .129624489           R-squared     =  0.4800
-------------+------------------------------           Adj R-squared =  0.4641
       Total |    302.1032  1249  .241876061           Root MSE      =  .36003

------------------------------------------------------------------------------
        blue |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     region2 |    .142984   .0496838     2.88   0.004     .0455083    .2404597
     region3 |  -.8660701   .0538176   -16.09   0.000    -.9716561   -.7604841
     region4 |  -.3482708   .0553645    -6.29   0.000    -.4568918   -.2396499
     region5 |  -.4125486   .0490918    -8.40   0.000     -.508863   -.3162342
     region6 |   -.268454   .0682078    -3.94   0.000    -.4022724   -.1346356
     region7 |  -.4770183     .06827    -6.99   0.000    -.6109587   -.3430779
     region8 |  -.4661851   .0703855    -6.62   0.000     -.604276   -.3280942
       y1970 |   -.047713   .0721033    -0.66   0.508    -.1891742    .0937483
       y1971 |  -.0500984   .0721028    -0.69   0.487    -.1915585    .0913617
       y1972 |  -.0696159   .0720867    -0.97   0.334    -.2110444    .0718126
       y1973 |  -.0709449   .0720873    -0.98   0.325    -.2123747     .070485
       y1974 |  -.1324361   .0727356    -1.82   0.069    -.2751377    .0102656
       y1975 |  -.1511024   .0727741    -2.08   0.038    -.2938797   -.0083252
       y1976 |  -.1989414   .0727336    -2.74   0.006    -.3416391   -.0562438
       y1977 |  -.2003362   .0727337    -2.75   0.006     -.343034   -.0576383
       y1978 |  -.1748881    .072267    -2.42   0.016    -.3166703   -.0331059
       y1979 |  -.1761744   .0722697    -2.44   0.015    -.3179619   -.0343869
       y1980 |  -.1632997   .0721488    -2.26   0.024    -.3048501   -.0217492
       y1981 |   -.163445    .072151    -2.27   0.024    -.3049997   -.0218902
       y1982 |  -.2263174   .0723477    -3.13   0.002    -.3682579   -.0843768
       y1983 |  -.2263662   .0723488    -3.13   0.002    -.3683091   -.0844234
       y1984 |  -.2024029   .0721877    -2.80   0.005    -.3440296   -.0607762
       y1985 |  -.2922748   .0724182    -4.04   0.000    -.4343537   -.1501959
       y1986 |  -.3316209   .0725644    -4.57   0.000    -.4739868   -.1892551
       y1987 |  -.3548831   .0726399    -4.89   0.000    -.4973971   -.2123691
       y1988 |  -.3557746    .072647    -4.90   0.000    -.4983024   -.2132468
       y1989 |  -.3553421   .0726461    -4.89   0.000    -.4978681   -.2128161
       y1990 |  -.3507816    .072623    -4.83   0.000    -.4932622   -.2083009
       y1991 |  -.3510695   .0726256    -4.83   0.000    -.4935553   -.2085837
       y1992 |  -.3752564    .072762    -5.16   0.000    -.5180099   -.2325029
       y1993 |  -.3757081   .0727658    -5.16   0.000    -.5184691   -.2329471
       larea |  -.0396257   .0172054    -2.30   0.021    -.0733814     -.00587
        lpop |   .1949255   .0174979    11.14   0.000     .1605961     .229255
        dems |   .4642864   .0808377     5.74   0.000      .305689    .6228837
   religion2 |   .0050572   .0011684     4.33   0.000     .0027649    .0073495
       urban |  -.0152149   .0012656   -12.02   0.000    -.0176979   -.0127318
     bluerel |  -.3172535   .0555771    -5.71   0.000    -.4262916   -.2082154
       _cons |  -.8864057   .2262548    -3.92   0.000      -1.3303   -.4425113
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