ON THE CAUSES AND CONSEQUENCES
OF STRUCTURAL REFORMS
FEBRUARY 28–29, 2008

Product Market Regulation and Market Work: A Benchmark Analysis

Lei Fang
Arizona State University

Richard Rogerson
Arizona State University and NBER

NBER WORKING PAPER SERIES

PRODUCT MARKET REGULATION AND MARKET WORK: A BENCHMARK ANALYSIS

Lei Fang
Richard Rogerson

Working Paper 12891
http://www.nber.org/papers/w12891

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2007

We thank Berthold Herrendorf, Yongsung Chang, Ellen McGrattan and seminar participants at ASU, NYU, Wisconsin and the University of Tokyo for useful comments. Rogerson acknowledges financial support from the NSF. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

Product Market Regulation and Market Work: A Benchmark Analysis
Lei Fang and Richard Rogerson
NBER Working Paper No. 12891
February 2007
JEL No. E2,J2,L5

ABSTRACT

Recent empirical work finds a negative correlation between product market regulation and aggregate employment. We examine the effect of product market regulations on hours worked in a benchmark aggregate model of time allocation. We find that product market regulations affect time devoted to market work in effectively the same fashion as do taxes on labor income or consumption. In particular, if product market regulations are to affect aggregate market work in this model the key driving force is the size of income transfers associated with the regulation relative to labor income, and the key propagation mechanism is the labor supply elasticity. We show in a two sector model that industry level analysis is of little help in assessing the aggregate effects of product market regulation.

Lei Fang
Department of Economics
Arizona State University
Tempe AZ 85287
lei.fang.1@asu.edu

Richard Rogerson
Department of Economics
College of Business
Arizona State University
Tempe, AZ 85287
and NBER
richard.rogerson@asu.edu

1. Introduction

Time devoted to market work differs greatly across OECD economies: total hours of work per person of working age are currently more than 30% lower in Belgium, France, Germany, and Italy than they are in the US. A growing literature seeks to understand the causes of these differences.[1] Any explanation for these differences must consist of two components: driving forces and propagation mechanisms. The driving forces are those factors that differ across these economies, and the propagation mechanism is the economic channels through which these factors influence hours of work. Many driving forces have been suggested in the literature, including taxes, labor market regulations, and unions. A recent literature has emerged on the importance of product market regulations for labor market outcomes. Empirical work by Boeri et al (2000), Bertrand and Kramarz (2002), and Lopez-Garcia (2003) finds a strong negative correlation between product market regulation and employment. Theoretical work includes contributions by Nickell (1999), Fonseca et al (2001), Blanchard and Giavazzi (2002), Messina (2006), and Ebell and Haefke (2004, 2006).

A full understanding of how product market regulations affect labor market outcomes requires a systematic assessment of the channels through which these regulations affect equilibrium outcomes in various economic environments. This paper seeks to contribute to this effort. Specifically, we examine the effects of one prominent aspect of product market regulations–increased entry costs– on labor market outcomes in two static versions of a simple benchmark model of aggregate time allocation: a representative household model in which there are no trading frictions. In the first version we assume monopolistic competition in product markets but competitive behavior in the labor market. In the second version we allow for imperfect competition in both labor and product markets. In both versions we assume that the household values only consumption and leisure and that the preferences would be consistent with balanced growth in a standard growth model setting.

While the setting in which we carry out our analysis is simple, it generates three important insights about the effect of product market regulations which take the form of entry barriers. First, from the perspective of influencing time devoted to market work, the key driving force is the size of transfer payments relative to labor income accruing to households as a result of the regulation. Second, the extent to which this driving force leads to less market work is completely determined by the elasticity of labor supply. The third insight follows from the first two: understanding the effects of product market regulations on time allocated to market work in this setting is isomorphic to the problem of understanding the effects of labor income taxes or consumption taxes on time allocated to market work. In both cases the key driving force is the size of transfers

[1] Recent examples include Alesina et al (2006), Davis and Henrekssen (2004), Prescott (2003), and Rogerson (2005, 2006). A related literature seeks to understand differences in unemployment rates, but these differences are almost an order of magnitude smaller in terms of implications for differences in hours devoted to market work.

relative to labor income, and the key parameter of the propagation mechanism is the labor supply elasticity. These results hold in both versions of our model.

Two conclusions follow from these results. First, the importance of product market regulation relative to taxation of labor income and/or consumption is completely dictated by the relative magnitude of the transfers induced by each. Second, entry barriers that consist of real resource costs have no impact on the volume of market work. Specifically, in this case it does not matter how large the barriers are, since they do not generate any transfer payments in equilibrium. Although entry barriers of this type do not have any effect on hours of work, it does not follow that they have no welfare costs. Even when there is no effect on time allocated to market work, we show that product market regulations still influence welfare through affecting other dimensions of the resource allocation.

We also extend our analysis to a two-sector model. Our results about the impact of regulation carry over to this setting as well, even if the regulations are sector specific. Moreover, we show that the relation between sectoral market work and sectoral regulation is not informative about the relationship between regulation and aggregate market work. The key message is that one cannot extrapolate from industry-level effects to aggregate effects. Similar to the case of labor income taxes, our two-sector analysis suggests an additional channel through which entry barriers may influence market hours. In particular, if we think of one of the sectors as representing home production, and the home sector produces goods that are substitutes for those produced in the market, then if entry barriers lead to higher relative prices for the market goods, individuals will substitute away from market produced consumption toward home produced consumption.

Given the setting in which our analysis takes place, our results are most related to those obtained in Messina (2006). He too considered a representative household model with no trading frictions. Although his model is much richer than ours, the key finding from our analysis that is useful in interpreting his results concerns the role played by the entry barrier. He assumes that the barrier is a payment which effectively leads to a transfer payment to consumers. He calibrates the size of the regulation by using data from Djankov et al (2002), which is based on measures of time costs. In our model, if this regulation were modelled as a time cost, the impact would be zero. While Ebell and Haefke (2006) consider a model with trading frictions, their quantitative analysis shows that changes in regulations which reflect real resource costs have virtually no affect on unemployment.

An outline of the paper follows. The next section lays out the basic model and characterizes both efficient and equilibrium allocations in the absence of any product market regulations. Section 3 characterize the effect of taxes on time devoted to market work. These expressions will be useful in interpreting the analogous expressions derived for the case of product market regulations, which is done in Section 4. Section 5 considers an extension to allow for endogenous price markups, and Section 6 considers an extension to allow for imperfect competition in the labor market. Section 7 considers product market regulations in a two sector model, and Section 8 concludes.

2. Benchmark Model

2.1. Environment

This section lays out the benchmark model of monopolistic competition and characterizes the equilibrium allocation for the model. The economy is static. There is a representative household with preferences defined over consumption of a final good (c) and leisure ($1-h$) given by:

$$\alpha \log(c) + (1-\alpha)\frac{(1-h)^{1-\gamma}-1}{1-\gamma}. \tag{2.1}$$

The parameter α satisfies $0 < \alpha < 1$ and determines the relative weight of leisure and consumption, while the parameter γ satisfies $\gamma \geq 0$ and defines the Frisch elasticity of the demand for leisure, which is given by $-1/\gamma$. We adopt this specification of preferences because it is consistent with balanced growth and permits a parsimonious way of incorporating a range of labor supply elasticities. All of the results derived below continue to hold in the more general case of any utility function consistent with balanced growth.

There are two production sectors, an intermediate goods sector and a final goods sector. Each point on the positive real line represents a potential intermediate good. Each of these intermediate goods can be produced using a linear technology $y(i) = h(i)$, where $h(i)$ is labor input for the intermediate good i, but there is a fixed cost $\phi > 0$ associated with operating any of these technologies. We assume that the fixed cost is in units of labor. For the purposes of the decentralization in which we will assume many firms that each takes the actions of other firms as given, we will also assume that each point on the real line corresponds to a different firm and that each firm owns the intermediate good technology represented by the same point on the real line.

The final goods sector combines the available intermediate goods into the final good via the CES production function:

$$c = [\int_0^\infty y(i)^\rho di]^{1/\rho}], \tag{2.2}$$

and as indicated, the only use of the final good is as consumption. In the decentralization that follows we will assume that the final goods sector is competitive, and hence for simplicity we assume that there is a single representative firm in this sector. We assume that the representative household owns all of the firms and hence receives any profits that might accrue in equilibrium.

2.2. Efficient Allocations

For comparison with later results it is useful to first characterize efficient allocations for this economy. Given the symmetry of the environment, it is easy to show that efficient allocations will also be symmetric, in the sense that any intermediate good technologies that are operated in equilibrium will be operated at the same level. Of course, given the fixed cost, only a finite mass of these technologies will be operated. Again, due to the symmetry, efficiency will only dictate the mass of intermediate goods that are produced and not the specific identities of these goods. Since this indeterminacy is of no substantive interest, we simply assume that the intermediate technologies operated lie in the interval $[0, N]$ and we characterize the optimal value of N.

In view of the above discussion, it is sufficient to choose values of the output of each intermediate (y), the mass of intermediates (N), and total market work (h) to maximize:

$$\alpha \log([Ny^{\rho}]^{1/\rho}) + (1-\alpha)\frac{(1-h)^{1-\gamma} - 1}{1-\gamma} \tag{2.3}$$

subject to feasibility, which entails:

$$\begin{aligned} h &= N(y+\phi) \\ 0 &\leq h \leq 1 \\ N &\geq 0,\ y \geq 0 \end{aligned} \tag{2.4}$$

Given our functional forms, the solution to this problem is interior. Letting λ be the Lagrange multiplier on the feasibility constraint, the first order conditions are:

$$\begin{aligned} \frac{\alpha}{\rho N} &= \lambda(y+\phi) \\ \frac{\alpha}{y} &= \lambda N \\ \lambda &= \frac{(1-\alpha)}{(1-h)^{\gamma}} \end{aligned} \tag{2.5}$$

Simple substitution yields:

$$\frac{1-\alpha}{\alpha}\frac{h}{(1-h)^{\gamma}} = \frac{1}{\rho} \tag{2.6}$$

and:

$$y = \frac{\rho}{1-\rho}\phi. \tag{2.7}$$

which completely characterizes the solutions for h and y. Given solutions for y and h we can then use the feasibility constraint to find the value of N in terms of the solutions for h and y.

2.3. Decentralized Equilibrium

We study an equilibrium in which the consumer behaves competitively in both the output and the labor markets and the final goods firm behaves competitively in both the final goods market and the intermediate goods market, while intermediate goods firms behave as monopolistic competitors in output markets and as perfect competitors in the labor market. Given the symmetry imposed on the environment, we focus on equilibria in which all active intermediate goods firms charge the same price and produce the same amount. Given that we have an unbounded set of potential firms, profits in equilibrium will be zero for any firm that operates. Given the symmetry of the model it is clear that equilibrium will only determine the mass of firms that operate and not the identities of these firms. We again resolve this indeterminacy by assuming that the firms that operate lie in an interval with left endpoint equal to 0. We will normalize the price of the final good to be equal to one and denote the symmetric price of the intermediate goods by p, and the wage rate by w.

Formally, a symmetric equilibrium for our model is a list c^*, h^*, y^*, N^*, p^*, w^*, $d^*(p)$ such that

(1) (Consumer maximization) Taking w^*as given, c^* and h^* solve the consumer maximization problem.

(2) (Final good producer maximization) Taking $p(i) = p^*$ for all i and N^* as given, $y(i) = y^*$ for all i solves the final good producer's profit maximization problem. And the function $d^*(p)$ represents the demand of the final good producer for any intermediate i as a function of the price of intermediate i, holding all other prices at their equilibrium values, and holding the number of varieties fixed at N^*.

(3) (Intermediate goods producers maximization) For each $i \in [0, N^*]$, $p_i = p^*$, $y(i) = h^*/N^* - \phi$ solves the profit maximization problem of intermediate producer i, taking the demand function $d^*(p)$ and the wage rate w^* as given.

(4) (Free entry) All operating intermediate firms earn zero profits: $(p^* - w^*)y^* = w^*\phi$.

As is well known, it is relatively easy to characterize the equilibrium for this model. Since this derivation will be useful for the policy exercises conducted in the next section, we sketch the derivation here. The production function of the final good producer implies that the demand function $d^*(p)$ takes the form $d^*(p) = Ap^{\frac{1}{\rho-1}}$, where A is a constant, which in turn implies a simple markup rule for the equilibrium price of intermediate goods: $p^* = \frac{1}{\rho}w^*$.

The consumer maximization problem is to choose values of c and h to maximize:

$$\alpha \log(c) + (1-\alpha)\frac{(1-h)^{1-\gamma} - 1}{1-\gamma} \tag{2.8}$$

subject to the budget constraint $c = w^*h$. Substituting this into the objective function, we obtain the first order condition:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = 1. \tag{2.9}$$

This expression completely characterizes the equilibrium value of h. The analogous expression for the Social Planner's solution has the same expression on the left-hand side but instead had $1/\rho$ on the right hand side. Since the left-hand side is decreasing in h, it follows that the decentralized equilibrium has too little time devoted to market work. Although the time devoted to market work in the decentralized equilibrium is independent of the value of ρ, the extent of the inefficiency in time allocation is decreasing in ρ, since the Social Planner's solution for h is decreasing in ρ. In particular, the two solutions approach each other as ρ converges to one.

The solutions for y and N (and hence c) are also easily obtained. Specifically, independently of the above derivation for h, the equilibrium value of y can be determined solely from the zero profit condition given we know the equilibrium price. In particular, zero profits requires:

$$(p^* - w^*)y = w^*\phi \tag{2.10}$$

and using the fact that $p^* = w^*/\rho$, this implies

$$y = \frac{\rho}{1-\rho}\phi. \tag{2.11}$$

Note that the value of y is the same in the decentralized equilibrium as it is in the Social Planner's problem. It follows that the lower value of h in the decentralized equilibrium results in a proportional decrease in the number of intermediate goods that are produced relative to the Social Planner's problem. The value of N is again easily determined from the feasibility condition:

$$N = \frac{h}{(y+f)}. \tag{2.12}$$

The consumption of the final good is then easily computed as:

$$c = N^{1/\rho}y. \tag{2.13}$$

3. Taxes and Market Work

In this section we derive expressions to characterize the effect of taxes on labor income and consumption on equilibrium allocations. While our ultimate interest is in understanding the effect of product market regulations on equilibrium allocations, and specifically on time devoted to market work, the expressions relating taxes to allocations will prove useful in helping us interpret the expressions that we obtain for product market regulations. We consider a policy in which labor income is taxed at the constant proportional rate τ_h but distinguish policies based on what is done with the revenue. Specifically, we contrast two scenarios, distinguished by whether the government uses the tax revenues in a manner that affects the marginal utility of private consumption. In the first scenario we assume that the revenue is rebated lump-sum to the representative consumer, or equivalently in this model, that the government uses the tax revenues to purchase the final good and then transfers these purchases of the final good to the consumer as a lump sum transfer. This scenario implies that government spending is a perfect substitute for private spending. The second scenario also assumes that the government uses its revenues to purchase the final consumption good, but assumes differently that the government discards these goods, or equivalently, uses them to in turn produce something that consumers do not value.[2] In this scenario, the government uses revenues in a manner that does not affect the marginal utility of private consumption. As we shall see, the reason for considering these two variations on spending is that they have extremely different implications for equilibrium allocations, specifically for hours of work, and will be useful in considering different regulatory policies.

In defining equilibrium in the presence of these policies we must account for the behavior of the government sector. Let g denote government purchases of the final consumption good and let T denote government lump-sum transfers in units of the consumption good. Then under scenario one we must add the condition $T^* = g^* = \tau w^* h^*$, while under scenario 2 we must add the condition $g^* = \tau w^* h^*$ but set $T^* = 0$.

Under both scenarios it is easy to show that the demand function for a given intermediate takes the same form as before, implying that in equilibrium the price charged by intermediate goods producers will continue to satisfy $p^* = w^*/\rho$. We next derive the implications for equilibrium allocations.

3.1. Lump-Sum Transfers

With lump sum transfers, the household's budget constraint becomes:

$$c = (1-\tau)w^* h + T \tag{3.1}$$

Substituting this into the consumers objective function yields a first order condition for h given by:

$$\frac{\alpha(1-\tau)w^*}{(1-\tau)w^* h + T} = \frac{(1-\alpha)}{(1-h)^\gamma} \tag{3.2}$$

Since the government budget constraint requires that $T = \tau w^* h$, this equation reduces to:

$$\frac{(1-\alpha)h}{\alpha(1-h)^\gamma} = (1-\tau) \tag{3.3}$$

This equation gives the well-known result that if tax revenues are rebated lump-sum then hours of work are decreasing in taxes.

The magnitude of this effect for a given change in τ depends on the labor supply elasticity parameter γ. In particular, consider two economies that are identical except

[2] Another equivalent possibility is that the goods are used to produce a second good that enters utility additively with respect to utility from c and $1-h$.

for their values of τ. Let $\tau_2 > \tau_1$, and let h_i represent the equilibrium hours worked in economy i, $i = 1, 2$. It follows that these values satisfy:

$$\log(\frac{h_1}{h_2}) - \gamma \log(\frac{1-h_1}{1-h_2}) = \log(1-\tau_1) - \log(1-\tau_2)$$

It follows that for a given value of h_1, the ratio h_1/h_2 will be increasing in γ. To describe this in terms of the driving force/propagation mechanism characterization mentioned in the introduction, the driving force is the size of the tax, and the propagation mechanism is determined by the labor supply elasticity parameter γ.

To finish characterizing the equilibrium, we note that the zero profit constraint implies the same value for y as before (i.e., $y = \frac{\rho}{1-\rho}\phi$) , so there is no effect on y. The feasibility condition is unchanged, so N changes proportionally with h.

For comparison with later results, it is also useful to consider the case where the tax is placed on consumption as opposed to labor income. Denoting this tax as τ_c, and assuming that the unit price paid by consumers in equilibrium is given by $(1 + \tau_c)$, the expression for hours becomes:

$$\frac{(1-\alpha)h}{\alpha(1-h)^{\gamma}} = \frac{1}{1+\tau_c}. \tag{3.4}$$

3.2. Discarded Revenues

If government revenues are discarded rather than returned to the household, then the household's budget constraint is simply $c = (1-\tau)w^*h$. Deriving the first order condition for h with this budget equation now yields:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = 1 \tag{3.5}$$

which is identical to the case in which there was no tax. Considering the outcomes for y and N it is easy to show that y continues to have the same value as in the no-tax case and therefore that N will as well. This does not imply that allocations are not affected by taxes in this case. In particular, given the budget constraint above, given no change in w and h, it follows that c is equal to $(1 - \tau)$ of its value in the no-tax case.

4. Product Market Regulation and Market Work

Given the simple form of our model we cannot consider a rich class of regulatory policies. However, the literature that we referred to in the introduction typically focuses on one particular aspect of regulatory policy, and this is the size of fixed costs associated with entry. Hence, we focus on regulatory policies as they impact on the size of the fixed entry cost ϕ. However, as we show below, it is important to distinguish between two different kinds of regulations. The first type of regulation represents real resource costs. Examples of this include regulations that require additional resources to be used up in the entry process, by requiring additional studies, filing additional reports, requiring more meetings and approval at various levels etc....The second type of regulation involves purely a nominal cost and does not involve any use of resources. An example of this is when entry requires the purchase of a license. In line with the analysis of tax policies, in this case we will further distinguish between two cases based on what is done with the revenues generated by the nominal entry cost payments: are they returned to consumers via a lump-sum transfer or are they discarded.

In all of the above cases, equilibrium will continue to require that profits are zero. A final case that we deal with is one in which the nature of regulation does not lead to zero profits. In particular, we will consider a policy in which the government controls the number of firms that operate in equilibrium, possibly by randomly issuing permits, but that there is no market for these permits. Assuming the number of permits is less than the equilibrium value of N in the case without permits, then any firm that receives a permit will make positive profits in equilibrium.

4.1. Barriers to Entry I

Here we assume that the barrier takes the form of real resource cost. This means that we model the barrier as an increase in the fixed cost ϕ, which recall was measured in units of labor. To analyze this case it is not necessary to do any additional calculations beyond those in Section 2.4. From the previous expressions derived to characterize equilibrium we see that an increase in the value of ϕ has no effect on h, but leads to an increase in y and a decrease in N. It follows that there are welfare effects associated with this type of regulation, but that there is no effect on time devoted to market work.

4.2. Barriers to Entry II

Here we instead assume that the barrier takes the form of an entry fee. We assume that the entry fee is equal to κ, and for convenience assume that the fee is denominated in units of the wage rate w^*. In this subsection we assume that the proceeds from this entry fee are thrown away by the government, i.e., that the government uses the proceeds to purchase the final consumption good but then discards it. The household's budget equation does not change and as a result the first order condition for the consumer maximization problem continues to generate the usual expression for h:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = 1, \tag{4.1}$$

implying that there is no effect on hours of work. There is, however, an affect on c and y. In particular, the zero profit condition now reads:

$$(\frac{1}{\rho}w^* - w^*)y = w^*(\phi + \kappa), \tag{4.2}$$

implying that

$$y = \frac{\rho}{1-\rho}(\phi + \kappa) \tag{4.3}$$

so that y is increasing in κ. But since κ only represents a nominal cost, feasibility is the same as before, :

$$N = \frac{h}{(y + \phi)} \tag{4.4}$$

which combined with the result for y implies that N decreases. It follows that allocations in this case are identical to those obtained in the case where the entry cost represents a real resource cost. Specifically, although product market regulations in this context do affect allocations and welfare, they do not manifest themselves in changes in hours of market work.

4.3. Barriers to Entry III

Here we continue to assume that the entry barrier is a license fee but now assume that the government rebates the proceeds to the household. In this case the household budget constraint becomes

$$c = w^* h + T \tag{4.5}$$

where T is the size of the transfer. Solving the consumer's maximization problem, the implied condition for h is

$$\frac{(1-\alpha)}{\alpha} \frac{w^* h + T}{(1-h)^\gamma} = w^*. \tag{4.6}$$

It is possible to explicitly solve for T in terms of h using the other equilibrium conditions. As above, the equilibrium value of y can be determined solely from the zero-profit condition, and N can be determined from the feasibility condition as a function of y and h. Knowing N as a function of h allows us to solve for T as a function of h. This gives:

$$T = w^* N \kappa = \frac{(1-\rho)\kappa}{\phi + \rho\kappa} w^* h \tag{4.7}$$

which substituted into equation (4.6) yields:

$$\frac{(1-\alpha)}{\alpha} \frac{h}{(1-h)^\gamma} = \frac{1}{1 + \frac{(1-\rho)\kappa/\phi}{1+\rho\kappa/\phi}} \tag{4.8}$$

However, it is perhaps more revealing to instead multiply both sides of equation (4.6) by h, and rearrange to yield:

$$\frac{(1-\alpha)}{\alpha} \frac{h}{(1-h)^\gamma} = \frac{1}{1 + \frac{T}{w^* h}} \tag{4.9}$$

Note that the term T/w^*h represents government transfers as a fraction of total labor income in the economy. It is instructive to compare this with the expression relating hours of work with tax programs. Specifically, assuming a tax only on consumption and that revenues are rebated lump-sum to consumers, we obtained the expression:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = \frac{1}{1+\tau_c} \tag{4.10}$$

The two expressions are identical except that τ_c is substituted for T/w^*h. However, both of these terms have similar interpretations. In the case of regulation, T/w^*h is the size of transfers relative to total labor income, while in the case of consumption taxes, simple manipulation of the consumer and government budget constraints implies that τ_c is also the size of transfers relative to total labor income. The implications of this are two-fold. First, if regulations take the form of nominal payments and these payments are rebated to households, then higher regulation is associated with less time devoted to market work. Second, in terms of the impact on time devoted to market work, this type of regulation will operate through exactly the same channels as consumption taxes. In particular, the key driving forcing is the size of the implied transfer payments relative to total labor income, and the key parameter that determines the propagation of this forcing variable is γ, which determines the labor supply elasticity.

While the comparison to consumption taxes is particularly direct in terms of the expressions that one obtains for hours of market work, since there is an equivalence between labor income taxes and consumption taxes, there is also a strong relationship between this type of regulatory policy and labor income taxes. Given the expressions derived in Section 3, we know that in the context of our model, a consumption tax of τ_h is observationally equivalent to a consumption tax of $\tau_c = \frac{1}{1-\tau_h} - 1$. It follows that the above discussion similarly indicates a strong relationship between this type of product market regulation and taxes on labor income.[3]

A simple point to note here is that looking at the relative size of κ across economies is not particularly useful in assessing whether the labor market effects are likely to be large. Many researchers refer to the study of Djankov et al (2002), which shows that time costs of setting of up business are roughly 6 days in the US and more than 60 in many European countries, implying a difference of an order of magnitude in entry barriers. Given that these differences reflect time costs they should be modeled as representing real resource costs. However, for the sake of illustration, we assume that this is a pure nominal cost. A simple example shows that this magnitude is not a good indicator for the size of the driving force. Specifically, assume that $\rho = .8$, and $\phi = 1$. Assume for the US that $\kappa = .01$, implying that in the US roughly 1% of total setup costs are associated with regulatory barriers. In line with the above mentioned studied, assume that $\kappa = .1$ in Europe. Evaluating the right hand side of equation (4.8) for the

[3] In fact, the procedure that Prescott (2004) followed in measuring effective tax rates would have included government fees such as those studied here in his measure of consumption taxes.

two cases we get a value of .998 for the US and .982 for Europe, implying a relative value of only 1.0165. That is, relative to the driving force associated with taxation of labor income, this order of magnitude difference in entry barriers is equivalent to a difference of less than 2% in tax rates. If we alternatively assumed that κ in the US is equal to .1, and κ in Europe is equal to 1, implying that in Europe half of the costs associated with starting a business are directly due to regulation, the relative magnitudes of the right hand side of equation (4.8) is only 1.09.

Lastly, it is relatively easy to obtain expressions for the new values of y and N. Once again, the zero-profit condition solely determines the equilibrium value of y:

$$y = \frac{\rho}{1-\rho}(\phi + \kappa) \tag{4.11}$$

and then the feasibility condition can be used to determine N.

4.4. Barriers to Entry IV

In this section we assume that the government directly controls entry through a process of permits, but there is no charge for a permit. Specifically, in order to operate an intermediate producer must obtain a permit, and we assume that the government restricts the number of permits to be less than the entry that would occur in a decentralized equilibrium. If the number of permits is less than the amount of entry in the decentralized equilibrium, it follows that profits will be positive for any firm that receives a permit. Hence, if it is costless to apply for a permit, all firms would apply. We can then think of the government policy as simply granting permits to a randomly chosen mass of applicants. While we have described one particular policy, it is worth noting that this policy is similar to some others of potential interest. For example, suppose that for some reason (e.g., political connections) the barriers to entry for some firms are higher than they are for other firms, so that the barriers keep out potential entrants even though profits are positive for firms that operate. The permit policy described above is a special case of this policy in which the policy induced barrier is zero for some firms and infinite for other firms.

Let $\bar{N}$ be the mass of permits granted by the government, and assume that this number is binding, in the sense that absent permits, additional firms would like to operate. Denote profits earned by an intermediate producer in equilibrium by π. Since the household owns all of the firms in the economy, these profits will be returned to the household and the household budget constraint will now be:

$$c = w^* h + \pi \tag{4.12}$$

The fact that entry is restricted does not change the slope of the demand function $d^*(p)$ and hence does not change the fact that in equilibrium we will have $p^* = w^*/\rho$. Substituting the budget equation into the consumers objective function, one obtains the following equation to characterize the optimal choice of h:

$$\frac{(1-\alpha)}{\alpha}\frac{w^*h+\pi}{(1-h)^\gamma}=w^*. \tag{4.13}$$

While we could solve for π as a function of the equilibrium value of h and obtain an equation in only h, it is again more revealing to simply multiply both sides by h and rearrange to obtain:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^\gamma}=\frac{1}{1+\frac{\pi}{w^*h}}. \tag{4.14}$$

The message from this expression is exactly the same as from equation (4.9) in the previous subsection. Specifically, this type of policy does have an impact on hours of work, but the key forcing variable is the magnitude of profits created by the policy relative to total labor income, and the key factor that determines how this translates into changes in hours is the labor supply elasticity.

To complete the analysis of this case, note that the value of N in equilibrium is simply the number of permits granted, and the value of y is now determined by the feasibility condition.

5. Endogenous Markups

One feature of the previous analysis is that policy does not affect the markup of price over marginal cost in equilibrium. One might suspect that one of the key channels through which product market regulations work is to increase markups, and that by virtue of not having this channel the previous analysis is of limited interest. In this section we show that adding this channel to the analysis has no impact on the previous results.

The only change that we make to the previous model is in the technology for the final goods sector. Specifically, rather than letting ρ be a fixed parameter, we assume that ρ is an increasing function of the mass of different intermediate products that are available, and write this as $\rho(N)$. The motivation for this extension is the intuitive notion that as more intermediate goods are produced, the more similar they are, and hence the more substitutable they become. Formally, this should be modelled explicitly as a property of the commodity space, and the equilibrium should deal explicitly with the issue of how intermediate firms decide where to locate in the commodity space. We will sidestep this issue here and simply assume that firms that operate always locate in a symmetric fashion so that all of the intermediate goods are equally substitutable, and that this substitutability is solely a function of N.

For a given mass N of operating intermediate goods producers, this model behaves just as the previous model, if we set $\rho=\rho(N)$. In particular, the final good producer's demand function takes the same form as before and as a result, optimal behavior on the part of the intermediate goods producers will give $p^*=w^*/\rho$. However, it now follows that any policy which alters the value of N will necessarily alter the markup in equilibrium, through its effect on ρ.

Although this extension does have implications for the effects of tax and regulatory policies on both allocations and welfare, it turns out that it has no impact on how these policies qualitatively affect the total volume of market work. This can be seen quite readily from an examination of the household's utility maximization problem. In equilibrium, the household simply maximizes:

$$\alpha \log(c) + (1-\alpha)\frac{(1-h)^{1-\gamma}-1}{1-\gamma} \tag{5.1}$$

subject to the budget constraint

$$c = w^* h + T, \tag{5.2}$$

where we allow for the possibility that the household receives some form of transfer payment from the government or some profits from firms. Substituting the budget equation into the objective function one obtains the first order condition:

$$\frac{(1-\alpha)}{\alpha}\frac{w^* h + T}{(1-h)^{\gamma}} = w^* \tag{5.3}$$

which can be rearranged to give:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = \frac{1}{1+\frac{T}{w^* h}}. \tag{5.4}$$

In particular, if transfers are zero, because either license revenues are discarded, or because the entry costs represent real costs, then there will be no effect on the volume of market work. However, we know from the previous analysis that in the case of a regulation that takes the form of a real resource cost, regulations do lead to less entry and hence a lower value of N. This lower value of N necessarily implies that there will be higher markups in equilibrium, but the above expression tells us that when $T = 0$, the fact that the markup increases has no implications for the volume of market work in equilibrium. It does not follow that endogenous markups have no implications for the effect of entry barriers on allocations. The zero profit condition now implies that:

$$y = \frac{\rho(N)}{1-\rho(N)}\phi \tag{5.5}$$

so that if ϕ increases, the reduction in N leads to an opposing effect on y. Since feasibility requires that:

$$N(y+\phi) = h \tag{5.6}$$

it follows that a given increase in ϕ will have a smaller effect on N than in the case where markups were exogenous. Lastly, recall that consumption of the household is given by:

$$c = N^{1/\rho} y \tag{5.7}$$

so that the endogenous markup will affect the drop in c associated with a given increase in ϕ due to regulations.

In cases where the regulation leads to income transfers, either through rebate of license feels or through higher profits, it remains true that the key impulse is the size of the transfer relative to labor income and that the key parameter that determines the magnitude of the effect is the labor supply elasticity γ. In particular, given the volume of the transfer relative to labor income, from the perspective of what happens to hours of market work it is completely irrelevant whether the regulation is accompanied by a change in markups.

6. Imperfect Competition in the Labor Market

The previous analysis has assumed that labor markets are competitive. Several papers suggest that the effect of regulation, specifically entry barriers, on labor market outcomes is very much influenced by this assumption. In this section we extend the model to allow for monopolistically competitive behavior in the labor market on the part of workers and show that the results from the previous analysis continue to hold. This finding should not be interpreted to suggest that noncompetitive wage setting cannot have interactions with product market regulation that influence time devoted to market work. Rather, the analysis should be interpreted as showing that the mere presence of noncompetitive wage setting does not overturn the previous results.

The extension that we consider seems a natural way to bring noncompetitive wage-setting into the standard model of time allocation that does not introduce trading frictions, and follows the approach in Comin and Gertler (2006). Specifically, we now assume a continuum of households with mass equal to one, each with the same preferences as used earlier in the analysis. What distinguishes the households is that each is endowed with a different type of labor services. The production technology for intermediate goods is now written as:

$$y(i) = [\int_0^1 h(j)^\eta dj]^{1/\eta} \tag{6.1}$$

where $h(j)$ is the input of labor services from household j, and $0 < \eta < 1$ determines the degree of substitutability of the various labor types. Our previous analysis can be seen as the special case of $\eta = 1$, in which case all labor services are perfect substitutes. Once again there is a fixed cost ϕ associated with operating each intermediate goods technology, but it is now more convenient to assume that this cost is measured in units of the final consumption good rather than labor, since labor is no longer homogeneous.

We consider a decentralized equilibrium in which each household sets the wage rate for its labor taking as given all other prices in the economy. Each intermediate producer will behave competitively in the labor market, taking the wages of each labor type as given. We first solve for the decentralized equilibrium in the absence of any taxes or regulations, though in the interest of space we focus on the equilibrium value of h. Because this case is a relatively straightforward extension of the earlier model we do repeat a formal definition of equilibrium. We note, however, that a symmetric equilibrium will now involve all of the same objects as before, and a new function $g^*(w)$ that represents the demand for each type of labor as a function of its own wage holding all other prices equal to their equilibrium values. Similarly to what happens in the market for intermediate goods, it is easy to show that this function takes the form $Bw^{\frac{1}{\eta-1}}$, where B is a constant. It follows that in equilibrium, household j will choose c, h and w to maximize:

$$\alpha \log(c) + (1-\alpha)\frac{(1-h)^{1-\gamma}-1}{1-\gamma} \tag{6.2}$$

subject to:

$$\begin{aligned} c &= wh \\ h &= Bw^{\frac{1}{\eta-1}} \end{aligned} \tag{6.3}$$

Substituting into the objective function, taking first order conditions and rearranging, one obtains the following expression that characterizes the optimal choice of h:

$$\frac{(1-\alpha)}{\alpha}\frac{h}{(1-h)^{\gamma}} = \eta. \tag{6.4}$$

This expression has a natural interpretation in terms of markups. The inverse of the left-hand side of this equation reflects the gain to the worker of supplying an extra unit of labor, and the right hand side says that in the monopolistically competitive equilibrium this value will be a markup of $1/\eta$ times its value in the competitive case.

It is easy to show that the Social Planner's choice of h is the same as before and therefore satisfies equation (6.4) except with a value of $1/\rho$ on the right hand side, and the equilibrium allocation assuming a competitive labor market would have the value 1 on the right hand side. It follows that each source of imperfect competition decreases hours of work relative to the efficient allocation. These expressions show that imperfect competition in either the labor market or the market for intermediate goods have symmetric effects on hours of work, since the right hand side of equation (6.4) is simply $\eta\rho$ times the right hand side of the equation for the efficient allocation of time. Of course, how large the impact is on h relative to the efficient allocation depends on the the value of γ.

While the above analysis shows that imperfect competition in either labor or product markets induces inefficiencies in the allocation of time to market work, the issue of interest here is how a change in product market regulation affects time devoted to market work given imperfect competition in the labor market. It turns out that our previous analysis of the effects on hours of work goes through without any change. Specifically, all of our previous expressions for hours of work remain unchanged except for the addition of the term η on the right hand side. It follows that the presence of labor market imperfections of the sort considered here has virtually no impact on how changes in regulation affect market work. In particular, the result that regulations that increase the real resource costs associated with entry has no effect on time allocated to market work continues to hold in this model, independently of the value of η. The same holds true for the case of license fees that are thrown away. In the case of license fees that are rebated, it remains true that the key driving force is the size of the rebates relative to labor income and the key parameter that dictates how this driving force is transformed in a change in hours is the labor supply elasticity parameter γ.

The statement that the value of η does not affect how a given change in product market regulations affect total market work should not be confused with the statement that the value of η does not affect hours of market work. Our results most definitely imply that differences in η do impact on hours of work, so that economies with different values of η will have different equilibrium time allocations.

7. A Two-Sector Analysis

The framework used for the above analysis is best suited to comparing two economies which have differences in product market regulation across all sectors. However, in reality there are many prominent examples of product market regulations that are sector specific. In this section we consider the simplest extension of the model to permit an analysis of this issue. To pursue this we extend the original model to allow for two final consumption goods. We now write preferences as:

$$\alpha \log(c) + (1-\alpha)\frac{(1-h)^{1-\gamma}-1}{1-\gamma} \tag{7.1}$$

where c is now total consumption and h is total time devoted to market work. Total consumption is a CES aggregate of the two final consumption goods, denoted by c_1 and c_2:

$$c = (\mu c_1^{\varepsilon} + (1-\mu)c_2)^{1/\varepsilon} \tag{7.2}$$

where ε determines the elasticity of substitution between the two goods.

The technology in sector 2 is the same as that considered previously: there is a continuum of potential intermediate goods that have linear production functions with unit marginal cost and face the fixed set-up cost ϕ, and there is a final goods producer that aggregates the intermediate goods into the final consumption good c_2:

$$c_2 = [\int_0^N y(i)^{\rho} di]^{1/\rho}. \tag{7.3}$$

While we could consider a symmetric structure for the production of the other final good, for our purposes it is sufficient to consider the simpler structure in which c_1 is produced using only labor with a linear technology. We set the marginal productivity of this technology to one and assume that there are no fixed costs of operation in this sector.

We consider an equilibrium in which the market for labor and the markets for final goods are competitive, but assume that the market for intermediates used in production of the c_2 is monopolistically competitive as before. Equilibrium for this economy is a straightforward generalization of that in the previous economies studied, so we do not present the details here. As before, we focus on symmetric equilibria, in which the prices of all intermediate goods are the same, denoted by p_y^*. We normalize the price of c_1 to be one, denote the wage rate by w^*, and the price of c_2 by p_2^*. Given the linear technology to produce c_1, it must be that $w^* = 1$ in equilibrium. The demand functions for intermediate goods take on the same form as previously, and hence prices in equilibrium will still be given by the same markup:

$$p_y^* = \frac{1}{\rho}. \tag{7.4}$$

Finally, given that the final goods producer of c_2 is competitive, profits must equal zero in equilibrium:

$$p_2^* N^{1/\rho} y^* - N p_y^* y^* = 0 \tag{7.5}$$

which using $p_y^* = 1/\rho$ implies that:

$$p_2^* = \frac{1}{\rho} N^{\frac{\rho-1}{\rho}}. \tag{7.6}$$

It follows that all prices can be expressed in terms of equilibrium allocations.

The household's optimization problem can be written as maximizing:

$$\frac{\alpha}{\varepsilon} \log(\mu c_1^\varepsilon + (1-\mu) c_2^\varepsilon) + (1-\alpha) \frac{(1-h)^{1-\gamma} - 1}{1-\gamma} \tag{7.7}$$

subject to the budget equation:

$$c_1 + p_2^* c_2 = h \tag{7.8}$$

Letting λ be the multiplier on the budget constraint, we obtain first order conditions:

$$(1-\alpha)(1-h)^{-\gamma} = \lambda \tag{7.9}$$

$$\frac{\alpha\mu}{c^\varepsilon} c_1^{\varepsilon-1} = \lambda \tag{7.10}$$

$$\frac{\alpha(1-\mu)}{c^\varepsilon} c_2^{\varepsilon-1} = \lambda p_2^* \tag{7.11}$$

Combining equations (7.9), (7.10) gives:

$$(1-\alpha)(1-h)^{-\gamma} = \frac{\alpha\mu}{c_1(\mu + (1-\mu)[\frac{c_2}{c_1}]^\varepsilon)}. \tag{7.12}$$

Equations (7.10) and (7.11) and and (7.6) imply:

$$\frac{c_2}{c_1} = [\frac{\mu}{(1-\mu)\rho} N^{\frac{\rho-1}{\rho}}]^{\frac{1}{\varepsilon-1}} = A(N) \tag{7.13}$$

Using equation (7.6) to substitute for p_2^* in the budget equation gives:

$$N^{(\rho-1)/\rho} c_2 = \rho(h - c_1). \tag{7.14}$$

Using equation (7.13) this can be written as:

$$c_1 = \frac{\rho h}{N^{(\rho-1)/\rho} A(N) + \rho}. \tag{7.15}$$

Substituting equations (7.13) and (7.15) into the right hand side of equation (7.12) and simplifying yields:

$$\frac{(1-\alpha)}{\alpha} \frac{h}{(1-h)^{\gamma}} = 1 \tag{7.16}$$

which is exactly the same expression as in the one-sector case. Having determined the equilibrium value of h one can easily solve for the other components of the equilibrium allocation.

One can show that the previous analysis continues to carry over to the current context as well. In particular, if there is a regulation that involves a license fee κ to enter the intermediate goods sector, then aggregate market work will satisfy:

$$\frac{(1-\alpha)}{\alpha} \frac{h+T}{(1-h)^{\gamma}} = 1 \tag{7.17}$$

where T is the magnitude of the transfer from the government to the representative household. This gives rise to the same type of expression as derived earlier in the one sector case.

An interesting feature of the two-sector analysis is that we can also address how industry specific regulations affect the sectoral allocation of hours. In this regard, it is of interest to rewrite expression (7.15) as:

$$\frac{h_1}{h} = \frac{\rho}{A(N) N^{(1-\rho)/\rho} + \rho} \tag{7.18}$$

which can be simplified to:

$$\frac{h_1}{h} = \frac{1}{(\frac{\mu}{1-\mu})^{\frac{1}{\varepsilon-1}} \rho^{\frac{\varepsilon}{1-\varepsilon}} N^{\frac{\varepsilon(\rho-1)}{(\varepsilon-1)\rho}} + 1} \tag{7.19}$$

This expression gives the fraction of total work that is carried out in sector 1. This expression is useful in interpreting findings from industry level studies. In particular, consider the case of a regulation that increases entry costs in the intermediate goods sector, and assume that this increase takes the form of real resource outlays, i.e., an increase in the value of ϕ. As was true in the one-good model, our above analysis tells us that this regulation will have no effect on aggregate market work. However, this type of regulation will lead to a decrease in the mass of intermediate goods firms that operate, and equation (7.19) shows how this decrease in N will translate into a change in the relative amount of work done in each of the two sectors. The size of this effect depends on the two elasticity parameters, ε and ρ, but recalling that ρ satisfies $0 < \rho < 1$, the sign of the response will be determined by the sign of ε. In particular, if $\varepsilon > 0$, then hours of market work in sector 2 will decrease, while if $\varepsilon < 0$, hours of market work in sector 2 will actually increase. The key point however, is that the change in industry hours is not informative about the effect of this type of regulation on aggregate hours of work.

There is an alternative interpretation of our two-sector analysis which is also of potential interest. Specifically, rather than interpreting the two sectors to be two different market sectors, one could interpret sector 1 to be the home sector and sector 2 to be the market sector. In this case, any movement of hours between the two sectors will show up as changes in market work even if changes in total work are constant. In the case just discussed in the previous paragraph, if we assume that home and market goods are relatively good substitutes, so that $\varepsilon > 0$, then a regulation which increases the real resource costs of entry in the intermediate goods sector will lead to a fall in hours of market work. Of course, this fall in market work will be accompanied by an offsetting increase in the amount of homework. Recent work on cross-country comparisons of time use (see e.g., Freeman and Schettkat (2002), Olovsson (2004) and Ragan (2005)) indicate that homework is higher in the countries of continental Europe, so this channel may be significant. Of course, as shown in Olovsson (2004), Ragan (2005) and Rogerson (2005, 2006b), it is also true that adding home production influences how market hours respond to other driving forces, such as taxes.

8. General Preferences

The previous analysis has focused on preferences that are consistent with balanced growth. While there is good reason to use this condition to discipline preferences in the context of issues involving labor supply, it is also of interest to understand how our results carry over to other specification of preferences. The key point that we want to make in this section is that the strong link between how labor taxes and entry barriers affect hours of work continues to hold with more general preferences.

We begin with the analysis of labor income taxes. If we had simply started with a utility function $u(c, 1-h)$, then the expressions that we would have derived for the effect of taxes would have been:

$$\frac{u_2((1-\tau)wh, 1-h)}{u_1((1-\tau)wh, 1-h)} = (1-\tau)w \tag{8.1}$$

in the case where the tax revenues are not returned by a lump-sum transfer, and

$$\frac{u_2(wh, 1-h)}{u_1(wh, 1-h)} = (1-\tau)w \tag{8.2}$$

for the case in which revenues are returned via a lump-sum transfer. The difference between these expressions and those derived earlier is that the wage rate w now appears. In equilibrium, wages are an increasing function of N, and since taxes will influence N, the wage rate w will vary in response to tax policies, thereby introducing additional effects. However, in the first expression above, it should be noted that the effect on h is determined by the change in $w(1-\tau)$ in conjunction with the properties of preferences. In the second case there are two effects: holding w constant, the increase in τ leads to lower hours worked, but then there is the additional effect on hours due to the change in w.

Next consider the case of changes to entry barriers. If the entry barrier represents real time costs, then hours will be determined by the condition:

$$\frac{u_2(wh, 1-h)}{u_1(wh, 1-h)} = w \tag{8.3}$$

where once again, the wage w, will be decreasing in N, which is directly affected by the entry barrier. Comparing this expression to equation (8.1), the key point is that the mechanics are identical: the equations are of the exact same form, and the driving forces enter in exactly the same form. One should not conclude that the driving force is larger in the case of taxes, since the effect on w is larger in the entry barrier case due to the fact that the entry barrier has a direct effect on N.

If we instead considered the case in which the entry barrier represents a fee that is transferred to consumers via a lump-sum transfer, then the condition for hours becomes:

$$\frac{u_2(wh+T, 1-h)}{u_1(wh+T, 1-h)} = w \tag{8.4}$$

As before, in equilibrium, T is proportional to wh, so that letting this constant of proportionality be equal to b, this can be written as:

$$\frac{u_2((1+b)wh, 1-h)}{u_1((1+b)wh, 1-h)} = w \tag{8.5}$$

But making the change of variable $\tilde{w} = (1+b)w$, and defining $(1-\tilde{\tau}) = 1/(1+b)$, this expression can be rewritten as:

$$\frac{u_2(\tilde{w}h, 1-h)}{u_1(\tilde{w}h, 1-h)} = (1-\tilde{\tau})\tilde{w} \tag{8.6}$$

Comparing this expression with equation (8.2), one again notes that they take on the same form.

To summarize, the point of this section has been to argue that even with general preferences, the strong connection between the mechanisms through which labor taxes and entry barriers affect hours of market work remains. In particular, this analysis suggests that both tax policy and entry barriers give rise to two key driving forces: changes in the return to working, and transfers. How these driving forces translates into changes in hours of work is in turn dictated by the labor supply elasticities implicit in preferences.[4]

9. Conclusions

The goal of this paper was to assess the effect of product market regulations which take the form of increased entry costs on time allocated to market work in the context of a standard aggregate model of time allocation. Several results have emerged. The effect of product market regulation on time allocated to market work can be understood in exactly the same way as the effect of labor or consumption taxes on the time allocated to market work. The key driving force in both cases is the implicit transfer of resources to households as a fraction of total labor income, and the key feature of the model that influences the propagation of this driving force is the labor supply elasticity. A direct implication of this is that regulations which increase the real resource costs associated with entry have no impact on time devoted to market work. Our analysis also showed that differences in the magnitude of entry barriers associated with regulation are not very informative about the impact of regulations on market work, since large differences in regulatory barriers may be associated with small differences in effective transfer payments. Our results were robust to allowing for endogenous markups, a particular form of imperfect competition in the labor market, and to having multiple final goods. The multi-sector model also indicates that analysis of outcomes in individual sectors are unlikely to yield information regarding the effect of labor market regulation on total market work. Taken at face value, our results indicate that stories which stress product market regulation rather than taxes as a key driving force face a key challenge. Since the propagation mechanisms are identical, the relative importance of the two is determined by the relative importance of the implied transfer payments. We are aware of no evidence that suggests that differences in implicit transfers associated with product market regulation are comparable to the differences in revenues associated with either labor or consumption taxation. Of course, this conclusion should be qualified by the statement that our findings take place in the context of a benchmark model. Recent work that stresses the interaction of trading frictions in the labor market and the effects of product market regulations suggest channels which may overturn this finding.

[4] There is an important quantitative issue that this analysis does not address. Namely, what are the relative quantitative effects of tax policies and entry barriers on wages.

References

[1] Alesina, A., E. Glaeser, and B. Sacerdote, "Work and Leisure in the US and Europe: Why So Different?," forthcoming in NBER Macroeconomics Annual, 2006.

[2] Bertrand, M., and F. Kramarz, "Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry," Quarterly Journal of Economics 117 (2002), 1369-1413.

[3] Blanchard, O., and F. Giavazzi, "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets," Quarterly Journal of Economics 117 (2002), 879-907.

[4] Boeri, T., G. Nicoletti, and S. Scarpetta, "Regulation and Labor Market Performance," CEPR Working Paper 2420, 2000.

[5] Comin, D., and M. Gertler, "Medium Term Business Cycles," forthcoming, American Economic Review, 2006.

[6] Davis, S., and M. Henreksson, "Tax Effects on Work Activity, Industry Mix and Shadow Economy Size: Evidence from Rich Country Comparisons", NBER Working Paper #10509, 2004.

[7] Djankov, S., R. Laporta, F. Lopez de Silanes and A. Shleifer, "The Regulation of Entry," Quarterly Journal of Economics 117 (2002), 1-37.

[8] Ebell, M., and C. Haefke,"The Missing Link: Product Market Regulation, Collective Bargaining and the European Unemployment Puzzle", manuscript, 2004.

[9] Ebell, M., and C. Haefke, "Product Market Deregulation and the US Employment Miracle," manuscript, 2006.

[10] Fonseca, R., P. Lopez-Garcia, and C. Pissarides, "Entrepreneurship, Start-Up Costs and Unemployment," European Economic Review 45 (2001), 692-705.

[11] Freeman, R., and R. Schettkat, "Marketization of Production and the US-Europe Employment Gap", NBER Working Paper, 2002.

[12] Lopez-Garcia, P., "Labor Market Performance and Start-Up Costs: OECD Evidence," CESifo Working Paper #849, 2003.

[13] Messina, J., "The Role of Product Market Regulations in the Process of Structural Change," forthcoming European Economic Review, 2006.

[14] Nickell, S., "Product Markets and Labor Markets," Labor Economics 6 (1999), 1-20.

[15] Olovsson, C., “Why Do Europeans Work So Little?,” mimeo, Stockholm School of Economics, 2004.

[16] Prescott, E., “Why Do Americans Work So Much More than Europeans?”, Quarterly Review of the Federal Reserve Bank of Minneapolis, July 2004, 2-13.

[17] Ragan, K., “Fiscal Policy and the Family: Explaining Labor Supply in a Model with Household Production,” mimeo, University of Chicago, 2005.

[18] Rogerson, R., “Structural Transformation and the Deterioration of European Labor Market Outcomes,” mimeo, 2005.

[19] Rogerson, R., “Understanding Differences in Hours Worked,” manuscript 2006.

[20] Rogerson, R.,“Taxes and Market Work: Is Scandinavia an Outlier?,” manuscript 2006b.