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**Sinking the Blues: the Impact of Shop Closing Hours on
Labor and Product Markets**

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Abstract

There is a growing consensus among economists that extending shop opening hours creates jobs. While this is probably true in deregulating industries, this paper argues there are some deficiencies in the existing hypotheses about how exactly deregulation affects employment. First, this paper exploits recent changes in Sunday Closing Laws in the US to find that total employment, total revenue and the number of shops increase in deregulating industries and possibly decrease in non-deregulating industries. Second, a model assuming consumers like shopping on Sunday, monopolistic competition and low barriers to entry is presented to show how consumer behavior and retail competition can explain the observed impact of deregulation on retail labor and product markets and therefore ultimately employment.

JEL Classification: J23, L11, L81

Keywords: Shop opening hours, labor demand, organization of retail markets

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I. INTRODUCTION

The perceived impact of shop closing hours on our economy and work-life balance has stood at the centre of numerous public policy debates in many Western countries. As a result, the majority of restrictions on shop opening hours have been repealed or declared unconstitutional in most US states, the UK and Canada.¹ And in many European countries where regulation still is the rule rather than the exception, the debate is looming.² A common concern in cost-benefit analyses of deregulation is its perceived impact on employment. It is therefore the aim of this paper to shed some light on how deregulation most likely affects retail labor and product markets and therefore ultimately employment.

This paper first examines the most commonly imposed restriction on shop opening hours known as Sunday Closing Laws or Blue Laws.³ It is documented that 10 US states deregulated at some point between 1977 and 1992 and 8 states still had Sunday Closing Laws in 1997. It is this variation in regulation between US states at different points in time that will serve to identify the impact of shop closing hours on retail labor and product markets.

¹ For example, see Section II for a discussion of the history of Sunday Closing Laws in the US. See Maher [1995] for a history of Sunday Closing Laws in the UK and Skuterud [2004] for Canada.

² For example, see Kajalo [1997] for a discussion of Sunday Closing Laws across Europe.

³ There is disagreement about the origin of the term “Blue Laws”. Some claim it refers to the color of the paper upon which the first laws of New Haven were printed in 1665. New Haven ordered 500 hundred copies of its laws to be printed in England. These printed laws were returned on blue-colored paper. Others claim that the blue referred to by the term “blue laws” bears testimonial to the strictness with which the laws were observed by the Puritans. Just as a “true blue” dye never fades, so a person of fixed principles will not be easily swayed to depart from them. See Laband and Heinbuch [1987] for further discussion.

Using the Census of Retail Trade for 1997, this paper then provides some evidence that employment, revenue and the number of shops in regulated industries are significantly smaller in states with Sunday Closing Laws. This is true looking at the fraction of total retail for regulated industries or comparing outcomes per 1000 inhabitants or per dollar of personal disposable income in each state. To further test this hypothesis, this paper then turns to the Census of Retail Trade for years 1977, 1982, 1987 and 1992. It is shown that deregulation increases employment with 4.4 to 6.4 percent, revenue with 3.9 to 10.7 percent and the number of shops with 1 to 1.5 percent. These estimates are remarkably robust using different specifications and different data. Also, some suggestive evidence is shown for the hypothesis that deregulation negatively affects employment, revenue and the number of shops in industries exempted from Sunday Closing Laws.

This paper finally presents a model building on standard assumptions about retail markets to explain the observed impact of deregulation. For deregulating industries, it is argued that deregulation is likely to increase employment because at least one person has to be employed at all opening times (threshold labor effect). Also, in so far the observed increase in revenue due to increased product demand reflects an increase in the volume of sales, employment will further increase (sales effect). Finally, if the increase in revenue dominates the increase in labor costs, retailers will extend their opening hours and profits will increase. The number of shops will therefore increase if barriers to entry are low, further increasing employment (profitability effect). However, to the extent that consumers substitute income towards deregulating industries, employment losses elsewhere will be larger the more important is threshold labor, the stronger are

preferences for Sunday shopping and the lower are entry barriers. In line with the empirical evidence, these are the channels through which it is argued that deregulation affects retail labor and product markets and therefore ultimately employment.

There is a small but growing literature related to the idea that product market regulation affects employment. Krueger and Pischke [1997] argue that product market constraints may depress employment growth. For example, they state that zoning laws (regulating the start-up of companies) may have hampered employment growth in many European countries. To this end, Bertrand and Kramarz [2002] examine zoning laws in the French retail industry to conclude that retail employment could have been more than 10 percent higher in the absence of such laws. Similarly, restrictive store opening hours could partially explain why employment in retail is relatively low. This hypothesis has recently been scrutinized by Skuterud [2004] for Canada concluding that regulation decreases retail employment with 5 to 12.5 percent. Similarly, Burda and Weil [2001] estimate an employment decrease of 2.5 percent from regulation mainly using repeated cross-sections of US states. As a statement about the impact of shop closing hours on employment these estimates are probably correct. But this paper argues that simply looking at correlations between employment and product market regulation is not able to explain how exactly these employment changes come about.

The remainder of the paper is organized as follows. Section II documents the US history of Sunday Closing Laws. Section III describes the main data used and Section IV shows that employment, revenue and the number of shops are most likely to increase in deregulating industries and to decrease in industries exempted from Sunday Closing Laws. Section V then starts from what we know about retail markets to present a model

that predicts the observed impact of deregulation on retail labor and product markets. The final section concludes.

II. SUNDAY CLOSING LAWS

Sunday Closing Laws are an ancient institution in American law. The first Sunday law passed on American soil was enacted by the Colony of Virginia in 1610. By the end of the 18th Century, all thirteen colonies had Sunday closing laws written in their statutes. During the heydays of Sunday Closing Laws at the end of the 19th Century, state regulation of Sunday commerce was so prevalent that 46 states restricted at least some businesses to open on Sunday.⁴

In 1961 Sunday Closing Laws were ascribed the purpose of securing a common day of rest by the United States Supreme Court, making them binding in all remaining thirty-three states.⁵ However, the validity of Sunday Closing Laws in some of those states has recently been challenged on the basis of their classifications of businesses or commodities covered by the law.⁶ Consequently, a further 25 states deregulated their Sunday Closing Laws between 1961 and 1997.⁷ Figure 1 shows the 10 states that

⁴ Dilloff [1980] and Laband and Heinbuch [1987] provide more details on the early history of Sunday closing laws in the US.

⁵ See Theuman [2004] for further details of *McGowan v Maryland*, 366 U.S. 420 (1961) and its companion cases.

⁶ Theuman [2004] further discusses state and federal cases decided since 1961 regarding the validity, construction and effect of Sunday closing laws.

⁷ Figure 1 is not referring to Sunday Closing Laws that affect automobile shops or shops selling alcohol on Sunday. The decision was made to focus on general Sunday Closing Laws to avoid a patchwork of

deregulated between 1979 and 1997 (with dates when statutes were repealed or declared unconstitutional) as well as all 8 states that had Sunday Closing Laws in 1997.⁸ It is this variation that will be exploited in this paper to identify the impact of shop closing hours on retail labor and product markets.

III. DATA

The main data used in this study is the Economic Census of Retail Trade. The Census of Retail Trade is part of the Economic Census conducted every five years ending in 2 or 7. The strength of the Census is that it aims to sample all retail activity in the US. From every survey, total weekly employment (number of paid employees in the week including March 12), real total annual revenue, the number of establishments and real total annual payroll are calculated for a number of industries in retail. The procedures for data collection and dissemination can be found on the Census Bureau web-page.

The first main dataset used in this study is the 1997 Census of Retail Trade. The advantage of this data is that it measures retail activity for narrowly defined NAICS industries. However, the more precise NAICS classification introduced in 1997 is no longer comparable with the SIC classifications used in earlier surveys. A second comparability problem arises because the Census of Retail Trade for the first time includes some new store types in 1997. For example, for the 1997 Census of Retail Trade

legislation. It seems unlikely that Sunday opening implies consumers buy more cars and the fraction of liquor stores in retail seems too small to largely affect activity in other stores.

⁸ Appendices A and B contain more detailed legal references.

includes wholesalers open to the general public such as computer shops, office supply dealers and building material stores.

The second main data set used in this paper collects state level data for the years 1977, 1982, 1987 and 1992 from a variety of Census sources for 8 industries in retail. The strength of this data is that it not only allows a comparison between states and industries at one point in time. However, one difficulty using this data is that information is available only for those 8 industries. A second difficulty is that only measures for every two consecutive years are comparable. This is due to changes in the sampling criteria and industry classification between 1977 and 1982 and changes in the industry classification between 1982 and 1987 and 1987 and 1992. To this end, the Census Bureau has made public two data sets for 1982 and 1987, one comparable with the previous sampling year and one comparable with the following sampling year.

IV. EMPIRICAL ANALYSIS

Using the 1997 Census of Retail Trade

To see whether shop closing hours have any effect on retail labor and product markets, we first use the 1997 Census of Retail Trade. Table 1 provides some information about the different types of shops in retail. The group of “*Regulated Industries*” consists of all industries prohibited to open on Sunday if a state has or would have Sunday Closing Laws. The remaining store retailers are listed in the group of “*Other Industries*”. For this group it is less clear whether the industry of food stores and drug and propriety stores generally represents shops subject to or exempted from Sunday Closing Laws.

However, the 1997 Census of Retail Trade contains information for more narrowly defined shop types such that these industries can be broken down further. For example, Table 1 breaks down the group of food stores into supermarkets, convenience stores and specialty food stores. And even though supermarkets may also sell food which generally is an exempted product, there has been some controversy about their Sunday opening. Unfortunately, it is also uncertain whether convenience stores have always been exempted from Sunday Closing Laws such that it is not immediately clear whether differences in restrictiveness of Sunday Closing Laws between both types of food stores can be expected.⁹ For drug and propriety stores the difference could be more outspoken since cosmetics, beauty and perfume stores most often do not sell prescription drugs and have therefore mostly been prohibited to open on Sunday in contrast to pharmacies. Besides pharmacies, the group of gasoline stations (often with convenience stores) is also more likely to generally represent shops selling products exempted from Sunday Closing Laws. The more detailed industry classification available from the 1997 Census of Retail Trade therefore allows to examine how regulation not only affects activity in regulated industries but also shops exempted from Sunday Closing Laws.

The numbers in Table 1 are average percentages for each industry across states. For the regulated industries, general merchandise stores (which are mainly department stores) are the largest employer. Average store size in terms of employment is relatively large for general merchandise stores whereas miscellaneous retail stores seem relatively small. For other industries, food stores are the second biggest employer and Table 1

⁹ See Theuman [2004] for a number of cases.

shows that the majority is employed in relatively few supermarkets whereas gas stations are relatively small. All in all, these findings do not seem counter intuitive.

Table 1 gives mean percentages pooling states with and without Sunday Closing Laws. To get an idea whether regulation has any impact, one would like to see whether these means differ significantly between states with and without Sunday Closing Laws. This is done in Table 2. The first row of Table 2 gives the mean percentages for all regulated industries in states with Sunday Closing Laws. The second row calculates mean percentages for the same industries in states without Sunday Closing Laws. The third row calculates the mean differences between the first and the second row, suggesting regulated industries are relatively smaller in states with Sunday Closing Laws. The final row of Table 2 reports these differences as a fraction of the first row. What these fractions suggest is that regulation could reduce employment with 6 percent and revenue and the number of shops with 7 percent in regulated industries. Also note that if other industries in states with Sunday Closing Laws are indirectly affected by such laws, the estimated differences nevertheless suggest some impact of regulation on retail labor and product markets.

A further test for this hypothesis is to see whether mean differences exist per 1000 inhabitants. The results are found in the top panel of Table 3. The first row suggests that in regulated industries, regulation decreases employment with 2.5 workers per 1000 inhabitants, decreases annual expenditure with \$603 per inhabitant per year and decreases the number of shops with 0.096 per 1000 inhabitants. The low standard errors suggest the differences are statistically significant except for the number of shops. To see whether states with and without Sunday Closing Laws do not differ for other reasons, one can

compare the estimated mean differences for regulated industries given in the first row of Table 3 with mean differences for other industries given in the second row of Table 3. If retail is generally larger in regulated states as suggested by the mean differences for other industries, the difference-in-differences given in the third row of Table 3 suggest that regulation decreases employment with 3.4 jobs per 1000 inhabitants, decreases annual expenditure with \$565 per inhabitant and decreases the number of shops with 0.3 per 1000 inhabitants in regulated industries.

Rather than comparing differences per 1000 inhabitants in each state, the bottom panel of Table 3 compares mean differences per dollar of personal disposable. To allow for the numbers to be roughly comparable to those presented in the top panel, all means are multiplied with average income per 1000 inhabitants. The final row of Table 3 estimates that regulation could decrease annual expenditure with \$458 per average income and depress employment and the number of shops with 2.4 and 0.19 per \$21.7m respectively. Note that these differences are relatively similar to those presented in the top panel of Table 3.

A final check is to see whether differences between states with and without Sunday Closing Laws are similar for more types of shops. For regulated industries, Table 4 gives mean differences similar to those presented in Table 3 for annual revenue using both the population and income normalizations. Table 4 suggests these differences are roughly similar for different regulated industries. The results in Table 4 suggest that consumers spend less mainly on building material and garden stores and furniture and home furnishings stores in regulated states. Also interesting are the estimated differences for other industries given in Table 5. Table 5 shows that the differences for pharmacies

and drug stores are positive whereas the differences for cosmetics, beauty and perfume stores are negative. These opposing signs could indicate that regulation negatively affects sales in regulated shops but positively affects sales in exempted stores. Also, the differences for gasoline stations are positive and relatively large. These estimates are not inconsistent with the hypothesis that consumers substitute income away from regulated shops towards stores exempted from such regulation.

To conclude, a simple cross-section analysis learned that regulation most likely reduces employment, revenue and the number of shops in regulated industries. Moreover, some evidence was shown for the hypothesis that regulation increases employment, revenue and the number of shops in industries exempted from Sunday Closing Laws.

Using the 1977-1992 Census of Retail Trade

To further provide evidence for the hypothesis that deregulation has an impact on retail labor and product markets, Census of Retail Trade data for years 1977, 1982, 1987 and 1992 have been collected. Table 6 summarizes these data. The industries listed as “*Deregulating Industries*” are roughly similar to those in the 1997 Census of Retail Trade except for the group of miscellaneous retailers which has now been listed under “*Other Industries*”. The reason for doing so is that the more aggregate industry classification used by the Census Bureau before 1997 does not allow excluding the non-store retailers from this group. Because estimates for more narrowly defined shops are not available before 1997, not much can therefore be said a priori about whether other industries generally represent regulated or non-regulated stores, except for gasoline service stations.

The mean percentages in Table 6 are calculated after pooling all years and the reported standard errors therefore reflect variation in the industry composition between states.

Some preliminary results

Just as in the previous section, one can compare mean percentages for deregulating industries between states with and without Sunday Closing Laws to see whether deregulation has any long-run impact. Table 7 shows these differences for each Census sampling year between 1977 and 1992 as a fraction of the mean percentage for states with Sunday Closing Laws. All estimates are positive suggesting deregulation increases employment with about 2 percent, increases revenue with 3 to 5 percent and the number of shops with 1 to 2 percent in deregulating industries. Also note these estimates are somewhat smaller but not very different from those reported in the bottom row of Table 2.

One problem with using each Census wave separately is that it is difficult to identify the causal impact of deregulation from a cross-section of states and industries. The remainder of this section therefore uses the different timing of deregulation for those states that deregulated between 1979 and 1992 (note from Figure 1 that no state deregulated between 1992 and 1997) to examine the impact of deregulation using the 1977-1992 Census of Retail Trade as a panel. In order to do so, an important question is to which extend the Census sampling coincides with the timing of deregulation. The first column of Table 8 lists all the states that deregulated between 1977 and 1992 as shown in

Figure 1.¹⁰ The grey areas on the horizontal axis are the Census sampling years and the crosses reflect the effective date of deregulation in each state. Depending on how long the impact of deregulation takes to complete, the group that deregulated by 1980 was most likely affected during the period 1977-1982. Similarly, the impact period for the group that deregulated by 1983 is most likely to be 1982-1987 and for the group that deregulated by 1987 it is the period 1987-1992. To the extent that deregulation caused positive changes outside these perceived treatment periods, the estimated returns to deregulation will be attenuated during the impact period and upward biased in other periods.

As a first test whether deregulation has had any impact at all, Table 9 compares outcomes in deregulating industries with the same industries in non-deregulating states and other industries in every other state. This is done using the following specification in each period:

$$(1) \quad \Delta y_{is} = \beta_0 + \beta_1 I_{is} + A_s + B_i + \varepsilon_{is}$$

with Δy_{is} the change in the log of employment, revenue or the number of shops in industry i and state s and with I_{is} a dummy equal to 1 if industry i in state s deregulated in that period. Terms A_s and B_i further capture state and industry fixed effects respectively.

The first specification used in columns (1), (4) and (7) of Table 9 excludes the state dummies from (1). For each dependent variable the estimated returns are different in each time period and sometimes even negative. One explanation for the observed

¹⁰ Excluded are North Dakota and Missouri. North Dakota is excluded because it only deregulated in 1991. Missouri is excluded because deregulation in 1979 implied counties could opt-out of state regulation. This happened gradually with 34 counties choosing to opt-out between 1979 and 1985, a further 19 counties between 1986 and 1990 and 12 counties opted-out between 1991 and 1992. See Appendix B for more details.

differences in point estimates is the sensitivity of retail activity to macroeconomic shocks and cycles and the fact that there is substantial geographical dispersion of shocks and cycles within the US.¹¹ For example, the smaller point estimates for the period 1977-1982 can partially be explained by that the recession in the late 1970's mostly affecting a band of states just east of the Mississippi running from the Great Lakes to the Gulf of Mexico including deregulating states Pennsylvania and to a lesser extend New Jersey. The higher point estimates found for the period 1982-1987 can be explained by the rapid expansion of the New England economy including deregulating states Massachusetts and to some extend Vermont. Finally, the lower point estimates for the period 1987-1992 partially reflect the plunge in oil and gas prices in the second half of the 1980's that struck the natural-resource-based states in the South Central, especially deregulating states Louisiana and Texas. It seems therefore important to control for aggregate differences between states in isolating the causal impact of deregulating Sunday Closing Laws.

To this end, columns (2), (5) and (8) of Table (9) include state dummies, just as in equation (1). The point estimates are now all positive and range between 3.5 to 6 percent for employment, 4.5 and 10 percent for sales and 1 and 2 percent for the number of shops. Note that these numbers are roughly similar to those reported in the bottom row of Table 2 and Table 7. Finally, to see whether state dummies mainly take out variation between states due to differences in economic success, columns (3), (6) and (9) of Table (9) replace the state dummies with differences in the log of the state wide unemployment rate, personal disposable income and population. Also, because these controls seem to vary similarly between the 5 geographical divisions used by the Census Bureau, region

¹¹ See Dzialo, Shank and Smith [1993] for a discussion of how different macro economic shocks and cycles have affected different regions in the US between 1977 and 1992.

dummies are also added as additional controls to potentially exclude further bias. The point estimates are very similar to those obtained using the state dummies indeed.

The impact of deregulation on employment, revenue and the number of shops

The estimates in Table 9 do not necessarily reflect the true return to deregulation for deregulating industries if also other industries are indirectly affected by deregulation. To this end, consider the following specification using only the sample of deregulating industries in each period:

$$(2) \quad \Delta y_{is} = \beta_0 + \beta_1 I_{is} + \beta_2 \Delta X_s + A_r + B_i + \varepsilon_{is}$$

with ΔX_s the change in the log of the unemployment rate, personal disposable income and population for that period and with A_r a set of 5 region dummies. Terms ΔX_s and A_r are included since the results in Table 9 suggested these controls take out a potential bias in the estimated returns in case no state dummies can be added. Also note that relative to equation (1), equation (2) further provides a specification test in that all right-hand side coefficients are now specific to deregulating industries, just like the coefficient of interest β_1 .

Estimates using equation (2) are given in Table 10. The point estimates suggest that deregulation increases employment with 4.5 to 6.5 percent, revenue with 4 to 10 percent and the number of shops with 1 to 1.5 percent in deregulating industries. Clustered standard errors reveal many of the estimated returns are statistically significant. Three points can be made about the observed impact of deregulation. First, the estimated returns are similar to those reported in earlier tables despite the different methods or specifications used or the possible measurement error in the timing of deregulation.

Second, the estimated returns are relatively large. For example, our data suggest that the average cyclical upswing increases revenue with about 20 to 30 percent. Finally, the similarity of point estimates between Tables 9 and 10 also suggests that the estimated returns for other industries are largely insignificant (which upon further inspection seems to be true). If anything, note this is consistent with the evidence presented in Table 5 that deregulation might have a negative impact on retail labor and product markets in more narrowly defined exempted industries.

To conclude, estimates so far suggest deregulation is likely to have an impact on retail labor and product markets. Following deregulation, employment is expected to increase with 4.4 to 6.4 percent, revenue with 3.9 to 10.7 percent and the number of shops with 1 to 1.5 percent in deregulating industries. Also, the results presented here are not inconsistent with the hypothesis put forward earlier that deregulation possibly has a negative impact on labor and product markets in exempted industries.

Some robustness checks

For each group of deregulating states, Table 10 assumed the period of impact was measured accurately. If this is the case, no impact of deregulation should be observed in other periods. Figure 2 therefore plots the point estimates in Table 10 together with point estimates for other periods. For example, the first three bars in the top panel of Figure 2 draw the point estimates given in the top panel of Table 10. The next three bars estimate the returns to deregulation for states that deregulated by 1980 for the period 1982-1987 and so forth. It is clear from Figure 2 that the estimated returns in Table 10 do not seem

largely affected by differing trends or that measurement error in the timing of deregulation.

Whereas most of the point estimates in Table 10 are between 1 and 5 percent, estimated employment and revenue growth in Massachusetts and Vermont seems relatively large. This could either suggest that the estimate is upward biased or that deregulation did imply a larger change in these states (maybe due to the economic boom in the North East when deregulation took place). To further examine this, Figure 3 uses an alternative data set. The figure uses an annualized measure of real retail revenue derived from the Monthly Retail Trade Survey between 1978 and 1992. Unfortunately, these historical series are only available for a number of states but a useful comparison between Massachusetts (which deregulated in December 1982) and neighboring state New York can be made. The top panel of Figure 3 gives the raw differences between both states. The top panel suggests a difference-in-differences between 1982 and 1987 of about 10 percent, similar to the point estimate given in Table 10. But one concern is the possibility that the difference-in-differences between 1982 and 1992 of about 3 percent is the better long-run measure of structural change. The bottom panel of Figure 3 therefore draws the series adjusted for changes in the unemployment rate, personal disposable income and population. The regression adjusted series suggests that deregulation did have a persistent and relatively large impact of 7 to 8 percent on retail revenue in Massachusetts.

An interesting question is which industries gain most from deregulation. Table 11 therefore uses the following specification for each of 4 deregulating industries in each period:

$$(3) \quad \Delta y_s = \beta_0 + \beta_1 I_s + \beta_2 \Delta X_s + A_r + \varepsilon_s$$

with Δy_s the change in the log of annual revenue. Remarkably, the largest impact is estimated for the group building materials and garden stores, furniture and home furnishings stores and clothes stores, just as in Table 5. Maybe an intuitive explanation for these results is that Sunday opening increases activity in home and garden related activities because that is what consumers do on Sunday. Alternatively, the increase in clothes stores might suggest that some consumers regard Sunday shopping as a preferable pastime activity. This intuition will return when the next section presents a model in order to understand the observed impact of deregulation.

The impact of deregulation on average weekly wages

One issue ignored so far has been the possible impact of deregulation on wages. Table 12 therefore uses specification (2) to examine the impact of deregulation on average weekly wages in deregulating industries. This is made possible because the Census of Retail Trade also provides a measure of annual payroll. Comparing the percentage changes in employment with the percentage changes in annual payroll it is then possible to say something about the impact of deregulation on average weekly wages. The first column of Table 12 reproduces the point estimates found in the first column of Table 10. The second column in Table 12 gives point estimates for annual payroll. The point estimates are very similar and if anything somewhat larger for the payroll data indicating a small but insignificant increase in average weekly wages. This is consistent with the hypothesis that deregulation increases product demand and therefore labor demand as will be argued next.

V. A MODEL TO ANALYZE THE IMPACT OF EXTENDING OPENING HOURS ON LABOR AND PRODUCT MARKETS

Throughout this section, it is assumed that each shop has some market power by offering a differentiated product and that in the long-run barriers to entry are low. Building on these and other standard assumptions about retail markets, this section then provides a framework to explain the observed impact of deregulation by accounting for changes in consumer behavior, retail competition and ultimately labor demand. We will consider the case of Sunday opening, although the model equally applies to any extension of opening times. The model presented here is informal and a more technical exposition can be found in Appendix C.

The impact of extending opening hours on employment and sales

Empirical evidence suggests that employment costs in retail vary with opening times and the volume of sales (Nooteboom [1982, 1983] and Thurik [1982]). The idea that part of labor costs only vary with opening times can be justified by noting that one must employ at least one worker at all times. Furthermore, there seems to be considerable empirical evidence in favor of constant marginal labor costs. Total labor costs per week therefore write as

$$(4) \quad C = c_D D + c_X X$$

with c_D threshold labor costs per day, D the number of opening days a week, c_X constant marginal labor costs and X the volume of weekly sales. Weekly employment is then given by

$$(5) \quad N = n_D D + n_X X$$

with n_D threshold labor per day and n_X inverse marginal labor productivity.¹²

The impact of Sunday opening on weekly employment can then be analyzed through an increase of D in (5). If consumers only inter-temporally substitute income from others days of the week to Sunday, the volume of weekly sales does not increase after deregulation and weekly employment only increases with the additional required threshold labor (threshold labor effect). But derived demand in (5) also learns that if deregulation implies an increase in the volume of sales, employment further increases (sales effect). A sales effect could be expected if consumers have a taste for Sunday shopping. If this is the case, consumers are willing to pay the price for this new “good” and total revenue in deregulating industries will increase. The previous section provided some direct evidence for this hypothesis. And to the extend an increase in revenue

¹² Equations (4) and (5) are related by that $c_D = wn_D$ and $c_X = wn_X$ with w the wage per unit of time (and abstracting from other costs items related to opening times and sales). For example, assume that weekly sales are given by

$$X = \frac{1}{n_X} (N - n_D D)$$

if N strictly exceeds the required amount of threshold labor and zero otherwise. Besides a standard production function, this relationship can also reflect a first order approximation to Nooteboom’s [1983] “isomenes” (equal-waiting curves). In Nooteboom’s model, employment depends positively on sales since firms want to keep the relative waiting time (average waiting time relative to the average service time per customer) at approximately n_X . This gives the following expression for labor demand:

$$N = n_D D + n_X X$$

if $X > 1/n_X$ and zero otherwise. Integrating over wages then gives (4).

reflects an increase in the volume of sales, a sales effect must partially explain the observed increase in employment.¹³ Moreover, the next section argues that if the sales effect is sufficiently large, Sunday opening will increase retail profitability and therefore the number of shops.

The impact of extending opening hours on retail profitability

If the increase in total revenue outweighs the increase in labor costs, profits will increase and retailers will decide to open on Sunday.¹⁴ If barriers to entry are low, the number of shops will therefore increase in the long-run until all profits are exhausted.

¹³ Whether the increase in total revenue is driven by an increase in prices or the volume of sales (or both) ultimately depends on how retailers set prices given demand for their products and retailing costs. Skuterud [2004] and Burda and Weil [2001] find some evidence that prices marginally increase after deregulation. In general, there is a small literature that looks at the impact of deregulation on prices using different assumptions about how retailers set prices, product demand and retailing costs. According to Inderst and Irmen [2004], the theoretical literature is divided about whether prices should increase or decrease after deregulation. In any case, the empirical and theoretical analysis presented in this paper is consistent with either of both.

¹⁴ If threshold labor costs are too high, it is not immediately clear why retailers would decide to extend their opening hours. Alternatively, one could think of some models that assume deregulation will be effective even if it is not profitable to do so for retailers in the short-run. First, if Sunday opening smoothes consumption across days of the week and marginal labor productivity is sufficiently decreasing in sales, cost savings in midweek outweigh the total costs of Sunday opening. However, the required concavity in the production of daily labor does not seem very likely given the empirical evidence in favor of (5). Moreover, even if the production of daily labor is sufficiently concave, it is then not immediately clear why deregulation would increase employment. Second, Sunday opening could increase shop space utilization or could even imply that optimal shop size becomes smaller because of a reduction in peak demand. If these cost savings outweigh the additional costs of Sunday opening, retailers will find it profitable to extend their opening hours even if weekly revenue is not increased. However, since these savings will only be realized when shop space is no longer sunk, it is not immediately clear why shops would extend their opening hours immediately after deregulation or even in the long-run. Finally, Sunday opening could relate to fears of losing too many customers to other shops when remaining closed. However, it then remains a question how shops can increase revenue to bear the costs of Sunday opening.

Given that consumers have a sufficiently strong taste for Sunday shopping, employment is therefore likely to increase not just because of increased threshold labor and an increase in the volume of sales but also an increase in the number of shops (profitability effect). Assuming all shops are identical for simplicity, this is easily seen since total labor demand in the steady state is given by

$$(6) \quad SN = n_D SD + n_X SX .$$

If an increase in D increases S and X , total employment will unambiguously increase.

Equation (6) suggests 3 possible channels through which deregulation can increase employment. First, deregulation directly increases employment through an increase in threshold labor. Second, deregulation will be effective if it is profitable for retailers to open on Sunday or if consumers have sufficiently strong tastes for Sunday shopping. In so far the increase in total revenue reflects an increase in the volume of sales, employment will further increase. Finally, increased profits will increase shop start-ups in the long-run until all profits are exhausted.

To summarize, if consumers have sufficiently strong tastes for Sunday shopping, deregulation will increase employment in deregulating industries because of increased threshold labor (threshold labor effect) but also because of an increase in the total volume of sales (sales effect) and the number of shops in the long-run (profitability effect). The expected impact of deregulation on employment in deregulating industries must therefore be analyzed accounting for its impact on retail labor and product markets. Employment gains are expected to be larger if consumers have strong tastes for Sunday shopping, threshold labor is important (but not too important such that it is no longer profitable for retailers to open on Sunday) and low barriers to entry.

The impact of extending shop opening hours on deregulating and non-deregulating industries

If consumers use Sunday as a day for more shopping, total expenditure in deregulating shops will increase. However, this implies an unambiguous decrease in expenditure on other goods or services in other industries if total income does not increase. Deregulation is therefore expected to have a negative impact on total revenue, the number of shops and therefore employment in other industries. Some evidence for this hypothesis was presented above.

To allow for this possibility, assume two types of shops exist: type s shops for which opening hours are being deregulated and type m shops for which opening hours are not being deregulated. Type m shops can either remain prohibited to trade on Sunday after deregulation or be exempted from Sunday Closing Laws before deregulation. Denote the number of type s shops as S and the number of type m shops as M . Also assume for simplicity all type s shops and all type m shops are identical but type s and type m shops can have different cost parameters.

The solid lines in Figure 4 are the long-run zero-profit curves for type s shops (vertical axis) and type m shops (horizontal axis) before deregulation. First, the intercepts $S_{M=0}$ and $M_{S=0}$ are assumed to be finite and to depend positively on personal disposable income and negatively on threshold labor costs. Second, the zero-profit curves are assumed to be downward sloping for S and M strictly positive. To see this, consider the zero-profit curve for type s shops. If type s and type m goods are substitutes, an increase in M requires a decrease in the total fraction of income spent on type s goods.

Consequently, higher M reduces profitability in type s industries which decreases S .

Finally, Figure 4 shows the intersection of the zero-profit curves determines the

equilibrium number of shops S^* and M^* before deregulation.¹⁵

Assuming personal disposable income is constant, deregulation decreases from $S_{M=0}$ to $S'_{M=0}$ because of increased total threshold labor costs. But deregulation also rotates upwards the zero-profit curve for type s shops around $S'_{M=0}$ and rotates inwards the zero-profit curve for type m shops around $M_{S=0}$. The zero-profit curve for type s shops rotates upwards and for type m shops rotates inwards because consumers spend a larger fraction of total income on type s goods after deregulation. This rotating will be more outspoken the stronger are consumer preferences for Sunday shopping and the more substitutable products are between type s and type m shops. Also note that the zero-profit curves rotate around their intercepts because the intercepts do not change if personal disposable income is constant.

A new equilibrium is reached at (S^{**}, M^{**}) . Because S^{**} must lie on the zero-profit curve for type s shops that has shifted upwards, total expenditure on type s goods must increase. Moreover, if it is profitable for retailers to open on Sunday, the increase in total revenue outweighs the increase in threshold labor costs and $S^{**} > S^*$. In this case,

¹⁵ An important question is whether the analysis as drawn in Figure 4 can exist under standard assumptions about retailing costs, consumer preferences and retailer behavior. Appendix C formally derives the analysis summarized in Figure 4 using a Dixit-Stiglitz type model of monopolistic competition assuming labor costs are as in (4). The appendix starts from CES representative utility incorporating both types of shops, the number of shops for each type and the number of opening days for each shop in the utility function. Besides the standard Dixit-Stiglitz restrictions on the utility parameters, the appendix proves that for a unique stable equilibrium to exist it is sufficient to assume the substitutability of goods between shops of different type is less than the substitutability between goods of similar type. This assumption does not seem too restrictive. The appendix then shows that the impact of deregulation is as shown in Figure 4.

employment in deregulating industries will increase because of an increase in threshold labor (threshold labor effect), total revenue (sales effect) and the number of shops (profitability effect). However, the inward rotation of the zero-profit curve for type m shops reflects an unambiguous decrease in total expenditure on type m goods. In the short-run, some type m shops will make losses and eventually the number of type m shops unambiguously decreases. The decrease in total revenue and the number of shops predicts employment in non-deregulating industries will fall. In analogy with the employment gains in deregulating industries, the employment losses in other industries will be larger if consumers have a strong taste for Sunday shopping, threshold labor is important and barriers to entry are low.

The impact of deregulation on wages and prices

So far this section has ignored the possibility that deregulation also affects wages. The evidence presented in the previous section suggested that if anything wage would increase because of an increase in product and therefore labor demand. If wages increase significantly (maybe because of legally imposed requirements for working irregular hours), threshold labor costs and marginal labor costs will increase. It then is straightforward to show that the increase (decrease) in total revenue, the number of shops and therefore employment in deregulating (non-deregulating) industries will be smaller.

Finally, note that the analysis assumed that all type s shops set a unique price and all type m shops set a unique price before and after deregulation.¹⁶ However, in so far the

¹⁶ In the model presented in Appendix C retailers perceive demand to be iso-elastic and charge a constant mark-up over marginal costs. Deregulation therefore has no impact on the price set by each retailer.

observed increase in total revenue reflects an increase in the price of deregulated goods, the expected impact of deregulation on employment will be smaller. Also note that the analysis in Figure 4 explicitly accounts for the possibility that deregulation affects aggregate prices since Figure 4 allows for type s and type m shops to charge different prices in equilibrium. For example, assume labor productivity in type s shops is higher than in type m shops such that type s shops charge a lower price. In this case, part of the increase in S and decrease in M is explained by consumers substituting income towards deregulating industries because type s workers are more productive. The more productive type s workers are, the bigger will be the gains (losses) for type s (type m) industries, the bigger will be the increase in average productivity and the bigger will be the decrease in the aggregate price index.

VI. CONCLUSIONS

This paper has argued there are important deficiencies in our understanding of how shop closing hours affect employment in retail industries. Using a number of data sets and a number of different techniques, it was first shown that regulation most likely decreases employment with 4.4 to 6.4 percent, revenue with 3.9 to 10.7 percent and the number of shops with 1 to 2 percent in regulated industries. Some evidence also suggested regulation increases employment, revenue and the number of shops in industries exempted from such laws. This paper then provided a framework in which the observed impact of regulation could be understood. If total disposable income is constant, it was argued that employment in regulated industries is lower the more important is

threshold labor (threshold labor effect), the more consumers substitute income towards exempted industries (sales effect) and the lower are barriers to entry (profitability effect). However, it was also argued that employment in exempted industries will be higher for similar reasons. In any debate about the impact of deregulation, it seems therefore important to simultaneously account for its expected impact on retail labor and product markets and therefore ultimately employment.

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Table 1
Percentages of Total Retail by Industry, 1997

	Weekly Employment	Annual Revenue	Number of Shops
Regulated Industries			
Building materials and garden stores	9.768 (1.429)	14.22 (2.730)	10.50 (2.037)
General merchandise stores	21.72 (3.481)	20.07 (3.434)	4.173 (1.163)
Apparel and accessory stores	10.45 (2.478)	7.733 (2.592)	16.42 (3.239)
Furniture and home furnishing stores	6.769 (1.055)	7.587 (1.639)	11.43 (1.340)
Miscellaneous retail stores	11.35 (2.094)	8.358 (1.262)	22.26 (3.346)
Other Industries			
Food stores	23.84 (3.026)	22.58 (2.694)	12.33 (2.532)
Supermarkets and other grocery stores	21.54 (2.679)	20.97 (2.391)	7.358 (1.321)
Convenience stores	1.364 (0.904)	1.029 (0.634)	2.799 (1.442)
Specialty food stores	0.932 (0.450)	0.573 (0.324)	2.171 (0.952)
Drug and propriety stores	7.227 (1.809)	6.746 (1.906)	8.506 (1.381)
Cosmetics, beauty and perfume stores	1.572 (0.340)	1.025 (0.242)	3.930 (0.859)
Pharmacies and drug stores	5.655 (1.684)	5.720 (1.811)	4.575 (1.201)
Gasoline service stations	8.875 (2.709)	12.70 (3.047)	14.38 (3.284)

Notes: Data are taken from the 1997 Census of Retail Trade. Weekly Employment measures the number of paid employees in the week including March 12. Listed industries are defined using NAICS industry classifications. The percentages are mean percentages across all states and the standard error in brackets reflects variation in the industry composition in retail across all states.

Table 2
Mean Percentages of Total Retail for Regulated Industries in States with and without Sunday Closing Laws, 1997

	Weekly Employment	Annual Revenue	Number of Shops
I. States with Sunday Closing Laws	57.11 (1.145)	54.80 (1.363)	61.09 (0.798)
II. States without Sunday Closing Laws	60.71 (0.608)	58.67 (0.518)	65.59 (0.598)
I - II	-3.596 (1.410)	-3.868 (1.273)	-4.496 (1.341)
(I - II)/ I	-0.060 (0.023)	-0.068 (0.022)	-0.070 (0.020)

Notes: Data are taken from the 1997 Census of Retail Trade. The numbers in brackets are standard errors. For the grouping of states into those with and without Sunday Closing Laws, see Appendix A.

Table 3
Mean Differences in States with and without Sunday Closing Laws, 1997

	Weekly Employment	Annual Revenue (\$1000)	Number of Shops
<i>Per 1000 inhabitants</i>			
Regulated Industries	-2.481 (1.090)	-603.0 (192.2)	-0.096 (0.158)
Other Industries	0.917 (0.202)	-37.39 (20.79)	0.204 (0.021)
Difference-in-differences	-3.399 (0.914)	-565.6 (100.4)	-0.301 (0.099)
<i>Per \$21.7m of personal disposable income</i>			
Regulated Industries	1.200 (1.822)	-108.8 (235.9)	0.223 (0.228)
Other Industries	3.576 (1.323)	349.3 (133.8)	0.410 (0.141)
Difference-in-differences	-2.376 (2.252)	-458.1 (271.2)	-0.187 (0.268)

Notes: Data are taken from the 1997 Census of Retail Trade. The numbers are mean differences of percentages between states with and without Sunday Closing Laws. The numbers in brackets are standard errors. For the grouping of states into those with and without Sunday Closing Laws, see Appendix A.

Table 4
Differences in Means for Annual Revenue (in thousands of \$) in States with and without Sunday Closing Laws for each Regulated Industry, 1997

	Per 1000 inhabitants	Per \$21.7m of PDI
Building material and garden stores	-156.4 (83.12)	-44.34 (107.3)
General merchandise stores	-107.7 (107.7)	72.21 (135.1)
Apparel and accesory stores	-95.34 (84.55)	-24.76 (71.56)
Furniture and home furnishings stores	-138.0 (48.18)	-76.13 (41.50)
Miscellaneous retail stores	-105.5 (11.63)	-35.77 (11.48)

Notes: Data are taken from the 1997 Census of Retail Trade. The numbers are mean differences of percentages between states with and without Sunday Closing Laws. The numbers in brackets are standard errors. For the grouping of states into those with and without Sunday Closing Laws, see Appendix A.

Table 5
Differences in Means for Annual Revenue in States with and without Sunday Closing Laws for each Other Industry, 1997

	Per 1000 inhabitants	Per \$21.7m of PDI
Food stores	-98.45 (88.23)	106.1 (74.36)
Supermarkets and other grocery stores	-87.24 (79.20)	102.9 (74.09)
Convenience stores	-2.836 (19.01)	7.270 (17.39)
Specialty food stores	-8.374 (8.210)	-4.054 (6.880)
Drug and propriety stores	7.647 (48.08)	73.35 (40.29)
Cosmetics, beauty and perfume stores	-17.17 (1.663)	-8.402 (1.452)
Pharmacies and drug stores	24.82 (45.20)	81.75 (38.68)
Gasoline service stations	53.41 (77.60)	169.8 (106.2)

Notes: Data are taken from the 1997 Census of Retail Trade. The numbers are mean differences of percentages between states with and without Sunday Closing Laws. The numbers in brackets are standard errors. For the grouping of states into those with and without Sunday Closing Laws, see Appendix A.

Table 6
Percentages of Total Retail by Industry, 1977-1992

	Weekly employment	Annual Revenue	Number of Shops
<i>Deregulating Industries</i>			
Building materials and garden stores	6.405 (1.179)	8.107 (1.719)	7.600 (1.928)
General merchandise stores	20.32 (2.439)	17.80 (2.451)	4.047 (1.107)
Apparel and accessory stores	10.50 (1.564)	7.259 (1.382)	13.74 (1.764)
Furniture and home furnishing stores	6.291 (0.700)	6.382 (0.913)	10.23 (1.030)
<i>Other Industries</i>			
Miscellaneous retailers	16.54 (2.750)	13.84 (3.776)	28.20 (3.971)
Food stores	26.91 (2.319)	30.18 (2.248)	18.34 (2.545)
Drug and propriety stores	5.532 (0.776)	5.088 (0.961)	5.016 (0.921)
Gasoline service stations	7.490 (1.498)	11.34 (2.131)	12.83 (2.150)

Notes: Data are taken from the Census of Retail Trade. Weekly Employment measures the number of paid employees in the week including March 12. Annual Revenue is in 1985 dollars. The industries listed are the most disaggregate information available from the Economic Census and is based on SIC industry codes. Percentages are calculated after pooling years 1977, 1982, 1987 and 1992. The standard errors reflect the variation in industry composition across states.

Table 7
Percentage Difference in Mean Fraction of Deregulating Industries
between States with and without Sunday Closing Laws by Year, 1977-
1992

	Weekly Employment	Annual Revenue	Number of Shops
1992	-0.023 (0.025)	-0.053 (0.043)	-0.052 (0.025)
1987	-0.018 (0.021)	-0.029 (0.029)	-0.010 (0.021)
1982	-0.021 (0.023)	-0.038 (0.034)	-0.018 (0.019)
1977	-0.023 (0.025)	-0.048 (0.030)	-0.019 (0.022)

Notes: Data are taken from the Census of Retail Trade, 1977-1992. The numbers in brackets are standard errors. For the grouping of states into those with and without Sunday Closing Laws, see Appendices A and B.

Table 8
The Timing of Deregulation and Census Sampling, 1977-1992

	1977				1982					1987					1992
Deregulated by 1980															
Pennsylvania		X													
Connecticut			X												
New Jersey				X											
Deregulated by 1983															
Vermont					X										
Massachusetts						X									
Deregulated by 1987															
Mississippi									X						
Texas										X					
Louisiana											X				

Notes: References to exact date of deregulation are found in Appendix B.

Table 9
The Impact of Deregulation using all Industries and all States, 1977-1992

	Change in Log(Dependent Variable)								
	Weekly Employment			Annual Revenue			Number of Shops		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>Period 1977-1982</i>								
Dummy for deregulating industries	-0.003 (0.039)	0.038 (0.017)	0.044 (0.020)	0.051 (0.051)	0.043 (0.042)	0.036 (0.045)	-0.013 (0.014)	0.011 (0.013)	0.011 (0.019)
State dummies		✓			✓			✓	
State specific controls and region dummies			✓			✓			✓
	<i>Period 1982-1987</i>								
Dummy for deregulating industries	0.156 (0.023)	0.060 (0.042)	0.054 (0.038)	0.233 (0.032)	0.097 (0.027)	0.085 (0.028)	0.078 (0.015)	0.021 (0.020)	0.012 (0.018)
State dummies		✓			✓			✓	
State specific controls and region dummies			✓			✓			✓
	<i>Period 1987-1992</i>								
Dummy for deregulating industries	-0.014 (0.019)	0.035 (0.027)	0.048 (0.032)	0.020 (0.021)	0.046 (0.021)	0.042 (0.015)	-0.096 (0.013)	0.013 (0.022)	0.009 (0.019)
State dummies		✓			✓			✓	
State specific controls and region dummies			✓			✓			✓

Notes: Data are taken from the Census of Retail Trade 1977-1992. The first specification only includes dummies for industry as additional controls. The second specification includes industry and states dummies. The final specification includes industry dummies, growth in state wide unemployment, population and personal disposable income and 5 region dummies. Standard errors are clustered by whether the industry belongs to the group of deregulating industries or not interacted with state cells. The number of observations is between 389 and 400.

Table 10
The Impact of Deregulation on Deregulating Industries using all States, 1977-1992

	<u>Change in Log (Dependent Variable)</u>		
	Weekly Employment	Annual Revenue	Number of Shops
	<i>Period 1977-1982</i>		
Returns to deregulation	0.044 (0.021)	0.039 (0.046)	0.012 (0.019)
	<i>Period 1982-1987</i>		
Returns to deregulation	0.064 (0.038)	0.107 (0.028)	0.015 (0.018)
	<i>Period 1987-1992</i>		
Returns to deregulation	0.046 (0.032)	0.044 (0.015)	0.009 (0.019)

Notes: Data are taken from the Census of Retail Trade 1977-1992. All regressions include changes in the log of the state wide unemployment rate, population and personal disposable income, 5 region dummies and industry dummies. Standard errors are clustered by state. The number of observations is between 197 and 200.

Table 11
The Impact of Deregulation on Annual Revenue in each Deregulating Industry
using all States by Period, 1977-1992

	<u>Period</u>		
	1977-1982	1982-1987	1987-1992
Building materials and garden stores	0.076 (0.094)	0.127 (0.114)	0.033 (0.088)
General merchandise stores	-0.001 (0.063)	0.086 (0.046)	0.127 (0.087)
Apparel and accessory stores	0.032 (0.041)	0.105 (0.068)	0.054 (0.058)
Furniture and home furnishing stores	0.037 (0.071)	0.106 (0.089)	-0.038 (0.057)

Notes: Data are taken from the Census of Retail Trade 1977-1992. All regressions include changes in the log of the state wide unemployment rate, population and personal disposable income and 5 region dummies. The number of observations is between 48 and 50.

Table 12
The Impact of Deregulation on Average Weekly Wages in
Deregulating Industries using all States, 1977-1992

	<u>Change in Log (Dependent Variable)</u>	
	<u>Weekly Employment</u>	<u>Annual Payroll</u>
	<i>Period 1977-1982</i>	
Returns to deregulation	0.044 (0.021)	0.055 (0.033)
	<i>Period 1982-1987</i>	
Returns to deregulation	0.064 (0.038)	0.073 (0.046)
	<i>Period 1987-1992</i>	
Returns to deregulation	0.046 (0.032)	0.061 (0.032)

Notes: Data are taken from the Census of Retail Trade 1977-1992. All regressions include the change in the log of state wide unemployment, population and personal disposable income, 5 region dummies and industry dummies. Standard errors are clustered by state. The number of observations is between 198 and 200.

Figure 1
The US History of General Sunday Closing Laws, 1979-1997

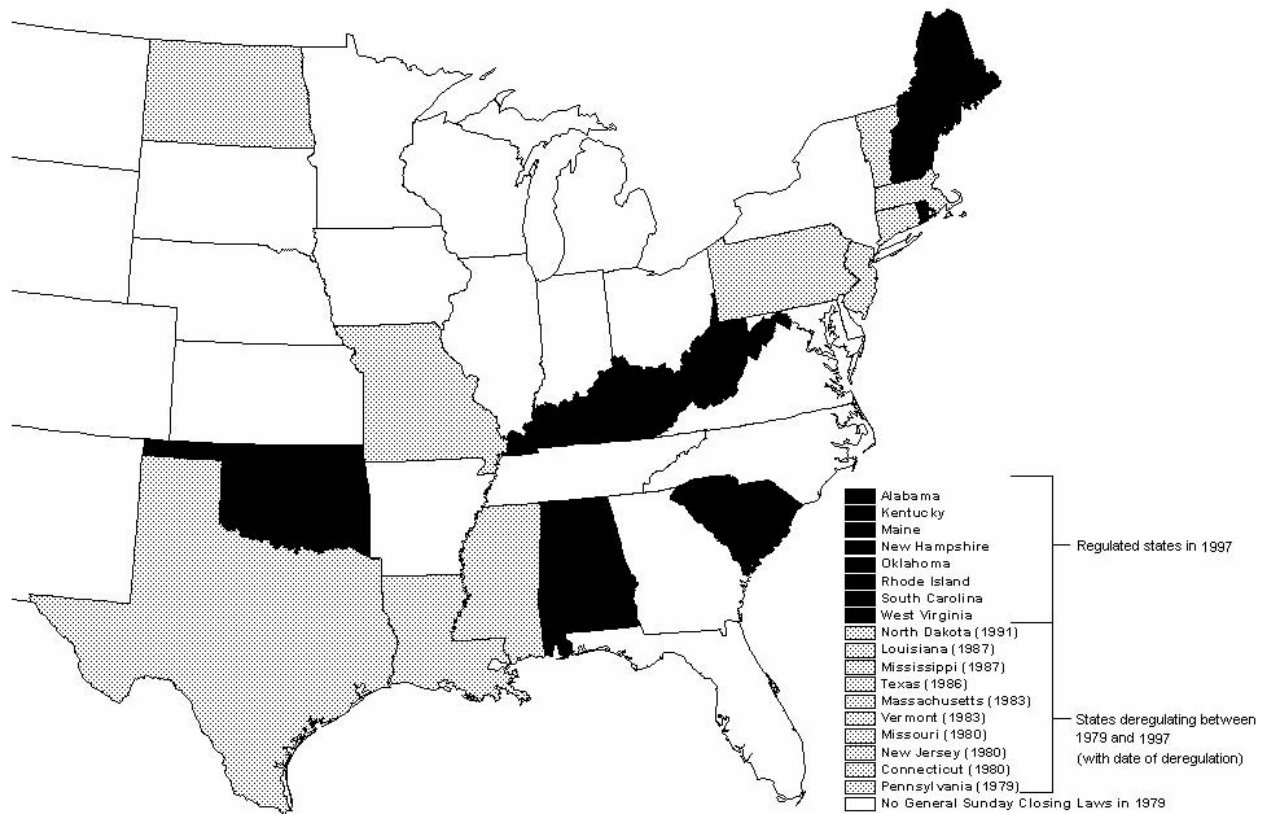
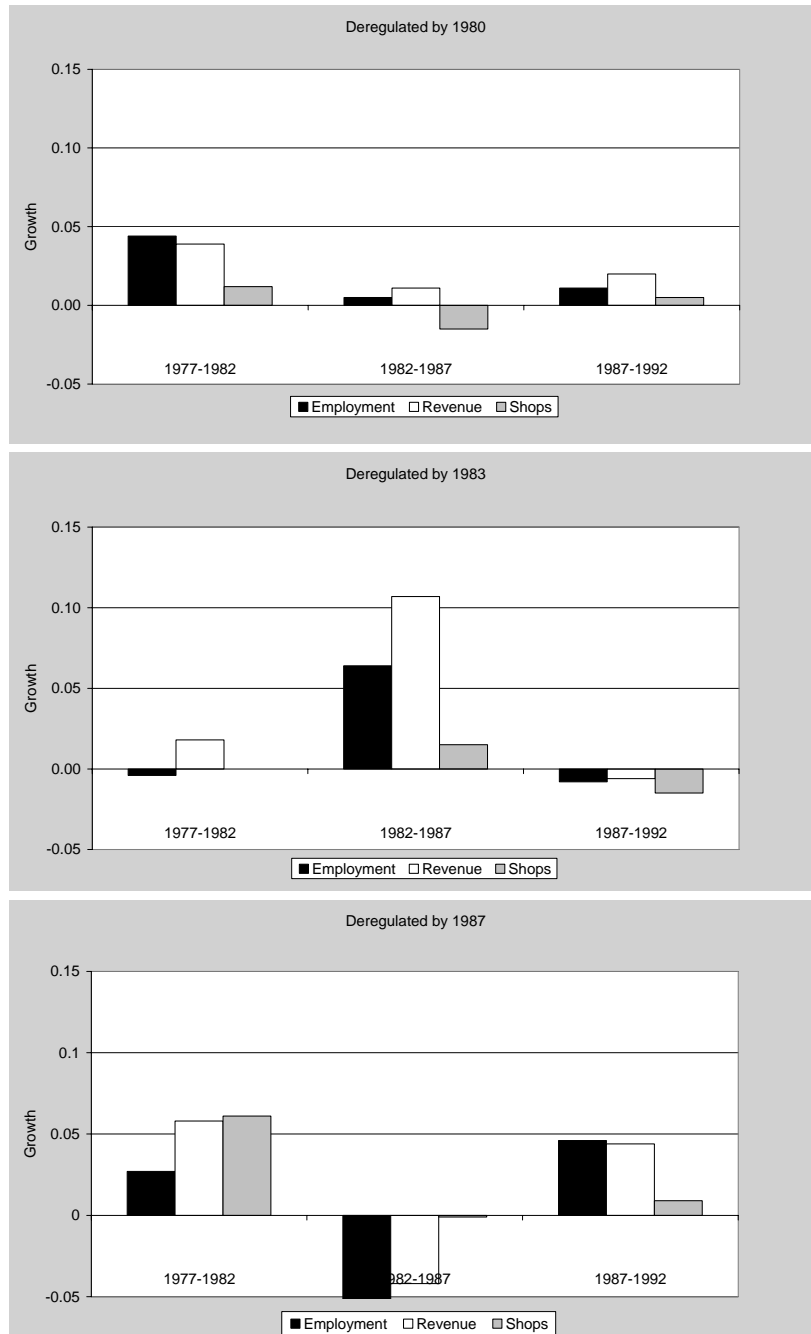
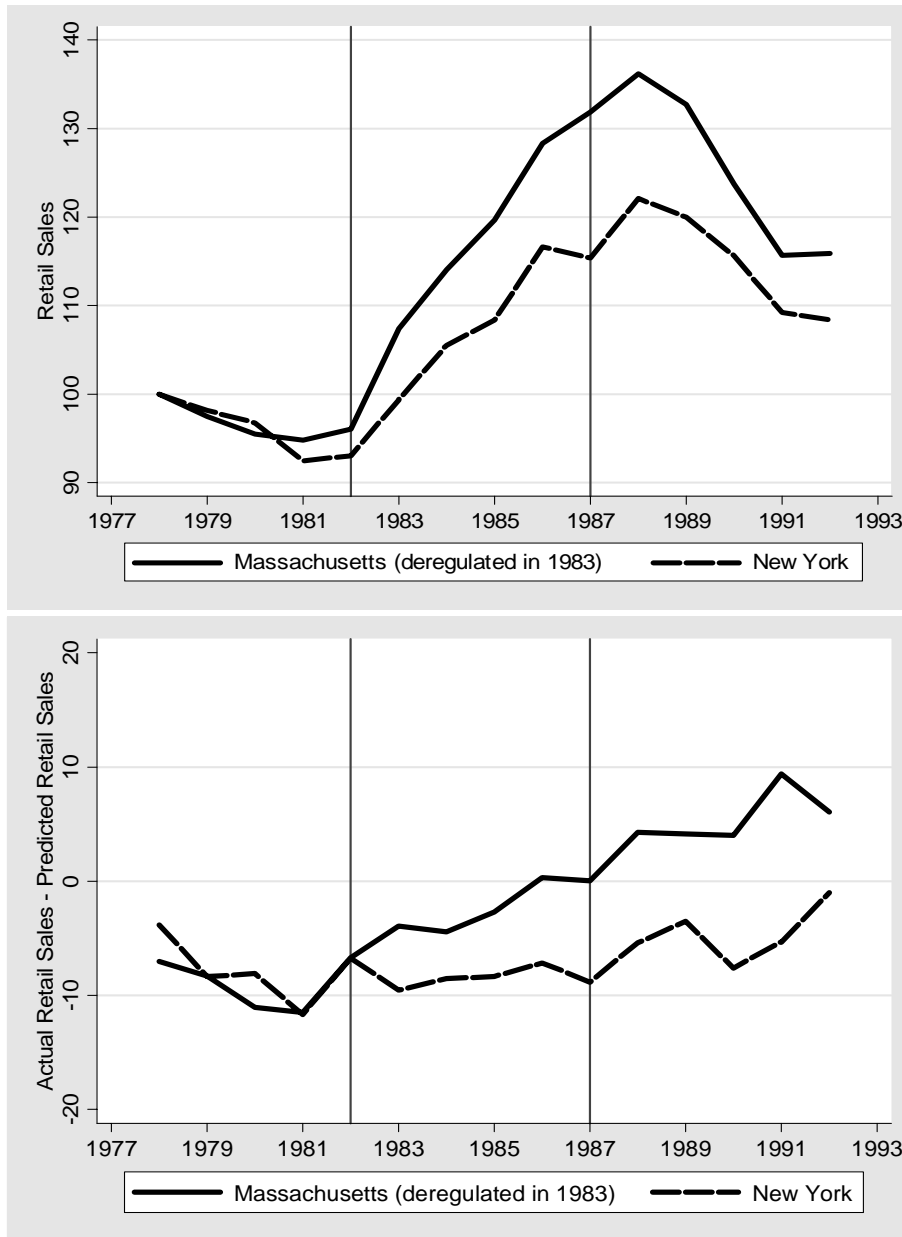


Figure 2
The Impact of Deregulation on Deregulating Industries for all Periods, 1977-1992



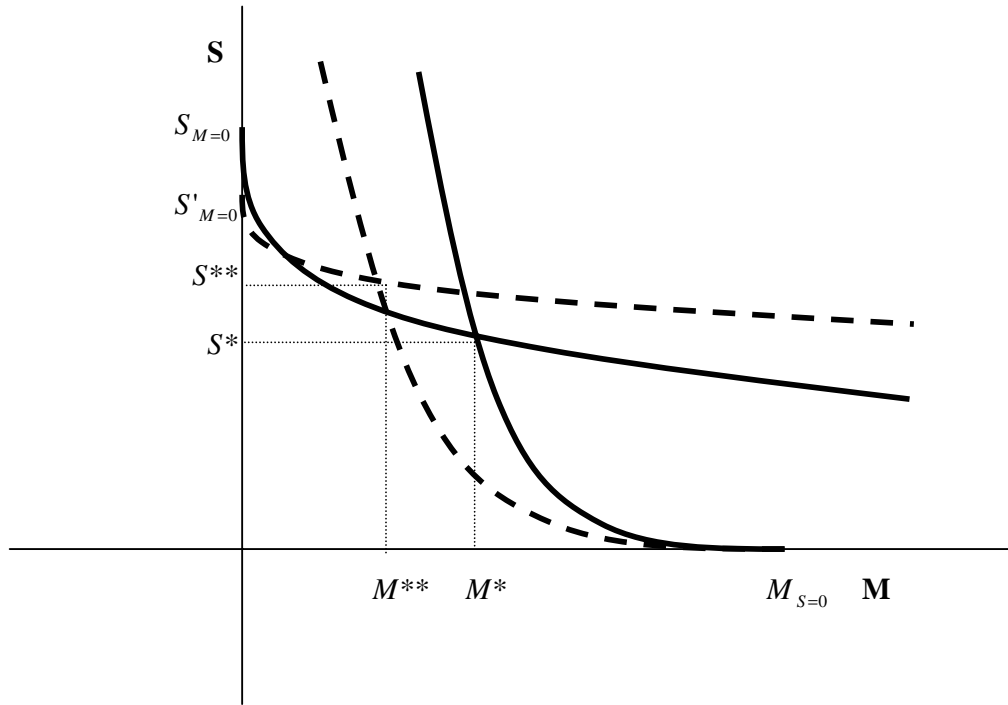
Notes: Data are taken from the Census of Retail Trade 1977-1992. All regressions include the log of state wide unemployment, population and personal disposable income, the interaction of year dummies with 5 region dummies and the interaction of year dummies with industry dummies. In addition, all regressions further include industry, state, state-industry and time dummies. Standard errors are clustered by state-year cells. The number of observations is between 394 and 400.

Figure 3
Differences in Annual Retail Revenue between Massachusetts and New York, 1978-1992 (1978=100)



Notes: Data are taken from the annualized Monthly Retail Sales Survey. The series in the lower panel are constructed by taking the difference between actual (deflated and normalized to 1978=100 as in the top panel) and predicted revenue. Predicted revenue is expected revenue from changes in the log of state wide unemployment, population and personal disposable income.

Figure 4
The Impact of Deregulating Shop Closing Hours on Revenue and the Number of Shops



Appendix A Current General Sunday Closing Laws

Alabama	Ala. Code 13A-12-1: "The keeping of an open store on Sunday is prohibited."	
Kentucky	Ky. Rev. Stat. Ann. 436.160: "Any person who works on Sunday or employs another person on Sunday shall be fined not less than \$2 and not more than 50\$ for each violation."	Ky. Rev. Stat. Ann. 436-165: "Any legislative body of any city or county may further permit or regulate retail sales on Sunday [...]."
Maine	Me. Rev. Stat. Ann. Tit. 17:3204: "Businesses cannot be open to the public on Sundays [...]."	
New Hampshire	N.H. Rev. Stat. Ann. 332-D:2: Opening of shops or selling any merchandise is prohibited on Sunday.	N.H. Rev. Stat. Ann. 332-D:4: "The governing body of any city or town may adopt bylaws and ordinances permitting and regulating retail businesses."
Oklahoma	Okla. Stat. Tit. 21: 918: "Secular labor, trades and all manner of public selling of any commodities are acts forbidden to be done on the first day of the week, the doing of which is Sabbath-breaking."	
Rhode Island	R.I. Gen. Laws 5-23-1: "Retail establishments licensed by the town council or any town may be permitted to open for business on Sundays between noon and 6 p.m and on holidays during normal working hours."	
South Carolina	S.C. Code Ann. 53-1-5: "It shall be unlawful for any person to sell at retail any goods on Sunday before 1.30 p.m on Sunday."	S.C. Code Ann. 53-1-150 to 170: "Counties also have the option of suspending certain Sunday closing laws."
West Virginia	W. Va. Code 61-10-25: "It shall be unlawful to engage in work, labor or business on Sunday."	W. Va. Code 61-10-28: "The county court of any county is hereby authorized to call a local option election for the purpose of determining the will of the voters as to whether the provisions of section 61-10-25 shall continue to have effect in said county."

Appendix B

The US History of General Sunday Closing Laws, 1979-2004

	Sunday Closing Law	Date of Deregulation
North Dakota	N.D. Cent. Code 12.1-30-01: "It is a misdemeanor for any person between the hours of twelve midnight and twelve noon on Sunday to conduct a business or labor for profit [...]."	Repealed February 1991.
Louisiana	La. Stat. Ann. 51-191: "All stores, shops, saloons and all places of public business, [...], shall be closed at twelve o'clock on Saturday nights, and remain closed continuously for twenty-four hours, during which time no proprietor thereof shall give, trade, barter, exchange or sell any stock or any article of merchandise kept in his establishment."	Repealed December 1986.
Mississippi	Ms. Stat. Ann. 97-23-67 generally prohibited sales on Sunday.	Repealed July 1986.
Texas	Tx. Stat. Ann. 132-9001 prohibited the sale of goods on both the two consecutive days of Saturday and Sunday.	Repealed September 1986.
Massachusetts	Ma. Gen. Laws Ann. 136.5: "Sunday shall be a common day of rest. Whoever on Sunday keeps open his shop, [...], or does any labor, business or work, except works of necessity and charity, shall be punished [...]."	Ma. Gen. Laws Ann. 136.50: "It is no longer prohibited to keep open a store or shop and sell retail goods therein [...] provided [...] any store or shop shall not open for business on Sunday prior to the hour of noon." Effective December 1982.
Vermont	Vt. Stat. Ann. 13-3351/52 related to the establishment of a common day of rest and the prohibition of business on such day.	State v. Ludlow Supermarkets Inc. 141 Vt. 261, 448 A2d 791 struck down the entire state wide scheme. Effective May 1982.
Missouri	Mo. Rev. Stat. 578.100: "On Sunday, it is a misdemeanor to engage in in the business of selling clothing and wearing apparel and accessories; furniture; housewares; home business or office furnishings and appliances; hardware; tools; paints; building and lumber supply materials; jewelry; silverware; watches; clocks; luggage; musical instruments and recordings or toys."	Mo. Rev. Stat. 578.110: "Any counties may exempt itself from provisions 578.100 by vote of qualified voters at any election (for larger counties) or public hearing (for smaller counties)." Between November 1979 and June 1985, 34 counties deregulated, between April 1986 and November 1990, 19 counties deregulated and between April 1991 and April 1995, 22 counties deregulated.
New Jersey	N.J. Stat. Ann. 2A-171-1 prohibited wordly employment or business on Sunday.	Repealed September 1979.
Connecticut	Ct. Gen. Stat. Ann. 53-302a: "No person, firm or corporation shall engage in work, labor or business, or employ others in work, labor or business on Sunday."	Caldor's Inc. v. Bedding Barn Inc., 177 Conn. 304, 417 A.2d struck down the entire state wide scheme. Effective April 1979.
Pennsylvania	Pa. Stat. Ann. 18-7361: "A person is guilty of a summary offense if he does or performs any worldly employment or business whatsoever on Sunday."	Kroger Co. v. O'Hara Tp. 392 A2d 266 481 Pa. 101 struck down the entire state wide scheme. Effective October 1978.

Appendix C

This appendix presents a formal Dixit-Stiglitz type model of monopolistic competition to analyze the impact of deregulating shop closing hours. The informal model described in the text can be summarized using representative utility given by

$$(C.1) \quad U = \left(\left(\sum_{i=1}^M \left(\sum_{j=1}^{D_m} x_{ijm} \delta \right)^{\frac{\gamma}{\delta}} \right)^{\frac{\rho}{\gamma}} + \left(\sum_{i=1}^S \left(\sum_{j=1}^{D_s} x_{ijs} \delta \right)^{\frac{\gamma}{\delta}} \right)^{\frac{\rho}{\gamma}} \right)^{\frac{1}{\rho}}$$

with x_{ijm} consumption from shop i on day j given the opening hours of the shop were not deregulated (type m shop) and x_{ijs} consumption from shop i on day j given the opening hours of the shop are being deregulated (type s shop). The number of type m shops is M and the number of type s shops is S . The number of hours per week type m shops can trade is D_m and the number of hours per week type s shops can open is D_s . For the indifference curves to be convex and finite we need that $0 < \delta < 1$, $0 < \gamma < 1$, $0 < \rho < 1$. Also assume that $\rho < \gamma$ or that the substitutability between type m and type s shops is smaller than the substitutability between shops of similar type. Also note that consumer tastes for shopping during extended opening hours is captured by $1/\delta$.

Demand for retail goods

Denote P_m and P_s as the standard Dixit-Stiglitz price indices for each type m and type s shop and \bar{P}_m and \bar{P}_s the standard price indices for all type m and s goods respectively. If in equilibrium all type m shops set a unique weekly price p_m and all type s shops set a unique weekly price p_s , P_m and P_s simplify to

$$(C.2) \quad P_m = \left\{ \sum_{j=1}^{D_m} p_m^{\frac{\delta}{1-\delta}} \right\}^{\frac{\delta-1}{\delta}} = D_m^{\frac{\delta-1}{\delta}} p_m$$

$$(C.3) \quad P_s = \left\{ \sum_{j=1}^{D_s} p_s^{\frac{\delta}{1-\delta}} \right\}^{\frac{\delta-1}{\delta}} = D_s^{\frac{\delta-1}{\delta}} p_s.$$

Given (C.2) and (C.3), \bar{P}_m and \bar{P}_s write as

$$(C.4) \quad \bar{P}_m = \left\{ \sum_{i=1}^M P_m^{\frac{\gamma}{1-\gamma}} \right\}^{\frac{\gamma-1}{\gamma}} = M^{\frac{\gamma-1}{\gamma}} D_m^{\frac{\delta-1}{\delta}} p_m$$

$$(C.5) \quad \bar{P}_s = \left\{ \sum_{i=1}^S P_s^{\frac{\gamma}{1-\gamma}} \right\}^{\frac{\gamma-1}{\gamma}} = S^{\frac{\gamma-1}{\gamma}} D_s^{\frac{\delta-1}{\delta}} p_s.$$

Weekly demand at each type m and s shop is then given by

$$(C.6) \quad X_m = \left(\frac{P_m^{\frac{1}{\gamma-1}}}{\bar{P}_m^{\frac{\gamma}{\gamma-1}}} \right) \sigma_m Y = \sigma_m \frac{Y}{M}$$

$$(C.7) \quad X_s = \left(\frac{P_s^{\frac{1}{\gamma-1}}}{\bar{P}_s^{\frac{\gamma}{\gamma-1}}} \right) (1 - \sigma_m) Y = (1 - \sigma_m) \frac{Y}{S}$$

with σ_m the fraction of total income Y spent on all type m shops which in equilibrium is given

by

$$(C.8) \quad \sigma_m = \frac{\bar{P}_m^{\frac{\rho}{\rho-1}}}{\bar{P}_m^{\frac{\rho}{\rho-1}} + \bar{P}_s^{\frac{\rho}{\rho-1}}}.$$

Supply of retail goods

Each shop sells a differentiated product. Shops have some monopoly power and enough shops exist such that each store perceives its demand only to depend on its own price. The first

order conditions for maximizing profits then gives the familiar result that prices are a constant mark-up over marginal costs or $p_m\gamma = c_m$. Similarly, in equilibrium we must have that $p_s\gamma = c_s$.

Assuming free entry of shops this gives the following zero-profit conditions:

$$(C.9) \quad \frac{1-\gamma}{\gamma} c_m X_m = F_m$$

$$(C.10) \quad \frac{1-\gamma}{\gamma} c_s X_s = F_s$$

with F threshold labor costs and other costs independent of sales.

Substituting (C.4) and (C.5) into (C.8) and (C.2), (C.4) and (C.8) into (C.6) and (C.6) into (C.9) and rearranging terms gives the following zero-profit condition for type m shops:

$$(C.11) \quad S = M \left(\frac{M_{S=0} - M}{M} \right)^{\frac{\gamma(\rho-1)}{\rho(\gamma-1)}} \left(\frac{D_m}{D_s} \right)^{\frac{\gamma(\delta-1)}{\delta(\gamma-1)}}$$

with

$$(C.12) \quad M_{S=0} \equiv \frac{1-\gamma}{\gamma} c_m \left(\frac{\gamma}{c_m} \right)^\gamma \frac{Y}{F_m}.$$

Similarly, the zero-profit condition for all type s shops can be written as

$$(C.13) \quad M = S \left(\frac{S_{M=0} - S}{S} \right)^{\frac{\gamma(\rho-1)}{\rho(\gamma-1)}} \left(\frac{D_s}{D_m} \right)^{\frac{\gamma(\delta-1)}{\delta(\gamma-1)}}$$

$$(C.14) \quad S_{M=0} \equiv \frac{1-\gamma}{\gamma} c_s \left(\frac{\gamma}{c_s} \right)^\gamma \frac{Y}{F_s}.$$

If $\gamma > \rho$, zero-profit conditions (C.11) and (C.13) have vertical asymptotes at $M = 0$ and $S = 0$ respectively. Inspection of the first order derivatives of S with respect to M in (C.11) and M with respect to S in (C.13) learns that for all possible parameter values the first order derivative is strictly negative if $M < M_{S=0}$ in (C.11) and $S < S_{M=0}$ in (C.13) and zero if $M = M_{S=0}$ in (C.11)

and $S = S_{M=0}$ in (C.13). For all possible parameter values the second order derivatives are strictly positive for all $M < M_{S=0}$ in (C.11) and all $S < S_{M=0}$ in (C.13). Figure 4 illustrates the equilibrium (S^*, M^*) . Also note that in (C.11) an increase in S of one requires a decrease in M less than one and in (C.13) a decrease in M of one requires an increase in S of less than one. This implies the equilibrium is stable.

The impact of deregulating shop closing hours

Using (C.11) for any given S , an increase in D_s (relative to D_m) requires a fall in M . Using (C.13), an increase in D_s requires an increase in S for any given M . The increase in S further decreases M in (C.11) and the decrease in M further increases S in (C.13) until a new stable equilibrium is reached. Assuming fixed daily costs of production are sufficiently small, the number of type s shops unambiguously increases and the number of type m shops unambiguously decreases following an increase in D_s . The dashed lines in Figure 4 reflect the impact of deregulation on the number of type m and s shops in equilibrium.

Also note from (C.11) and (C.13) that for any given (S^*, M^*) the increase in S and the decrease in M following an increase in D_s are bigger if δ is smaller or consumers have a preference for shopping on Sunday. Similarly, the increase in S and the decrease in M following an increase in D_s are bigger if ρ is bigger or the substitutability of goods between type m and type s shops is higher.

From (C.4), (C.5), (C.8), (C.11) and (C.13) it follows that an increase in D_s reduces the fraction of total income spent on type m goods, σ_m . The increase in S and the decrease in M further decrease σ_m as consumers will consume from every shop in equilibrium. The prediction

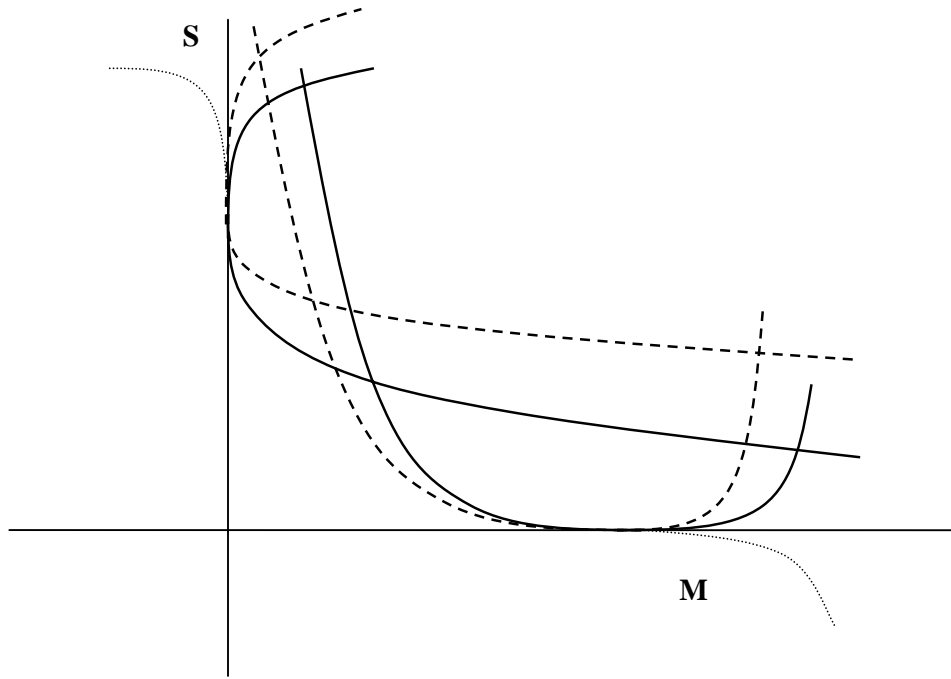
therefore is that total sales in type m shops decrease and total sales in type s shops increase following an increase in D_s . Consequently employment in type m shops will decrease and employment in type s shops will increase.

It can also be shown that following an increase in D_s , the decrease (increase) of total sales in type m (s) shops will be larger if δ is smaller or if consumers have a preference for shopping on Sunday. Similarly, if type m and s goods are more substitutable in consumption, the decrease (increase) of total sales in type m (s) shops will be larger if ρ is bigger.

Multiple stable equilibria

The solid line in Figure C.1 gives zero-profit conditions if $\gamma(\rho - 1) / \rho(\gamma - 1)$ is an even integer (and the dotted lines parts of the zero-profit conditions if $\gamma(\rho - 1) / \rho(\gamma - 1)$ is not an even integer) and shows multiple equilibria. The analysis remains qualitatively unchanged. For example, the comparative statics for an increase in D_s / D_m are given by the dashed lines. In all cases, S increases and M increases as before.

Figure C.1
Multiple Stable Equilibria



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