Blue Laws

Michael C Burda, Philippe Weil

Blue Laws*

Michael Burda
Humboldt-Universität zu Berlin and CEPR
Philippe Weil
Université Libre de Bruxelles, CEPR and NBER

April 2004

Abstract

This paper investigates the economics of "blue laws" or restrictions on shop-opening hours, most commonly imposed on Sunday trading. We show that 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. An instrumental variable approach identifies the effects to the extent that blue laws are endogenous. We find that blue laws 1) reduce relative employment, 2) raise annual compensation and labor productivity, and 3) depress prices in the retail sector. The primary mechanism appears to be a reduction of part-time employment.

Keywords: Blue laws, shop opening regulations, retail trade, employment
JEL Classification: JEL Numbers: D62, J22, L81

*Many people have heard this paper and it would be impossible to thank all who have contributed positively to its evolution, as did seminar participants at Berkeley, Irvine, Stockholm (IIES), FU Berlin, Frankfurt/Oder, CERGE (Prague), INSEAD, Rostock, Tilburg, WZ Berlin, Cologne, Göttingen, Dortmund, Rauischholzhausen, Freiburg, EUI Florence, Zurich, Mannheim, Bonn, Dresden, Aarhus, the Stockholm School of Economics and Koblenz. We are especially indebted to Katrin Kuhlmann for compiling the US blue law dataset used in the empirical analysis, and to Antje Mertens, Stefan Profit, Marco de la Negro and Michael Kvasnicka for help with data. Thanks are also due the Haas School of Business, UC Berkeley and to CES Munich for hosting both the authors at various stages of the project.

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 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

[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.

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 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 develop 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 mitigating 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 dataset of US states for the period 1969-93, we estimate the effect of state shop-closing laws to relative employment, compensation,

[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.

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 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 5 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" 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. We assume for simplicity, that families cannot choose whether to be manufacturers or retailers. The family type thus should be 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]. For simplicity, we assume that production of the manufacturing good begins daily at time 0 so that M-households can only choose 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.

Preferences of family $i = M, R$ are given by the utility function:

$$\mathcal{U}^i = \phi^i U^i(C^i) + V^i(\ell_s^i, \ell_c^i)$$

where C^i is consumption of the retailed good, and ℓ_s^i and ℓ_c^i denote, respectively, *solitary* and *common* leisure of household i. The distinction we are making between types of leisure is novel, and is designed to capture in a stylized way the idea that there might be coordination externalities in leisure. People might value time on an empty beach and time spent on a crowded beach differently; they might derive different enjoyment from reading a book alone or spending free time with others. 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 communal, 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. The taste for common leisure introduces through preferences an externality in

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

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

private consumption/leisure decisions.[7]

The utility function of both families is increasing and concave in the consumption good ($U' > 0, U'' < 0$) and in the two types of leisure ($V_1^i > 0, V_{11}^i < 0, V_2^i > 0, V_{22}^i < 0$). We assume that the marginal utility of solitary leisure, *holding total leisure constant*, is non-increasing in solitary leisure ($V_{11}^i - V_{12}^i \leq 0$). This restriction rules out strong complementarity in utility between the two types of leisure, which we find implausible. Finally, we impose the familiar Inada conditions: $U(0) = +\infty$, $V_1^i(0, z) = +\infty$ and $V_2^i(z, 0) = +\infty$ for all $z > 0$.

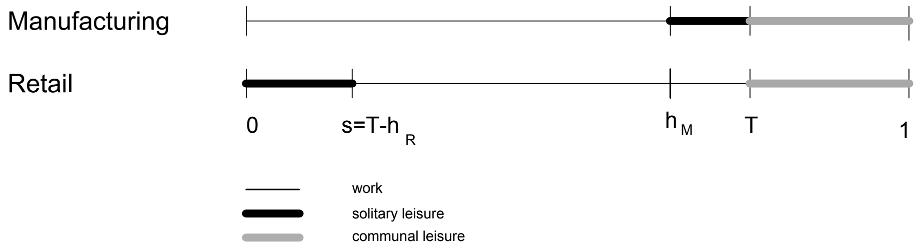

Figure 1: Time line

Because of the Inada condition on $V_1^M(0, \cdot)$, M-households always choose, given T, a shift length $h_M < T$.[8] Thus retail activity represents 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 do not choose to work more than one shift per day.

The resulting structure of days for manufacturing and retail workers is depicted in Figure 1: stores open at time $s = T - h_R$ just after factories do, and close at time T after factories. Leisure periods of manufacturers and retailers overlap from time T to time 1, so that common leisure is $1 - T$. Manufacturers enjoy additional solitary leisure between closing time h_M of factories and closing time T of shops, so that they enjoy $T - h_M$ units of solitary leisure. Finally, the retailers rest on their own between time 0 and time $s = T - h_R$.

[7] The separability assumption is introduced primarily for simplicity and implies that marginal rate of substitution of the two types of leisure is independent of consumption levels. It has the effect of eliminating income effects in the comparative statics analysis.

[8] This ensures that manufacturing households can shop *after* they stop working.

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

$$\max_{C_i, h_i} \phi^i U^i(C_i) + V^i(T - h_i, 1 - T)$$

such that

$$pC_i = w_i h_i$$
$$C_i \geq 0$$
$$T \geq h_i \geq 0$$

where C_i denotes consumption of the final good by household i, p is the price of the final good (choosing the intermediate good as numeraire), and w_i is the (intermediate good) wage rate in sector i. The first-order condition for an interior solution[9] (see equations (15) in the appendix) can be totally log-differentiated to yield, for $i = M, R$:

$$\widehat{\phi}_M - \hat{p} - \theta_M(-\hat{p} + \hat{h}_M) = \lambda_M \hat{h}_M - \mu_M \hat{T}, \tag{1}$$

$$\widehat{\phi}_R + \hat{w} - \hat{p} - \theta_R(\hat{w} - \hat{p} + \hat{h}_R) = \lambda_R \hat{h}_R - \mu_R \hat{T}, \tag{2}$$

where we have used the short-hand $\hat{x} \equiv d \ln x / dx = dx/x$ for log-differentials of a variable x. The coefficient θ_i denotes the Arrow-Pratt measure of relative curvature of the utility function with respect to consumption, and λ_i and μ_i measure, respectively, the (negative of the) elasticity of the marginal utility of solitary leisure with respect to solitary leisure and shop closing time, *holding total leisure constant.* The $\widehat{\phi}_i$ stand for multiplicative shocks to the marginal rate of substitution of consumption for private leisure, so higher values imply greater weight on the former relative to the latter. By assumption, the first two elasticities are positive, while the third one is non-negative. The standard case in which solitary and common leisure are perfect substitutes in utility corresponds to $\mu_i = 0$.

2.2 Firms

Manufacturing firms produce an intermediate (raw) good that is transformed by the retail sector into the final good eaten by our consumers.The manufacturing good Y is produced solely with labor h_M according to the linear

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

technology

$$Y = h_M \tag{3}$$

where the marginal product of hours in manufacturing labor is assumed constant and equal to 1. The retail good C is produced by combining the manufacturing good Y and labor h_R according to a production function that exhibits *private* constant returns to scale:

$$C/h_R = Af(Y/h_R), \tag{4}$$

where $A > 0$ is a multiplicative productivity term, 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.

While total factor productivity A is taken as given by individual retailing firms, but can depend *negatively* on the actions of other agents in equilibrium via a Marshallian externality:

$$A = A(H_R), \qquad A' \leq 0. \tag{5}$$

where H_R represents the *average* number of hours worked in retail. We adopt this specification 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. Think of A as standing 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.[10].

The total log-differential version of the first-order profit maximization conditions for retailers can be written, after some manupulation and after

[10] This "business-poaching" effect is similar to congestion-type externalities found in matching and search models. See Diamond (1982), Pissarides (1991).

imposing the equilibrium conditions $Y = h_M$ and $H_R = h_R$:[11]

$$\begin{aligned} \hat{p} &= \frac{1-\alpha}{\sigma}(\hat{h}_M - \hat{h}_R) + \gamma \hat{h}_R \qquad (6) \\ \hat{w} - \hat{p} &= \frac{\alpha}{\sigma}(\hat{h}_M - \hat{h}_R) - \gamma \hat{h}_R \qquad (7) \end{aligned}$$

where α is the share of factor payments to the manufacturing good input in retail output, and σ is the elasticity of substitution in retail output between the intermediate input Y and retail hours h_R, and γ measures the strength of the (negative) business-poaching retail externality.

Given $\widehat{\phi}_M, \widehat{\phi}_M$, and $\hat{T}$, the four equations (1), (2),(6) and (7) can be solved in the four unknowns $(\hat{w}, \hat{p}, \hat{h}_M, \hat{h}_R)$.[12] This enables us to fully characterize the effect of changing blue laws (i.e., shop closing times which are binding) on the equilibrium retail wage, the final good price, and employment in retail and manufacturing. Other prices and quantities can then be calculated from the respective budget constraints and equilibrium conditions.

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 tak. In doing so, they remove the preference-based leisure coordination externality. As an empirical assessment of welfare will prove difficult if not impossible, we focus on the effects of blue laws on observable variables, and examine how arbitrary (i.e., not necessarily optimal) blue laws affect consumption, hours and prices

Inspection of equations (6) and (7) tells us that in the absence of the retail externality ($\gamma = 0$), the effect of blue laws on the price of final output and on the real retail wage ($\hat{p}$ and $\hat{w} - \hat{p}$) must have the same sign. This link may however be broken in the presence of a Marshallian externality in retail ($\gamma > 0$), and might well lead the retail real wage and the price of the final good to move in opposite directions. In the empirical section of the paper, we will let the data speak as to the relative sign and importance of these effects.

The comparative statics of our model depend crucially on the sign on the real wage elasticity of the labor supply (i.e., on how the elasticity of marginal

[11] See equations (17) and (18) in the appendix.

[12] Recall that the manufacturing wage w_M, measured in terms of the intermediate good numeraire, is constant and equal to 1.

utility of consumption θ_i compares to 1). To avoid a painful taxonomy of results, we consider only the watershed case in which labor supply is wage-inelastic, that is, we impose the assumption

$$A1: \qquad \theta_M = \theta_R = 1.$$

Under $A1$, we conclude immediately from equations (1), (2),(6) and (7) that

$$\hat{h}_M = \frac{\widehat{\phi}_M + \mu_M \hat{T}}{\lambda_M + 1} \tag{8}$$

$$\hat{h}_R = \frac{\widehat{\phi}_R + \mu_R \hat{T}}{\lambda_R + 1} \tag{9}$$

Suppose further for the moment that $\widehat{\phi}_M = \widehat{\phi}_R = 0$, then

$$\hat{h}_M = \frac{\mu_M}{\lambda_M + 1}\hat{T}, \qquad \hat{h}_R = \frac{\mu_R}{\lambda_R + 1}\hat{T}. \tag{10}$$

As long as common and solitary leisure are imperfect substitutes, $\mu_i > 0$, so that relaxing blue laws (increasing T) unambiguously increases hours in *both* manufacturing and retail. Blue laws then affect not only the time (or date) when economic activity stops, but also total labor supply. A trivial, but nonetheless noteworthy and testable, corollary of these results is the fact that the relaxation of blue laws (a rise in T) should be accompanied by a decrease in total common leisure $1 - T$.

In the traditional model with perfect substitutability between common and solitary leisure in both manufacturing and retail , $\mu_M = \mu_R = 0$. In such environments, blue laws are simply irrelevant: they simply shift labor supply through time, but do not affect hours. Imperfect substitutability between common and solitary leisure for at least one type of household is required for blue laws to have economic effects.

3.1 Hours

From (10), we observe that tightening blue laws unambiguously decreases h_M and h_R, and therefore depresses intermediate good output and total value added. However, the effect of tighter blue laws on the intermediate good intensity of retailing h_M/h_R, which is crucial for determining relative price effects, is ambiguous. For the sake of exposition, we again consider here the most intuitive case in which tighter blue laws decrease manufacturing hours *less* than retail hours, or formally $\hat{h}_M - \hat{h}_R > 0$ when $\hat{T} < 0$. For this to hold, the parameters of the model must obey

$$A2: \qquad Q \equiv \frac{\mu_M(\lambda_R + 1)}{\mu_R(\lambda_M + 1)} - 1 \leq 0$$

Since Q can be written as $\frac{\frac{\mu_M}{(\lambda_M+1)}}{\frac{\mu_R}{(\lambda_R+1)}} - 1$, it measures the relative responsiveness of manufacturing labor supply with respect to closing law changes (compared with retail). The smaller the uncompensated labor supply elasticity of manufacturing families, the more likely the condition will hold. The restriction $A2$ is met in in several special cases worth noting:

- common and solitary leisure are perfect substitutes for M-families ($\mu_M = 0$) but not for R-families ($\mu_R > 0$).
- retailers exhibit significantly less concavity in the leisure argument than manufacturing workers $\lambda_M >> \lambda_R \approx 0$.
- the representative families are identical with constant elasticities of substitution.

Because anything is possible in general equilibrium with less restrictive parameter constellations, the empirical analysis refrains from assumptions regarding the direction of these effects, seeking instead to establish them by reference to the data.

3.2 Retail wages

Blue laws influence the retail wage through two channels. First, under assumption A2, tighter blue laws increase the intermediate good intensity of retail output ($\hat{h}_M - \hat{h}_R > 0$). Second, more restrictive opening hours potentially raise retail productivity through the Marshallian externality $A(H_R)$ by reducing retail hours ($\hat{h}_R < 0$). Both effects contribute to raising the retail real wage.

3.3 Final good prices

Technically, the effect of blue laws on prices is ambiguous. Under assumption $A2$, stricter blue laws tend to raise the price of final output by increasing h_M/h_R, from (6). The economic intuition is that increased intensity of the intermediate (inventory or raw input per hour worked in retail) must reduce its equilibrium value marginal product, which is $1/p$ and can fall only if $\widehat{p} > 0$.At the same time, a restriction of hours worked ($\hat{h}_R < 0$) *increases* equilibrium retail productivity via the congestion externality and thus tends to *lower* retail prices. Combining (6) and (10), the former effect dominates if and only if the Marshallian externality is sufficiently weak:

$$\gamma < \frac{1-\alpha}{\sigma} Q \tag{11}$$

where Q is defined in $A2$. Under $A2$, $Q \leq 0$, so this condition will never obtain and the Marshallian effects always dominates, i.e. blue laws tend to reduce the price of output in the retail sector. Naturally, if $\mu_M = \mu_R$ there are no effects on prices, since employment in both sectors is independent of the blue law.[13]

3.4 Final output

Stützel (see Stützel 1958, 1970) asserted 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. We now show that "Stützel's Paradox" does not in general hold in our model. In point of fact, blue laws lower retail output unless the retail productivity externality is very strong.

From the retail production function (4) and the definition of the retail labor share α, we find that

$$\hat{C} = (1-\gamma)\hat{h}_R + \alpha(\hat{h}_M - \hat{h}_R).$$

[13] 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 nonzero μ_i and the existence of a strong negative retailer externality. See Ifo-Institut (1995, 2000).

This expression is generally non-zero: there is no reason whatsoever to expect aggregate retail output to be insensitive to blue laws. In point of fact, tighter blue laws ($\hat{T} < 0$) *reduce* retail output under assumption $A2$ whenever

$$\gamma < 1 + \alpha\eta. \tag{12}$$

Since $0 > \eta \geq -1$ and $0 < \alpha < 1$, this inequality is likely to hold when γ is close to zero, i.e. when the retailer externality is negligible. For larger values of γ, however, tighter blue laws could *raise* aggregate final output. This result might well be in the spirit of Stützel's paradox, although only $\hat{C} = 0$ obtains only as a special case and is most often a lump-of-demand fallacy.

3.5 Summary

As is generally the case, regulations in general equilibrium do not always have clear-cut effects. A tightening of opening hours regulation ($\hat{T} < 0$) rolls back the time until which the shop may stay open, but need not tie down opening times of stores. In fact, as long as the Inada conditions hold for solitary leisure, retailers will always open somewhat later than $t = 0$, the beginning of the day. Thus it is always possible for retailers to "offset" a tightening of opening hours by earlier; only if they are truly indifferent between the two forms of leisure is the economy unaffected along this dimension. To the extent their labor input is reduced, retail output is affected, as are prices, wages and productivity.

While the sign of these effects is not always unambiguous, we have suggested that, for plausible parameter configurations (assumptions $A1$ and $A2$), one should expect, regardless of the value of γ,

$$\hat{T} < 0 \Longrightarrow \begin{cases} \hat{h}_M - \hat{h}_R & > 0 \\ \hat{h}_R & < 0 \\ \hat{w} - \hat{p} & > 0 \end{cases}$$

On the other hand, a strong Marshallian retail externality (γ large) means that $T < 0$ could lower retail prices ($\hat{p} < 0$), and lift consumption ($\widehat{C} > 0$). This is because lower retail opening hours lifts total factor productivity in the sector, raising wages, productivity, and output.[14]

[14] These predictions can be compared with those of Gradus (1996), who studies a more

4 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.[15]

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 nonrivalrous "good" which is not traded in a market, presumably due to the difficulty in assigning property rights, and infinitesimally small traders do not internalize, as in the vision of Marshall, the congestion externality they inflict on each other.

One could imagine a number of institutions – clubs, religion and slavery

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.

[15]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.

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 undercoordination 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.

5 The empirical effects of blue laws

5.1 Empirical Strategy

The model described in the previous sections allows us isolate a number of qualitative predictions for the effects of blue laws on observable variables. Under assumptions $A1$ and $A2$, they can be summarized as follows:

- two externalities will determine the qualitative direction of the net effect. These are the Marshallian congestion effect, summarized by γ and the communal leisure externality μ_R.and μ_R;
- blue laws have no effect if $\mu_i = 0$ for i=M and R. Intuitively, agents could in principle offset the law if they are indifferent about the time they spend together;[16]
- Stützel's Paradox obtains on a set of measure zero, but under assumptions $A1$ and $A2$, the retail externality dominates the effect on retail prices, meaning that the relative price of retail should be lower in regulated regimes.

In this section we seek evidence from the United States that retail restrictions – here in the form of Sunday closing or "blue laws" – on opening

[16] 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.

hours have an effect on observable variables. Rather than specifying and estimating a structural model, we first estimate nonparametric, full fixed effect models ("difference-in-difference" specifications) which attribute all time differences to a single trend. The discussion of the last section suggests that it will be necessary to take the issue of endogeneity of regime seriously when attempting to identify the effects of the laws, since authorities acting in the public interest are most likely to regulate in those areas in which the gain from harmonizing activity are greatest. This will require a careful search for instruments. Finally we turn to individual CPS data to verify the effects at the individual level.

5.2 Data

Our analysis was conducted on a panel of the fifty US states over the period extending from 1969-1993, and involves – here in the form of Sunday closing or "blue" laws. Because some variables are available for only a subsample of this period or only sporadically, however, the estimation period will generally be shorter. Implicitly, we assume that each state replicates the national average, up to an additive constant and an error term. Because many variables are available for only a subsample of this period or only sporadically, showever, the estimation period will generally be shorter. A complete table of summary statistics of the data used is presented in the Appendix.

5.2.1 Blue Laws in the United States

A distinctive element of this study is the use of a unique dataset of blue laws regulation in the US states in the period 1969-1993. The collection of these data involved a somewhat tedious review of state legislative records to identify and track changes in regulatory regimes. Because it is difficult to accomodate every nuance in state legislation, a set of eight dummy variables were defined over the sample.[17] Most important among these are the dummy variables STRICT, MODERATE and MILD, which describe the law in place during the year in a particular state. STRICT describes a state regime in which Sunday sales is severely regulated, and represent exceptions rather than the rule. Trade in food, tobacco, liquor as well as hardware, clothing and other goods are prohibited. MODERATE refers to regimes which exempt food explicitly from the SEVERE regime, while MILD adds a number of

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

additional exceptions to food, including hardware, dry goods, or appliances, but continue to rule out a number of products, especially alcoholic beverages. An extended set of additional laws were encoded for the analysis consists of states with Sunday prohibition of motor vehicle sales (MVREST), Sunday closing regulations applying solely to large establishments (LARGBS), common labor restrictions prohibiting hiring on Sundays (CLR), and devolution of authority to regulate Sunday trading to local communities (LOCDIS).

In the complete sample of fifty US states (Washington DC was excluded) for 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 STRICT, SEVERE or MILD equaling one; this rises considerably if one includes restrictions on motor vehicle sales (MVREST: 39.8% of all observations), devolution of regulatory discretion to local authorities (LOCDIS: 20.6% of all observations), limitation on large retail businesses (LRGBUS: 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) Figures 2-7 display snapshots of the regulatory regimes regarding blue laws over the potential sample period. 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, there is obvious heterogeneity among states in regions and over time, suggesting that idiosyncratic influences are also at work, for example in Vermont, Florida, Washington, Arkansas and Tennessee.

Figure 2 here

5.2.2 Macroeconomic" Data from US States (REIS)

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. This data, which are generated by a number of sources including the Census, include sectoral nominal and real value-added, nominal compensation (wages and salaries), full and part-time employment, as well as overall income for the US states, regions, and the nation as a whole. These data were available for the SIC 520 classification (retail trade in the broad sense), while employment and total compensation per employee were also available for the following 3-digit level sectors:

- Building materials and garden equipment (521)
- General merchandise stores (522)
- Food stores (523)
- Automotive dealers and service stations (524)
- Apparel and accessory stores (525)
- Home furniture and furnishings stores (526)
- Eating and drinking places (527)
- Miscellaneous retail (528)

5.2.3 US Current Population Survey

The third dataset employed in this study is 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 considered the following data generated by running state counts on CPS data and constructing the following proportions for each state i and year t:

- proportion of all workers employed in retail (SIC 520)
- proportion of all workers employed part time
- proportion of all employed workers in both retail (SIC 520) and part time
- proportion of all employed workers employed in department stores and mail order.

We also estimate the average hourly wage rate, in retail and overall, in state-years for which the CPS is available. Since these variables are used in the empirical analysis as regressands only, sampling error is an issue of estimation efficiency but not consistency. Finally, we employ the CPS household information directly in the March rotations. By merging the blue laws information with readily available 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.

5.3 Full Fixed Effects Specification

5.3.1 OLS Results

Table 1 presents the first set of empirical results involving "macro" US state data. The simple full fixed effect or "difference-in-difference" specification was implemented for (natural logs of) the ratio of the retail sector value to the state-year total or average. Each line in the table represents a single OLS regression of the variable of interest on a complete set of year and state dummies, plus alternately the dummy variables for the three regimes in the strict sense (STRICT, FOOD, and MILD), or these plus an extended set of blue laws (MVREST, LGRBUS, LOCDIS and CLR). Significance was computed on the basis of robust standard errors. To save space, we report only estimated coefficients and significance levels, as well as the F-statistic that all dummies are jointly zero. For the FOOD and MILD variables - corresponding to the bulk of the observations - the effect of blue laws is generally negative on employment, positive on compensation and labor productivity (per full and part time employee) and negative on prices. The price effect ranges from 2.7 to 4.2 log points. Point estimates are frequently significant at the 0.01 level. On the other hand, coefficient estimates on the STRICT regime dummy flip sign in several cases, indicating additional aspects not captured by the model. (only about 5% of all observations belong to this regime). We speculate this has to do with the proliferation of less efficient "mom and pop" shops under tight blue law regimes. Of the extended blue laws regimes, motor vehicle sales restrictions and large business restrictions were most frequently significant, being associated with lower employment and higher productivity and compensation. Strikingly, restricting Sunday car sales is associated with *higher* prices in retail.

In Table 2, we report the same difference-in-difference analysis for detailed three-digit relative employment data (full and part time) and relative compensation per FPT employee. Disaggregation helps us not only determine the most important source of the effect of blue laws - if they affect retail asymmetrically - but also allow a number of reality checks on the analysis. For example, the inclusion of the large sector 527 (eating and drinking establishments) helps reveal whether the different laws have a qualitatively different feature (they are most often affected by MILD, the traditional prohibition on liquor sales in restaurants), but may also be affected by a knock-on effect deriving from bundling Sunday shopping outings (a "mall food" effect of sorts).

In general, significant negative employment effects are concentrated in the sectors 523 (food and grocery stores) 524 (car dealers and service stations) 525 (apparel and accessory stores), and the behemoth 527 sector (eating and drinking establishments). As total retail employment, the STRICT regime appears qualitatively different, increasing employment in sectors 521,523, and 524. The motor vehicle sales restriction has a strongly significant effect on all sectors. For compensation, the results are consistent with those of Table 1, with the greatest effect coming from the "MILD" category, raising relative compenation by 2.0-4.0 log points.

5.3.2 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 may be inappropriate in the econometric analysis to assume that the regulatory environment is exogenous.[18] The problem is a common one: in democracies, legal institutions tend to reflect the popular will, which can vary over time and space. In a panel context, the endogeneity of policy may never be reflected over time, but between units in the data set, and the predominance of variance between states in the blue law dataset alerts us to this problem. If blue laws are indeed endogenous, OLS estimates will suffer from simultaneous equation bias.

To highlight this point, suppose that the true model determining the (log) of the variable of interest y in sector j in state i in year t is given by :

$$y_{ijt} - y_{it} = \alpha_0 + \alpha_1(y_{jt} - y_t) + \alpha_2 b_{it} + \alpha_3 x_t + u_{ijt} \tag{13}$$

where b_{it} stands for a single blue law dummy variable, and the omission of subscripts denote averages over the omitted category, i.e. y_{it} is the state i average in year t for variable y. The component of y_{ijt} not explained by the model is given by u_{ijt}, representing state-time specific factors driving y but not directly related to the direct economic impact of the blue laws. Now

[18] While we eschewed a welfare analysis, the last sections suggest that blue laws may or may not reflect the optimal choice of agents. In particular several sources of influence can be identified: differing tastes for consumption ϕ_i; differing preferences for coordination of leisure μ_i; strong Marshallian effects in retail γ (perhaps because the business stealing effect is too strong) giving rise to regulation restricting competition.

think of a simple supply of blue law legislation governed by

$$b_{it} = \beta_0 + \beta_1 x_t + \beta_2 z_t + \beta_3 TASTES_{it} + v_{it} \tag{14}$$

where x_t and z_t represent factors motivating state legislatures to pass blue laws, with the former appearing in equation (13) as well. Most important of these factors is the "taste" for retail, which was represented in the model as ϕ and μ. States with high values of ϕ (strong preferences for consumption) or low values of μ (indifference towards communal leisure or preferences for shopping while others are working) should be less likely to have blue laws ($\beta_3 < 0$). Since tastes are unobservable, an econometrician estimating (13) will necessarily include tastes in the error term u_{ijt}. If $\alpha_2 < 0$, estimation bias will be positive.

Even under the best of circumstances, finding appropriate instruments is a tricky affair. Ideally, one would seek variables correlated with (or a priori causal for) b, which are nevertheless orthogonal to u (and the tastes of households in the state for retail), or more particularly, factors which led to the institution of blue laws which are independent of retail variables in terms of the mechanism described in the paper. In the end, we chose three different instruments: the fraction of the state population which in the 1980 and 1990 Censuses classified as of Christian religion; the female participation rate in each state-year; and the deviation of the blue law regime from the regional average. The "Christian population" could explain adoption of a blue law despite a pro-consumption, leisure-indifferent population: it represents the means of getting the people to church on Sunday. By using religion to identify exogenous variation of blue laws, we trace their true effects on the variables of interest. Similarly, female labor force participation rate represents trends in labor supply which have little to do with blue laws or retail developments, but could influence both. Presumably, states with high female participation would seek to abolish laws that limit part-time work opportunities, in whatever sector they may be. Finally, the deviation of a state's blue law dummy from its regional average (defined using the eight Census Bureau regions) represents those legislative developments which represent departures from regional preferences.

Instead of estimating the effects of regimes individually, the small set of suitable instruments forced us to collapse the blue law variable into a single indicator, which was implemented as the sum of SEVERE, FOOD, and MILD ("BLUE") and the sum of BLUE plus MVREST, LRGBUS; LOCDIS and CLR ("SUPERBLUE"). Tables 3 and 4 which report the results. Now each entry corresponds to a regression. The OLS estimate is reported as a benchmark. The first column IV(I) corresponds to instrumental variables with religion and female participation as instruments, the second column IV(II) reports the single deviation of BLUE and SUPERBLUE from their regional averages.

The results are consistent with the OLS evidence of Tables 1 and 2, especially for the IV estimates using religion and female participation. States with blue laws of the narrow definition have 9 log points less relative employment, 16.1 log points higher wages, 17.4 log points higher productivity, and 6.1 log points lower relative prices. Value added shares are unaffected. Part-time work in retail is reduced by 1.7 percentage points, although overall part time is unaffected. The IV estimates suggest that negative employment effects emanate from general merchandise stores and eating and drinking establishments, while apparel food and grocery stores show little clear direction. Compensation is significantly higher under regulation in most sectors (522, 523, 525, 527). The results for SUPERBLUE, which have no direct quantitative interpretation, are reported as a consistency check and are similar to those for BLUE.

5.4 CPS March 1979 Results

Finally, we turn to individual CPS data for "independent" verification of the macro US state results. We took a representative year (1979) in which the state regimes were highly regulated (22 states had blue laws in the narrow sense). We considered the following three variables on individual workers in employment in March: (1) real weekly gross earnings, (2) weekly hours and (3) real hourly wages. 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 dummy variable, plus an interaction for the retail sector - this time defined *without* eating and drinking establishments - with the three dummies for state blue laws (narrow definition). The results, while not as strongly significant as those from the panel, support the conclusion that Sunday closing regulation affects employment negatively. As with the macro data, there is no evidence that the hourly wage in retail is affected. 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.

5.5 Summary of Results and Relation to Previous Work

Our findings indicate significant effects on observable variables. For the MILD regime, which is the most common, relative employment is generally reduced by about 2.5%, compensation and productivity are increased by about 3% and 5% respectively, and prices are depressed by 2.8% These effects are detectable with instrumental variable estimation at a cruder and less precise level. The data reject the notion that blue law regulatory regimes are the same, and point estimates suggest a nonmonotonicity in the effects of retail regulation. In their severe form, blue laws seem to reduce the overall efficiency of the retail sector while *increasing* employment. This is consistent with earlier findings of Morrison and Newman (1983) and Moorehouse (1984) that regulation is associated with a smaller proportion of larger stores, and that deregulation is associated with a shift to larger stores.

Another central finding is that blue law regulation reduces, rather than raises price margins in US data, measured as the relative price deflator of retail sector output relative to overall state value-added. This is not inconsistent with the scant research extant 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.[19]

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 actually induce more competition and result in lower travel costs as well

[19] 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.

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 equilibrum supply-demand model with parameters estimated from a Swedish study.

6 Conclusion

A fundamental problem in a society whose members value shared or communal leisure is how to coordinate activity.[20] 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 coordination. 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, and are likely to yield "superstar" effects. In that sense, it doesn't matter whether the Sabbath is Friday, Saturday or Sunday, as long as we mostly agree that there is one, and keep it.[21]

[20] 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).

[21] 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 this dimension of shop-closing regulation, see Thum and Weichenrieder (1997).

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 wages, productivity and especially employment we estimate must be put be compared with any putative gains from synchronized leisure. The negative effect on prices alerts us to the possibility that external effects may exist in the retail sector, however, and we plan to investigate this aspect in further versions of this paper. In their severe form, blue laws sometimes take the "wrong sign"; one interpretation is that tight regulation props up inefficient ("mom-and-pop") retailing structures with low productivity, and underutilized capacity and overstaffed operating levels. 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.

It should also be stressed that our results - while applicable to a retail sector in which almost a quarter of all US 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.

Appendix

.1 More Details on Retail Trade in General Equilibrium with Leisure and Retailing Externalities

.1.1 Consumers

The first-order condition for an interior solution[22] of a sector $i = M, R$ consumer is:

$$(w_i/p)\phi^i U_1^i[(w_i/p)h_i] = V_1^i(T - h_i, 1 - T). \tag{15}$$

Given T and the real wage w_i/p, we can thus compute the optimal shift length h_i, and thus labor supply, of each i-household. Log-linearizing these first-order conditions gives us equations 1 and 2 in the text, with

$$\theta_i \equiv -\frac{U^{i\prime\prime}(C_i)C_i}{U^{i\prime}(C_i)} > 0, \qquad \lambda_i \equiv -\frac{V_{11}^i(T - h_i, 1 - T)}{V_1^i(T - h_i, 1 - T)} h_i > 0,$$

and

$$\mu_i \equiv -\frac{V_{11}^i(T - h_i, 1 - T) - V_{12}^i(T - h_i, 1 - T)}{V_1^i(T - h_i, 1 - T)} T \geq 0.$$

The elasticity of the marginal utility of consumption θ_i is simply the Arrow-Pratt measure of relative curvature of the utility function with respect to consumption, while λ_i and μ_i measure the (negative of) elasticity of the marginal utility of solitary leisure with respect to solitary leisure and shop closing time, respectively. By assumption, the first two elasticities are positive, while the third one is non-negative. The standard case in which solitary and common leisure are perfect substitutes in utility corresponds to $\mu_i = 0$.

.1.2 Manufacturing

Because of the linearity of the production function in manufacturing, the competitive wage rate in that sector(expressed in units of the manufacturing good) is simply

$$w_M = 1. \tag{16}$$

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

.1.3 Retail

Competitive retail firms, which take A as given, choose the optimal mix of inputs Y/h_R to maximize profit per retail hour (in units of the manufacturing good numeraire) $pAf(Y/h_R) - Y/h_R - w_R$, so that

$$1/p = Af'(Y/h_R). \tag{17}$$

Since (private) returns to scale are constant, the real wage in retail is the excess of output per retail hour over factor payments to the manufacturing good input:

$$w_R/p = A.[f(Y/h_R) - (Y/h_R)f'(Y/h_R)]. \tag{18}$$

Noting that $A = A(h_R)$ and $Y = h_M$ in equilibrium , and log-linearizing these expressions yields equations (6) and (7) in the text, with

$$\alpha \equiv \frac{(h_M/h_R)f'}{f} > 0 \tag{19}$$

denoting the share of factor payments to the manufacturing good input in retail output, and

$$\sigma \equiv \frac{\hat{h}_M - \hat{h}_R}{\hat{w}} > 0 \tag{20}$$

representing the elasticity of substitution in retail output between the intermediate input Y and retail hours h_R, and

$$\gamma = -\frac{h_R A'(h_R)}{A(h_R)} \geq 0.$$

.2 The planner's optimum and a rationale for blue laws

Consider the optimal policy of a benevolent social planner seeking to maximize the unweighted sum of the welfare of the two types of households:

$$\max_{\substack{C^M, C^R,\\ T, h_M, h_R}} \left\{U^M(C^M) + V^M(T - h_M, 1 - T)\right\} + \left\{U^R(C^R) + V^R(T - h_R, 1 - T)\right\}$$

subject to the production functions (3), (4) and (5) and the resource constraint $C = C^M + C^R$ The first order conditions characterizing the optimum are

$$U_1^M = U_1^R \tag{22}$$

$$A(h_R)f' = V_1^M / U_1^M \tag{23}$$

$$A(h_R)(f - \frac{h_R}{h_M} f' - \gamma) = V_1^R / U_1^R \tag{24}$$

$$V_1^M + V_1^R = V_2^M + V_2^R. \tag{25}$$

Denote the solution chosen by the social planner as $\{C^{M*}, C^{R*}, h_R^*, h_M^*, s^*\}$. It deviates from an arbitrarily regulated market solution by explicitly taking into account the two external effects imposed by the retail sector on the economy: first, the effect of leisure's timing on total welfare; and second, the congestion externality ("ruinous competition") implied by the atomistic behavior of retailers. The first condition equates marginal utility of consumption (but not necessarily consumption levels) across the two families. The second and third equations equate the the marginal (social) product of labor for each family with the marginal rate of substitution of consumption for s-leisure in each family. The last condition (25) explicitly recognizes the social externality of c-leisure, and equates the net social utility of an additional hour spent by the two representative households jointly in c-leisure to the "opportunity costs" spent in solitude.

A References

Batzer, E. (1984) "Änderung des Ladenschlußgesetzes"? *Ifo-Schnelldienst* 15/84, 6-8.

Becker, G. (1965) "A Theory of the Allocation of Time" *Economic Journal* 75:493-517.

Bennett, R. (1981) "Regulation of Services: Retail Trading Hours," in B. Twohill, ed., *Government Regulation of Industry* Conference Series Number 9, Newcastle: Institute of Industrial Economics.

Clemenz, G. (1990) "Non-sequential Consumer Search and the Consequences of a Deregulation of Trading Hours," *European Economic Review* 34:1323-37.

De Meza, D. (1984) "Is the Fourth Commandment Pareto Optimal"? *Economic Journal* 94: 379-383.

Euromonitor (1995) (ed.) *Retail Trade International* Vol. 1-4 London.

Gradus, R. (1996) "The Economic Effects of Extending Shop Opening Hours" *Journal of Economics* 64:247-63.

Hamermesh, D. (1996) *Workdays, Workhours and Work Schedules*, Kalamazoo: Upjohn Institute for Employment Research.

Ifo-Institut für Wirtschaftsforschung (1995) *Überprüfung des Ladenschlußgesetztes vor dem Hintergrund der Erfahrungen im In- und Ausland* (An assessment of shop-closing regulation in the context of domestic and international experience). Report to the Federal Labor and Economics Ministries, Munich, August.

Imgene, C. (1986) "The Effect of 'Blue Laws' on Consumer Expenditures at Retail," *Journal of Macromarketing* 6:53-71.

Kay, J. and C. Morris (1987) "The Economic Efficiency of Sunday Trading Restrictions," *Journal of Industrial Economics* 36:113-129.

Kay, J., C. Morris, S. Jaffer, and S. Meadowcroft (1984) *The Effects of Sunday Trading:The Regulation of Retail Trading Hours.* London: Institute of Fiscal Studies Report Series No.13.

Knott, A. (1995) *Das Ladenschlußgesetz. Mögliche Auswirkungen einer Liberalisierung auf den Einzelhandelssektor.* Diplom-Thesis, Humboldt-Universität zu Berlin.

Laband, D. and D. Heinbuch (1987) *Blue Laws: The History, Economics, and Politics of Sunday-Closing Laws* Lexington: Lexington Books.

Morrison, S. and R. Newman (1983) "Hours of Operation Restrictions and Competition Among Retail Firms," *Economic Inquiry* 21:107-114.

Putnam, R. (1995) "Bowling Alone: America's Declining Social Capital" *Journal of Democracy* 6: 65-78.

Rybczynski, W. (1991) "Waiting for the Weekend," *The Atlantic Monthly* August.

Sanyal, K. and R. Jones (1982) "The Theory of Trade in Middle Products," *American Economic Review* 72.

SOU (1991) Betänkande av 1989 års affarstidsutredning *Affärstiderna* 1991:10

Stehn, J. (1987) "Das Ladenschlußgesetz – Ladenhüter des Einzelhandels"? *Kieler Discussion Paper* No. 128, January.

Stützel, W. (1958) *Volkswirtschaftliche Saldenmechanik: Ein Beitrag zur Geldtheorie.* Tübingen: J.C.B. Mohr.

Tanguay, G. L. Vallée, and P. Lanoie (1995) "Shopping Hours and Price Levels in the Retailing Industry: A Theoretical and Empirical Analysis," *Economic Inquiry* 33:516-524.

Thum, M. and A. Weichenrieder (1997) "'Dinkies' and Housewives: The Regulation of Shopping Hours," *KYKLOS* Vol. 50(4):539-559.

Weiss, Y. (1996) "Synchronization of Work Schedules," *International Economic Review* 37:157-179.

Table 1. Estimated Impact of Blue Laws on US Retail (SIC 520) Full Fixed Effects Model (OLS)								
Variable	Blue laws			Extended Blue Laws				Joint F-test
	STRICT	FOOD	MILD	MVREST	LARGBS	CLR	LOC	
REIS 1977-93								
Relative Employment	0.019**	-0.027**	-0.024*					8.94
	0.023**	0.022**	-0.022*	-0.116**	-0.037**	0.000	-0.001	9.09
Relative Compensation	0.002	-0.002	0.029**					3.89
	0.002	-0.010	0.030**	0.020	0.009	0.009	-0.001	3.36
Relative Productivity	-0.030**	0.006	0.053**					15.8
	-0.030**	-0.056**	0.054**	0.124**	0.057**	0.026*	0.029**	16.6
Relative Price Deflator	0.009	-0.016	-0.028*					3.29
	0.009	-0.042**	-0.027*	0.044**	0.026	0.003	0.024**	3.03
Value Added Share, Retail	0.224**	-0.046**	0.009					13.3
	0.021*	-0.079**	0.012	0.039**	0.049*	-0.031	0.029*	14.9
CPS 1977-93								
Relative Retail Employment	0.350	-0.327	0.082					0.69
	0.341	-0.041	-0.259	1.336	-1.60*	-2.77**	-1.12**	5.33
Part-time Employment	2.291**	-0.477	-0.037					10.7
	2.247**	-0.668	-0.228	1.646	-1.055	-0.372	1.020**	8.02
Part-time in retail	0.809*	-0.426	-0.187					3.19
	0.793*	-0.151	-0.386	0.633	-1.199**	-1.196*	-0.165	4.30
Department Store Employment	-0.188	0.060	-0.077					0.86
	-0.192	-0.124	-0.097	0.438	0.146	-0.581	-0.157	1.40
CPS Hourly Wage	-0.031	-0.003	0.002					0.99
	-0.032	0.026	-0.0014	-0.043	-0.047	-0.070**	0.008	2.32

Notes: * and ** indicate significance at 0.05 and 0.01 levels, respectively.
Reference category: Alabama in 1969.

Table 2. Estimated Effects of Blue Laws
OLS Fixed Effects Model, 3-Digit Sectors, 1969-93

Variable, Sector	Blue laws			Extended Blue Laws				Joint F-test
	STRICT	FOOD	MILD	MVR	LBS	CLR	LOC	
Rel. Employment								
521 Building materials	0.138**	-0.051	-0.008					6.77**
and garden equipment	0.142**	0.028	-0.017	-0.089*	-0.156*	0.070*	-0.039	5.35**
522 General	0.006	0.075**	-0.009					4.68**
merchandise stores	0.010	0.131**	-0.011	-0.106**	-0.070	0.011	-0.006	5.95**
523 Food and grocery	0.029**	-0.018*	-0.055**					10.12**
stores	0.033**	-0.000	-0.052**	-0.058**	0.001	0.004	0.011	8.90**
524 Car dealers and	0.028**	-0.026**	-0.005					9.33**
service stations	0.028**	0.006	-0.003	-0.073**	-0.014	-0.020	-0.029**	9.17**
525 Apparel and	-0.050**	-0.084**	-0.028					11.27**
accessory stores	-0.040**	0.006	-0.022	-0.216**	-0.058*	0.034*	0.000	13.53**
526 Home furniture,	-0.027*	0.001	0.047**					5.09**
furnishings stores	-0.019	0.067**	0.055**	-0.153**	-0.025	0.040**	-0.033**	11.87**
527 Eating and	0.017	-0.067**	-0.091**					10.65**
drinking places	0.025	0.001	-0.083**	-0.205**	-0.012	-0.024	0.026	7.07**
528 Miscellaneous	0.009	0.005	0.044**					4.90**
Retail	0.010	0.039*	0.041**	-0.063**	-0.051*	0.005	0.000	3.68**

Table 2. Estimated Impact of Blue Laws, OLS Fixed Effects Model, 3-Digit Sectors, 1969-93 (cont.)

Variable, Sector	Blue laws			Extended Blue Laws				Joint F-test
	STRICT	FOOD	MILD	MVR	LBS	CLF	LOC	
Rel. Compensation								
521 Building materials and garden equipment	-0.018	-0.009	-0.005					1.30
	-0.015	0.003	0.000	-0.050**	0.024	-0.005	-0.004	4.11**
522 General merchandise stores	0.022*	0.010	0.034**					6.02**
	0.018	-0.038**	0.036**	0.105**	0.058*	-0.004	-0.017*	11.3**
523 Food and grocery stores	-0.023*	0.009	0.030**					5.31**
	-0.023*	0.011	0.028**	0.025	-0.022	0.030**	-0.025*	5.78**
524 Car dealers and service stations	-0.016	0.007	0.028**					6.94**
	-0.015	0.010	0.029**	-0.015	0.003	0.002	0.009	3.79**
525 Apparel and accessory stores	-0.009	0.001	0.025*					2.14
	-0.011	-0.019	0.028**	0.028	0.047*	-0.026**	-0.014	4.06**
526 Home furniture, furnishings stores	-0.008	0.001	-0.016					0.50
	-0.009	0.022**	-0.014	-0.045*	-0.002	-0.027**	-0.036**	3.90**
527 Eating and drinking places	-0.005	-0.035**	0.021*					5.44**
	-0.004	-0.028**	0.022*	-0.035	0.000	-0.009	0.031**	7.18**
528 Miscellaneous Retail	0.028*	0.006	0.038**					5.35**
	0.026*	-0.034*	0.036**	0.088**	0.023	0.007	0.024*	4.86**

Table 3. Estimated Impact of Blue Laws on US Retail (SIC 520) Full Fixed Effects Model (OLS & IV)						
Variable	BLUE			SUPERBLUE		
	OLS	IV(I)	IV(II)	OLS	IV(I)	IV(II)
REIS Data (1977-93)						
Relative Employment	-0.006	-0.090**	0.004	-0.011**	-0.068**	0.003
Relative Compensation	0.006	0.161**	0.005	0.003	0.121**	0.004
Relative Productivity	0.012	0.174**	0.009	0.014**	0.131**	0.007
Relative price deflator	-0.013*	-0.061**	-0.015*	0.000	-0.047**	-0.012*
Share of Value Added	-0.010	0.021	0.002	-0.003	0.015	0.001
CPS Data (1977-1993)						
Relative Retail Employment	-0.009	0.325	0.341	-0.352*	0.243	0.267
Part-time Employment	0.394	-0.965	0.251	0.271	-0.732	0.197
Part-time in Retail	-0.023	-1.713**	0.162	-0.146	-1.296**	0.127
Department Store Employment	-0.052	0.153	-0.003	-0.033	0.115	-0.002
CPS Hourly Wage, Retail	-0.009	-0.012	-0.018	-0.007	-0.009	-0.014

Table 4. Estimated Impact of Blue Laws on US Retail (SIC 520) 3-Digit Sectors (OLS & IV)

Variable	BLUE			SUPERBLUE		
	OLS	IV(I)	IV(II)	OLS	IV(I)	IV(II)
Relative Employment						
521 Building materials and garden equipment	0.040*	0.027	0.046*	-0.006	0.020	0.037*
522 General merchandise stores	0.028	-0.294**	0.041*	0.018	-0.222**	0.033*
523 Food and grocery stores	-0.005	-0.039	0.008	-0.004	-0.029	0.006
524 Car dealers and service stations	0.001	0.011	0.000	-0.014**	0.009	0.000
525 Apparel and accessory stores	-0.058**	0.290**	-0.036**	-0.036**	0.219**	-0.030**
526 Home furniture, furnishings stores	-0.002	0.094*	-0.008	-0.005	0.071*	-0.007
527 Eating and drinking places	-0.035**	-0.417**	-0.008	-0.027**	-0.315**	-0.006
528 Miscellaneous Retail	0.014*	0.149**	0.003	0.001	0.112**	0.002
Relative Compensation						
521 Building materials and garden equipment	-0.012	0.027	-0.000	-0.006	0.021	-0.000
522 General merchandise stores	0.020**	0.156**	0.017*	0.009*	0.118**	0.014*
523 Food and grocery stores	-0.001	0.223**	-0.015	0.001	0.169**	-0.012
524 Car dealers and service stations	0.001	0.033	-0.002	0.003	0.025	-0.002
525 Apparel and accessory stores	0.002	0.102**	0.002	-0.002	0.077**	0.001
526 Home furniture, furnishings stores	-0.006	-0.009	-0.004	-0.011**	-0.007	-0.003
527 Eating and drinking places	-0.011	0.124**	0.001	-0.007	0.094**	0.001
528 Miscellaneous Retail	0.022**	0.222**	0.020*	0.015**	0.167**	0.016*

Table 5. Effect of Blue Laws in the March 1979 CPS

Dependent Variable	OLS estimates of interaction of retail trade* with blue law:			N
	STRICT	FOOD	MILD	
Real weekly gross earnings	-0.059 (-0.8)	-0.066 (-1.7)	-0.119 (-2.1)	8262
Weekly hours	-0.037 (-0.5)	-0.076 (-2.2)	-0.067 (-1.3)	8048
Real hourly wage	-0.018 (-0.2)	0.007 (0.2)	-0.051 (-0.9)	8048

*SIC 52 excluding 527 (eating and drinking establishments)
Note: t-statistics in parentheses.

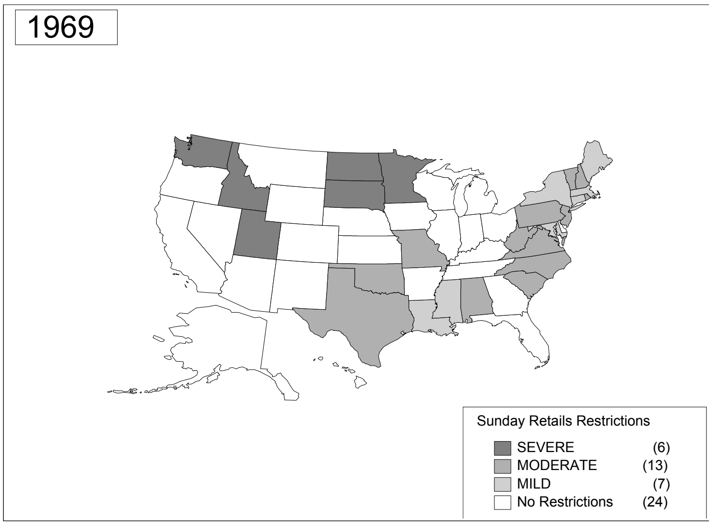

Figure 2:

Figure 3:

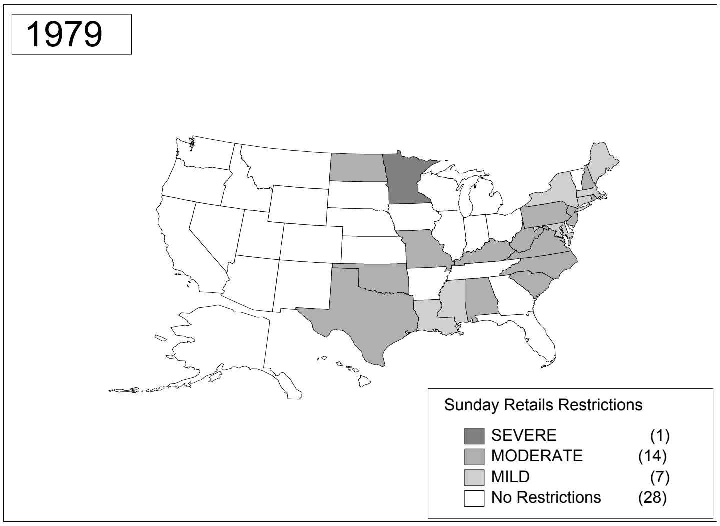

Figure 4:

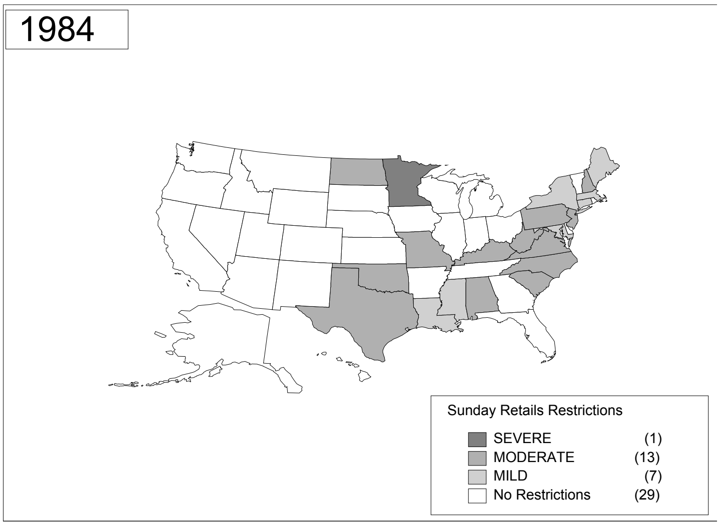

Figure 5:

Figure 6:

Figure 7: