"Hard Workers" and Labor Restrictions

Author(s):
Gersbach, Hans; Haller, Hans

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"Hard workers" and labor restrictions

Hans Gersbach · Hans Haller

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Abstract This paper analyzes the effects of changes in relative bargaining power within two-member households participating in labor and product markets. The most striking effects occur when household members differ in individual preferences and enjoy positive leisure-dependent externalities. For instance, a global change in relative bargaining power where the hardworking member becomes more influential in each working class household can render the working class worse off. Moreover, we show that restrictions on labor supply can prevent hard workers from exerting too much pressure on their hedonistic partners to work more. A restriction on individual labor supply improves welfare of the working class population, which adds a new twist to the literature on why working hours are limited in many European countries.

Keywords Household behavior · General equilibrium · Labor supply

JEL Classification D10 · D50 · J22

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H. Gersbach (✉)
CER-ETH, Center of Economic Research, ETH Zurich and CEPR,
Zürichbergstrasse 18, 8092 Zurich, Switzerland
e-mail: hgersbach@ethz.ch

H. Haller
Department of Economics, Virginia Polytechnic Institute and State University,
Blacksburg, VA 24061-0316, USA

1 Introduction

We study how a shift of bargaining power in favor of one partner in a household affects consumption and labor supply of both partners. We further investigate how the shift of bargaining power in a particular household causes a change of market prices and impacts upon other households. The case where such shifts occur in many households is considered as well. The shift of bargaining power in favor of female partners that appears to have taken place in the last decades may be an example for the latter.

For the purpose of this investigation, we embed a simple labor supply model in a general equilibrium model. We distinguish between two goods: labor (leisure) and a composite consumption good. Individuals are endowed with leisure, part of which they consume and part of which they supply to the labor market. Labor is demanded by a production sector that produces the composite consumption good.

Our modeling approach has several motivations and justifications. It demonstrates how one can perform general equilibrium analysis with a model of the household that is close to Chiappori's and the empirical literature. It also demonstrates that general equilibrium models with multi-member households can be extended to economies with production.[1] Further, our current analysis shows that spillovers between households are not necessarily mitigated by the presence of a production sector. Moreover, it discovers new feedback effects in the presence of a production sector: A change in a household's labor supply alters aggregate labor supply and real wage rates which in turn affect all households. Finally, introducing labor and a pure consumption good permits the distinction between hard workers and hedonistic household members who differ in their marginal rate of substitution between leisure and the composite consumption good.

Having labor as a factor of production allows us to differentiate between labor and capital income. For most of the analysis, we distinguish between a working class and a leisure class. The working class members receive only labor income and form the two-person households under consideration. The leisure class members receive all capital income and no labor income. Their consumer and household characteristics are not specified further. Instead of a leisure class, we can also have a government that absorbs all profits without affecting household decisions.

Our first central result is that hard workers are bad company. If the hard worker in a household gains more influence, the partner is induced to work more and consume less, whereas the hard worker tends to work less and consume more. Moreover, through the labor market, the hard worker causes negative spillovers to the members of other households, both hard workers

[1] Gersbach and Haller (2001) and Haller (2000) incorporate collective rationality à la Chiappori (1988, 1992) into general equilibrium models of a pure exchange economy with multi-member households. For applications to bargaining, see Gersbach and Haller (2009, 2011).

and hedonists. The severity of these spillovers depends on the nature of externalities within households. Perhaps the most striking result is that a global change in relative bargaining power, where the hardworking member becomes more influential in each working class household, can render the entire working class worse off—with the leisure class as the sole beneficiary. A similar effect cannot happen in a model without production or with the production sector fully owned by the working class.

Our second important finding is that a binding restriction on the number of hours an individual is allowed to work can benefit all workers, those for whom the restriction is binding and those for whom it is not. This finding represents a new argument why limits on working hours might be chosen in countries such as the Nordic countries, The Netherlands, or Germany, where weekly hours and paid annual leave are collectively agreed on and the former are restricted. We will elaborate on this implication of our model and on the related literature in Section 7.

In the next section, we introduce some of the main features of consumers, households, and the production sector or industry. In Section 3, we present and analyze the basic general equilibrium framework with fixed (leisure-independent) externalities within households. In Section 4, we consider the equilibrium effects of local (global) changes in relative bargaining power which lead to a growing influence of the hardworking member of a household (members of households). Section 5 comprises four model variations: introduction of a particular form of variable (leisure-dependent) externalities, treatment of the composite consumption good as a local public good rather than as a private good, introduction of binding exogenous restrictions on individual labor supply, and introduction of industry ownership by working class households. In Section 6, we address the robustness of our results. In Section 7, we resume the discussion of restrictions on labor supply. Section 8 concludes. "Appendix 1" discusses the household bargaining environment. "Appendix 2" contains the proof of Proposition 4.

2 Composition of society and the economy

We consider an economy composed of finitely many households $h = 1, \ldots, n$, with $n \geq 2$. Household h has two members h_1 and h_2, called the first member and the second member, respectively. The members of all n households form a population I of size $2n$. There are two goods: leisure and a private Hicksian composite good whose price p is normalized to unity. Consumption of h_i, the i-th member of household h, consists of his composite good consumption, denoted by c_i^h, and his consumption of leisure, denoted by $T - l_i^h$ where T denotes the total time available to each individual and l_i^h denotes h_i's labor supply. The resource constraints and the assumption of interior solutions imply that:

$$c_i^h > 0 \quad \text{and} \quad 0 < l_i^h < T, \quad i = 1, 2.$$

Individual preferences Utility of individual h_i is given by:

$$U_i^h := k_i \ln c_i^h + (1 - k_i) \ln(T - l_i^h) + G_i^h(l_i^h, l_j^h).$$

The coefficient $k_i \in (0, 1)$ represents the weight of the physical consumption good relative to leisure. The term $G_i^h(l_i^h, l_j^h)$ represents a group externality experienced by individual h_i, i.e., the emotional benefit of individual h_i from living together with individual h_j, $j \neq i$. Household members can differ with respect to the weights k_i and, of course, with respect to the group externality $G_i^h(l_i^h, l_j^h)$.

When $k_1 > k_2$, we call the first household members "hard workers" and the second household members "hedonists". Often the term "hard worker" describes simply a person with a strong work ethic or an addiction to or obsession for work. Our notion captures more sophisticated behavior. As an autonomous consumer facing a given real wage rate, the hard worker would work more and consume more of the composite commodity than the autonomous hedonist. As a household member (with a lot of weight in the household's utilitarian decision rule), the hard worker may actually end up working less and consuming more than the hedonistic partner. Thus, without knowing their respective influence on household decisions, an outside observer might mistake the hard worker for the hedonist and vice versa.

We will consider two plausible cases of group externalities: first, when the emotional benefit from being together with a partner is fixed and second, when the group externality depends on the leisure time or access time of the other household member.[2]

On preferences Several remarks about the nature of preferences are in order. The most natural assumption, which will be pursued in Section 5, is variable externalities where the individual's benefit of human relationships is increasing in the leisure time the partner can offer. Intuitively, the emotional benefit in partnerships depends on the time individuals have to share. If such externalities are quite strong, households will tend to synchronize their leisure time. The synchronization of working or leisure schedules in the presence of externalities has received widespread attention in other contexts such as interaction of workers in production facilities studied by Weiss (1996) and liberalization of shop-closing laws for which the theory has been developed by Clemenz (1990) and Burda and Weil (1999); see also Putnam (1995).

There are two sources of externalities in our model. First, non-pecuniary externalities, i.e., group externalities occur only at the household level and are internalized by efficient collective decisions within households. As we will discuss in detail in Section 5.4, the presence of such household-specific group externalities does not destroy Pareto-efficiency of competitive markets. Second, when we discuss local and global changes of bargaining power in

[2]Note that if the group externality depended on the leisure time of the other household member, individual decisions about working and leisure time would not be efficient for the household.

households, pecuniary externalities arise which do not destroy the validity of the first welfare theorem either but can make entire classes of society worse off.

Sources of income Except in Section 5.4, we assume that the households under consideration receive only wage income. The income from holding shares of firms is assumed to accrue to individuals who are not part of the population I we are studying. This is justified by the fact that the majority of households primarily depend on the wage income. We also assume that shareholders do not participate in the labor market. There are several conceivable scenarios for the existence of such a "leisure class". One is that the shareholders live on another island, continent, or planet. Another one is that at the prevailing wages, shareholders prefer not to work. A third one is that the shareholders are retirees who are unable to work and own shares directly or indirectly through pension funds. Yet another alternative is that the government imposes a 100% profit tax and spends the tax revenue on pensions or in other wasteful, harmful, or useful ways that do not affect household decisions, an assumption often made in the literature on optimal taxation (see, e.g., Auerbach 1985). The government might also own the industry and thus be the recipient of all profits. But then the assumption of profit maximization and perfect competition is less convincing. Obviously, a convex combination of all these alternatives is quite possible. Whoever ends up with some of the profits uses this income solely for the purchase of the composite good.

Production sector The production sector is assumed to be perfectly competitive. Since we are not concerned with the distributive aspects of share ownership, it suffices to determine aggregate profits using the aggregate technology, which is represented by a production function. The production function is of a specific functional form with standard properties and convenient numerical features: $f(L) = \beta \ln(1 + L)$ for $L \geq 0$.

Decision criteria of households First of all, we adopt collective rationality à la Chiappori (1988, 1992) regarding household behavior:

> Each household makes an efficient collective decision, i.e., given prices and wages, the household takes a decision regarding individual consumption and working time of its members which is Pareto efficient within the household. In other words, the household chooses an element in the 'efficient budget set' in the sense of Haller (2000) and Gersbach and Haller (2001).

We note that important contributions to the literature argue against assuming efficiency in household decision making (Lundberg and Pollak 2003; Konrad and Lommerud 1995, 2000). For instance, Lundberg et al. (1997) provide evidence that tends to support the idea that household members do not pool their incomes as it would be implied by efficient collective decision making. We stress that not efficiency of collective decision making per se is important but that a higher influence of the hardworking member in the household translates into higher labor supply of the other partner in the household. This could occur in a similar way or even in a more dramatic way when household decision making is inefficient. The efficiency assumption, however, renders the analysis exceptionally tractable.

Second, we assume more specifically that household decisions are based on a utilitarian social welfare function for the household. In particular, we assume that household h maximizes

$$U^h := \alpha_h U_1^h + (1-\alpha_h) U_2^h \tag{1}$$

where $\alpha_h \in (0, 1)$ is the utilitarian power or weight of the first individual. The weight α_h and $(1-\alpha_h)$ measures the relative influence or bargaining power of individual 1 and individual 2, respectively, within household h. If household h maximizes Eq. 1 under the household budget constraint, then the solution lies in the efficient budget set, that is, at the Pareto frontier of h's budget set. Conversely, each element in the household's efficient budget set maximizes Eq. 1 on the household's budget set with suitably chosen Pareto weights α and $1-\alpha$. The premise of our investigation is that the actual weights that underly the household decision are not arbitrary but not necessarily constant over time either. They may depend on many factors or, broadly speaking, on the household's bargaining environment. We refer to "Appendix 1" for further discussion.

3 Equilibrium with fixed externalities

In this section, we assume fixed externalities, that is, $G_i^h(l_i^h, l_j^h) \equiv \bar{G}_i^h > 0$. $\bar{G}_i^h$ can be interpreted as a free household public good.

3.1 Household optimization

We next examine the household's optimization problem in detail. Note that, for the time being, we assume that households only earn income from wages, and hence, industry shareholders do not belong to the set of households under consideration. Therefore, the budget constraint amounts to:

$$c_1^h + c_2^h = w\left(l_1^h + l_2^h\right), \tag{2}$$

where w denotes the wage rate. The household maximizes Eq. 1 subject to Eq. 2 and non-negativity constraints. Ignoring non-negativity constraints and setting $\alpha_h = \alpha$, the Lagrangian for the household's optimization problem is given by

$$\begin{aligned}\mathcal{L} = \alpha &\left(k_1 \ln c_1^h + (1-k_1)\ln\left(T - l_1^h\right) + \bar{G}_1^h\right)\\ &+(1-\alpha)\left(k_2 \ln c_2^h + (1-k_2)\ln\left(T - l_2^h\right) + \bar{G}_2^h\right)\\ &-\lambda\left(c_1^h + c_2^h - w\left(l_1^h + l_2^h\right)\right).\end{aligned}$$

Straightforward analysis of the first-order conditions yields the optimal individual consumption and labor supply:

$$c_1^h = 2\alpha k_1 w T, \tag{3}$$

$$c_2^h = 2(1-\alpha)k_2 w T, \tag{4}$$

$$l_1^h = 2\left(\frac{1}{2} - \alpha(1-k_1)\right) T, \tag{5}$$

$$l_2^h = 2\left(\frac{1}{2} - (1-\alpha)(1-k_2)\right) T. \tag{6}$$

For simplicity, we have not explicitly imposed non-negativity constraints on labor supply. Let us assume instead that $\alpha(1-k_1) < 1/2$ and $(1-\alpha)(1-k_2) < 1/2$, so that the constraints are not binding. These assumptions will have to be suitably modified in Section 5.

Total labor supply of a household is given by:

$$l_1^h + l_2^h = 2T\left(\alpha k_1 + (1-\alpha)k_2\right).$$

Note that total labor supply depends linearly on k_1 and k_2 and the utilitarian power of each individual. A proportional increase of the weight of consumption relative to leisure for both individuals will increase total labor supply by the same proportion.

3.2 Equilibrium in the labor market with homogeneous households

For the moment, we make the additional assumption that all households are homogeneous with respect to the preferences of their members and household utility.

Total labor supply of the economy L^s is given by:

$$L^s := \sum_{h=1}^{n}\left[l_1^h + l_2^h\right] = n\left(l_1^h + l_2^h\right) = 2Tn(\alpha k_1 + (1-\alpha)k_2). \tag{7}$$

Profit maximization involves setting the marginal product of labor equal to the wage rate. With $f(L) = \beta \ln(1+L)$ as the production function of the economy, this yields

$$w = \frac{\beta}{1+L^s} = \frac{\beta}{1+2n(\alpha k_1 + (1-\alpha)k_2)T}. \tag{8}$$

Substituting this equilibrium value for w in Eqs. 3–6, we obtain the optimal consumption and labor input of household members:

$$c_1^h = \frac{\alpha k_1 \beta}{1/(2T) + n(\alpha k_1 + (1-\alpha)k_2)}, \tag{9}$$

$$c_2^h = \frac{(1-\alpha) k_2 \beta}{1/(2T) + n(\alpha k_1 + (1-\alpha)k_2)}, \tag{10}$$

$$l_1^h = 2\left(\frac{1}{2} - \alpha(1-k_1)\right) T, \tag{11}$$

$$l_2^h = 2\left(\frac{1}{2} - (1-\alpha)(1-k_2)\right) T, \tag{12}$$

$$l_1^h + l_2^h = 2T(\alpha k_1 + (1-\alpha)k_2). \tag{13}$$

4 Changes in relative bargaining power

Here we study the allocative and welfare consequences of a shift of the utilitarian welfare weights within households reflecting the increased relative importance or power of the first household member. By a global change we mean that the utilitarian welfare weight changes in all households. A local change describes the change of the utilitarian weight in one household.

4.1 Global changes

We first discuss how identical changes of α across all households affect individuals and households. It follows immediately from Eqs. 9–12 that as α increases, the first household member consumes more and works less while the second household member consumes less and works more. Hence, first household members are clear gainers and second household members are clear losers from such a global change in relative bargaining power.

4.2 Local changes

In the following, we examine how shifts of bargaining power in some households affect the utility of individuals in other households where bargaining power remains unchanged. Let us assume that in s of the households, denoted h^*, the first individual has a weight factor $\alpha = \alpha^*$ and in $n - s$ of the households, denoted h_*, the individual has a weight factor $\alpha = \alpha_*$, where $\alpha^* > \alpha_*$. This is a departure from the homogeneity assumption made in Section 3.2. Without loss of generality, we also assume that $k_1 > k_2$ and thus that the first household member is more willing to sacrifice leisure time for income and consumption of commodities. We therefore call the first member the *hard worker* and the second member the *hedonist*.

For the total labor input, we obtain

$$
\begin{aligned}
L &= \sum_{h=1}^{s} l_1^{h^*} + l_2^{h^*} + \sum_{h=s+1}^{n} l_1^{h_*} + l_2^{h_*} \\
&= 2T\big(s(\alpha^* k_1 + (1-\alpha^*)k_2) + (n-s)(\alpha_* k_1 + (1-\alpha_*)k_2)\big) \\
&= 2T\big(s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)\big)
\end{aligned}
$$

and therefore

$$
w = \frac{\beta}{1 + 2T\big(s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)\big)}.
$$

Hence:

- For $h = h^*$, we get

$$
c_1^h = \frac{\alpha^* k_1 \beta}{1/(2T) + (s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)},
$$

$$
c_2^h = \frac{(1-\alpha^*) k_2 \beta}{1/(2T) + (s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)},
$$

$$
l_1^h = 2\left(\frac{1}{2} - \alpha^*(1-k_1)\right) T,
$$

$$
l_2^h = 2\left(\frac{1}{2} - (1-\alpha^*)(1-k_2)\right) T.
$$

- For $h = h_*$, we get

$$
c_1^h = \frac{\alpha_* k_1 \beta}{1/(2T) + (s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)},
$$

$$
c_2^h = \frac{(1-\alpha_*) k_2 \beta}{1/(2T) + (s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1-\alpha_*)k_2)},
$$

$$
l_1^h = 2\left(\frac{1}{2} - \alpha_*(1-k_1)\right) T,
$$

$$
l_2^h = 2\left(\frac{1}{2} - (1-\alpha_*)(1-k_2)\right) T.
$$

This gives rise to unambiguous comparative statics for part of which we shall temporarily treat s as a continuous variable:

Proposition 1 *Suppose $\alpha^* > \alpha_*$ and $k_1 > k_2$. Then*

$$
\frac{\partial w}{\partial s} < 0 \ \textit{and}\ \frac{\partial U_1^{h^*}}{\partial s} < 0,\ \frac{\partial U_2^{h^*}}{\partial s} < 0,\ \frac{\partial U_1^{h_*}}{\partial s} < 0,\ \frac{\partial U_2^{h_*}}{\partial s} < 0
$$

where h^* and h_* are households whose internal balance of power remains unchanged.

Proof

$$\frac{\partial w}{\partial s} = -\frac{2T\beta(\alpha^* - \alpha_*)(k_1 - k_2)}{\left[1 + 2T\big(s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1 - \alpha_*)k_2)\big)\right]^2} < 0,$$

$$\frac{\partial U_1^{h^*}}{\partial s} = -\frac{k_1(\alpha^* - \alpha_*)(k_1 - k_2)}{1/(2T) + (s(\alpha^* - \alpha_*)(k_1 - k_2) + n(\alpha_* k_1 + (1 - \alpha_*)k_2)} < 0,$$

etc. □

The proposition implies that the increase of relative importance or power of a hard worker in one household negatively affects all other individuals in the working population. Hard workers and hedonists in other households equally dislike an increase of the bargaining power of the hard worker in the particular household under consideration. An intuitive explanation would be that the shift of bargaining power decreases (increases) the labor supply of the hard worker (hedonist) in that household, but the net effect is positive. The latter conclusion follows from the fact that the household's total labor supply is proportional to $\alpha k_1 + (1 - \alpha)k_2$ which increases when α rises. In turn, a higher labor supply lowers wages and, consequently, the utility in all other households in population I.

While the net labor supply effect in a particular household is correctly predicted by the preceding intuitive argument, the details are quite different from what intuition suggests. Namely, the situation turns out to be worse for the hedonist in that household, who suffers from both a lower wage rate and a loss of bargaining power. The hedonist works more and consumes less than before, while the hard worker actually works less and consumes more, as an explicit comparison shows. Furthermore, since the wage rate has declined, industry profits are higher in the new equilibrium, and therefore, the shareholders (the leisure class) or the government gain from the shift of bargaining power.

To refine intuition, let us compare labor supply terms Eqs. 5 and 6 and see who actually works more in a household, the hard worker or the hedonist. The hard worker works more than the hedonist when both households members are equally important or powerful, that is, when $\alpha = 1/2$. However, an increase of α leads to a reduction of the hard worker's labor supply, which is more than compensated by an increase of the hedonist's labor supply. At $\alpha = (1 - k_2)/(2 - k_1 - k_2)$, both supply the same amount of labor.

The main findings of this section can be summarized as

Proposition 2 *Suppose fixed externalities. Then:*

(a) A global shift of power within households towards the hardworking members benefits those members and harms their hedonistic partners.
(b) A local shift of power within a particular household towards the hardworking member is beneficial to this individual and harms all other consumers in I.

We have seen that an increased weight of hard workers in household decisions proves detrimental to the welfare of others. In fact, the presence of hard workers per se is harmful to others. If instead of becoming more influential, the first household member becomes more of a hard worker, the comparative statics results with respect to other individuals are qualitatively the same. Ceteris paribus, the person who becomes more of a hard worker, works more and consumes more of the composite good. The only effect on others is through a reduced wage rate and, consequently, reduced composite good consumption. Needless to say that for the person whose preferences have changed, a comparison of ex ante and ex post welfare is meaningless, unless consumption of the composite good and consumption of leisure move in the same direction. To the extent that the latter condition holds, more pronounced workaholism, or a larger number of hard workers, can be detrimental to the entire workforce. In Section 7, we relate this observation to the phenomenon of prolonged work weeks in some expanding service industries.

5 Ramifications

In this section, we gain additional insights from considering four different variations of the basic model studied thus far. First, we introduce a particular form of variable externalities. Second, we consider the implications if all or part of the purchased private good is converted into a public good for the household. Third, we investigate the implications of binding exogenous restrictions on individual labor supply. Fourth, we address the case in which the households under scrutiny own the industry.

5.1 Variable externalities

In this section, we assume variable externalities of the form $G_i^h(l_i^h, l_j^h) = g_i^h \ln(T - l_j^h)$ with $g_i^h > 0$ for each household h and $i, j \in \{1, 2\}$, $i \neq j$. Such variable group externalities take into account that the benefits of human partnerships can depend on the partner as well as on the leisure time that the partner can offer.[3]

[3]In the current formulation, leisure of either household member constitutes a local public good. A further possibility could be that the externalities depend on the time household members can spend together, that is, on the minimum of the individual leisure times. The qualitative behavior of this type of externality is quite similar to the variable externalities studied next but more cumbersome to analyze.

After renormalizing coefficients so that they add up to unity, the utility of household members 1 and 2, respectively, can be rewritten as

$$\hat{U}_1^h = \hat{k}_1 \ln c_1^h + \left(1 - \hat{k}_1 - \hat{g}_1^h\right) \ln\left(T - l_1^h\right) + \hat{g}_1^h \ln\left(T - l_2^h\right),$$

$$\hat{U}_2^h = \hat{k}_2 \ln c_2^h + \left(1 - \hat{k}_2 - \hat{g}_2^h\right) \ln\left(T - l_2^h\right) + \hat{g}_2^h \ln\left(T - l_1^h\right).$$

The utility of household h is given by

$$U^h = \hat{\alpha}\hat{U}_1^h + (1 - \hat{\alpha})\hat{U}_2^h \tag{14}$$

where $\hat{k}_i = k_i/(1 + g_i^h)$, $\hat{g}_i^h = g_i^h/(1 + g_i^h)$ and $\hat{\alpha} = \alpha(1 + g_1^h)/[\alpha(1 + g_1^h) + (1 - \alpha)(1 + g_2^h)]$.

For homogeneous households, an analysis similar to the derivations in Sections 3.1 and 3.2 yields:

$$w = \frac{\beta}{1 + 2n\left(\hat{\alpha}\hat{k}_1 + \left(1 - \hat{\alpha}\right)\hat{k}_2\right)T}$$

and

$$c_1^h = 2\hat{\alpha}\hat{k}_1 wT = \frac{\hat{\alpha}\hat{k}_1\beta}{1/(2T) + n\left(\hat{\alpha}\hat{k}_1 + \left(1 - \hat{\alpha}\right)\hat{k}_2\right)}, \tag{15}$$

$$c_2^h = 2(1 - \hat{\alpha})\hat{k}_2 wT = \frac{\left(1 - \hat{\alpha}\right)\hat{k}_2\beta}{1/(2T) + n\left(\hat{\alpha}\hat{k}_1 + \left(1 - \hat{\alpha}\right)\hat{k}_2\right)}, \tag{16}$$

$$\begin{aligned} l_1^h &= 2\left(\frac{1}{2} - \hat{g}_2^h\left(1 - \hat{\alpha}\right) - \hat{\alpha}\left(1 - \hat{k}_1 - \hat{g}_1^h\right)\right)T \\ &= 2\left(\frac{1}{2} - \hat{g}_2^h - \hat{\alpha}\left(1 - \hat{k}_1 - \hat{g}_1^h - \hat{g}_2^h\right)\right)T, \end{aligned} \tag{17}$$

$$\begin{aligned} l_2^h &= 2\left(\frac{1}{2} - \hat{g}_1^h\hat{\alpha} - \left(1 - \hat{\alpha}\right)\left(1 - \hat{k}_2 - \hat{g}_2^h\right)\right)T \\ &= 2\left(\frac{1}{2} - \left(1 - \hat{k}_2 - \hat{g}_2^h\right) + \hat{\alpha}\left(1 - \hat{k}_2 - \hat{g}_1^h - \hat{g}_2^h\right)\right)T. \end{aligned} \tag{18}$$

With regard to comparative statics, we observe that $\hat{\alpha}$ is increasing in α, so that it suffices to study the response to an increase in $\hat{\alpha}$ rather than α. We are going to elaborate on two of four conceivable cases. The other two can be analyzed in a similar way.

Case 1 If $\hat{k}_1 > \hat{k}_2$ and $\hat{k}_1 + \hat{g}_1^h + \hat{g}_2^h < 1$, then the situation is parallel to that of Section 3. A global increase of α benefits first household members and harms second household members. As for the effect of a local change in relative bargaining power, if α increases only in household h, then the first member of household h is the only beneficiary and all other members of population I are negatively affected.

Case 2 If $\hat{k}_1 > \hat{k}_2$ and $\hat{k}_1 + \hat{g}_1^h + \hat{g}_2^h > 1$, then a global increase of α has the opposite effects on first household members: Their equilibrium consumption of the composite good goes up while their labor supply also goes up. We claim that the net effect on their welfare can be negative. To verify this claim, let us consider the equilibrium utilities, for convenience suppressing the $\wedge$'s momentarily. We get

$$\begin{aligned} U_1^h &= k_1 \ln\left(\frac{\alpha k_1 \beta}{n(\alpha k_1 + (1-\alpha)k_2) + \frac{1}{2T}}\right) \\ &\quad + \left(1 - k_1 - g_1^h\right) \ln\Big(2T\left(g_2^h(1-\alpha) + \alpha\left(1 - k_1 - g_1^h\right)\right)\Big) \\ &\quad + g_1^h \ln\Big(2T\left(g_1^h \alpha + (1-\alpha)\left(1 - k_2 - g_2^h\right)\right)\Big) \end{aligned}$$

Differentiating U_1^h with respect to α yields:

Proposition 3 *The equilibrium utility of first household members satisfies*

$$\begin{aligned} \frac{\partial U_1^h}{\partial \alpha} &= \frac{g_1^h\left(-1 + g_1^h + g_2^h + k_2\right)}{(1-\alpha)\left(1 - g_1^h - g_2^h - k_2\right) + g_1^h} \\ &\quad + \frac{\left(1 - g_1^h - k_1\right)\left(1 - g_1^h - g_2^h - k_1\right)}{\alpha\left(1 - g_1^h - g_2^h - k_1\right) + g_2^h} \\ &\quad + \frac{k_1}{\alpha} - \frac{n k_1 (k_1 - k_2)}{n\left(\alpha\, k_1 + (1-\alpha)k_2\right) + \frac{1}{2T}}. \end{aligned}$$

Proposition 3, which merely describes $\frac{\partial U_1^h}{\partial \alpha}$, indicates that general equilibrium feedbacks interact in a complex way with the local gain in utility when a member of a household can increase its utility by raising its utilitarian power.

Our main findings can be summarized as:

Proposition 4 *Suppose variable externalities. Then assertions (a) and (b) of Proposition 2 continue to hold for certain model parameter values. But there exist also model parameter values such that a global or local shift of power within households towards the hardworking member(s) is harmful to all consumers in I.*

The proof of Proposition 4 can be found in "Appendix 2". A comparison of Propositions 2 and 4 shows that the comparative statics results are sensitive to the nature of externalities. The striking result of Proposition 4 that all consumers in I can be worse off with higher α means that equilibrium outcomes for different α can be Pareto-ranked as far as population I is concerned. This fact is not surprising, since profits are not distributed to these consumers, and therefore, the model of the economy is not closed. Walras Law is violated, and the first welfare theorem cannot be established if welfare analysis is restricted to population I. But the welfare theorem holds, once shareholders and the government are included. In particular, shareholders or the government gain when all consumers in I lose.

5.2 Consumption as a local public good

In Section 5.1, we have treated leisure of either household member as a local public good. Here we explore the implications when the composite consumption good becomes a local public good rather than a private good. Then the household chooses household consumption c^h and labor supplies l_i^h, $i = 1, 2$. c^h replaces c_i^h in U_i^h and $c_1^h + c_2^h$ in the budget equation (Eq. 2). Moreover, $G_i^h \equiv 0$.

Given the wage rate w, the optimal choice of household h is l_1^h given by Eq. 5, l_2^h given by Eq. 6, and $c^h = c_1^h + c_2^h$ with c_1^h and c_2^h given by Eqs. 3 and 4, respectively. Therefore, with homogeneity across households, the equilibrium values are given by labor supplies according to Eqs. 11 and 12 and consumption c^h as the sum of Eqs. 9 and 10,

$$c^h = \beta \cdot \frac{\alpha k_1 + (1-\alpha)k_2}{1/(2T) + n(\alpha k_1 + (1-\alpha)k_2)}.$$

In case $k_1 > k_2$, a global increase of α affects first members in the same way as before: They work less and consume more after the global change of bargaining power in households. In contrast, second members now consume more and work more after the change of bargaining power. The equilibrium utility of a second member is

$$\begin{aligned} U_2^h &= k_2 \cdot \ln\left(\beta \cdot \frac{\alpha k_1 + (1-\alpha)k_2}{1/(2T) + n(\alpha k_1 + (1-\alpha)k_2)}\right) \\ &\quad + (1-k_2) \cdot \ln\left(2T \cdot (1-\alpha)(1-k_2)\right) \text{ and} \\ \partial U_2^h/\partial\alpha &= k_2 \cdot \frac{k_1 - k_2}{\alpha k_1 + (1-\alpha)k_2} \\ &\quad - k_2 \cdot \frac{n(k_1 - k_2)}{1/(2T) + n(\alpha k_1 + (1-\alpha)k_2)} - (1-k_2)/(1-\alpha). \end{aligned}$$

Since $(1-k_2)/(1-\alpha) > 1 - k_2 > k_1 - k_2 > k_2 \cdot \frac{k_1 - k_2}{\alpha k_1 + (1-\alpha)k_2}$, we obtain $\partial U_2^h/\partial\alpha < 0$. Hence, second members are worse off after the global shift of bargaining power. The extra consumption does not fully compensate for more work.

Let us consider a local shift instead, where in each household either $\alpha = \alpha_*$ or $\alpha = \alpha^* > \alpha_*$. If in one of the households, say h, α increases from α_* to α^*, then the first member of household h is better off while everybody else is worse off. Namely first of all, the analog of Proposition 1 can be shown in essentially the same way. Obviously, the first member of household h is better off. As for the second member, the equilibrium utility U_2^h can be decomposed into three logarithmic terms. When we signed $\partial U_2^h/\partial\alpha$ before, we found that the negative effect of an increase of α on the third term exceeds the positive effect on the first term while the effect on the second term is negative. This finding also applies to a local change from α_* to α^*.

We conclude that the assertion of Proposition 2 also holds when the composite consumption good is a local public good in every household. The conclusion still holds if the consumption good is a local public good in some households and a private good in the rest of the households. The conclusion further persists for certain model specifications where the household converts some but not all of the purchased consumption good into a local public good.

5.3 Restrictions on labor supply

Restrictions on working hours are well-known labor market regulations in many countries, either collectively agreed (e.g., the Nordic countries, The Netherlands, or Germany), or statutory-regulated (e.g., France).[4] We next examine whether more leisure is beneficial for the working class in our model. We have seen that more importance or power of hard workers induces hard workers to work less and hedonists to work more, with the overall effect of an increased aggregate labor supply and a lower wage rate. We are now looking at restrictions on individual labor supply that prevent the amount of labor supplied by hedonists to go up. Then more importance or power of hard workers leads to a decrease of aggregate labor supply. We find

Proposition 5 *A binding (quantitative) restriction on individual labor supply can be beneficial to all members of population I (if α rises).*

For a comparison between a model with and without binding restrictions on individual labor supply, we start with an equilibrium of the basic model of Sections 3 and 4, with $k_1 > k_2, \alpha = \alpha'$, and $l_1^h < l_2^h$ where according to Eq. 12,

$$l_2^h = (1 - 2(1 - \alpha')(1 - k_2))T. \tag{19}$$

[4]The employment effects of such work week restrictions, if any, have been modest and ambiguous. The empirical evidence tends to reject the idea that reducing work hours will help to decrease unemployment (see Börsch-Supan 2002; Entorf et al. 1992; Hunt 1998). Possibly, the hourly productivity and hourly wage of those employed went up. Since many of the indirect labor costs, like mandatory employer health insurance contributions, are independent of hours worked and wages paid, the full cost of employment per hour increased significantly. As a consequence, substitution of capital for labor and relocation of production to low cost countries became even more attractive than before. Unemployment remained constant at best. At worst people got laid off.

We are interested in the equilibrium allocation and welfare at $\alpha > \alpha'$ when the labor supply of second household members is restricted by its α'-equilibrium level, that is,

$$l_2^h \leq (1 - 2(1 - \alpha')(1 - k_2))T. \tag{20}$$

Without this restriction, there would be pressure on second household members to supply more labor as α increases, as exhibited by Eq. 12. With the restriction, their labor supply is frozen at the α'-equilibrium level given by Eq. 19. Let

$$\begin{aligned} a \; &= \alpha + (1-\alpha)k_2 \; = k_2 + \alpha(1-k_2) \; = 1 - (1-\alpha)(1-k_2); \\ a' &= \alpha' + (1-\alpha')k_2 = k_2 + \alpha'(1-k_2) = 1 - (1-\alpha')(1-k_2). \end{aligned}$$

The first-order conditions for the household's optimal decision and Eq. 19 yield

$$\begin{aligned} \lambda c_1^h &= \alpha k_1/a; \\ \lambda c_2^h &= (1-\alpha)k_2/a; \\ \lambda w l_1^h &= \lambda w T - \alpha(1-k_1)/a; \\ \lambda w l_2^h &= \lambda w T - \lambda 2w(1-\alpha')(1-k_2)T; \end{aligned}$$

and

$$w = \frac{(\alpha k_1 + (1-\alpha)k_2)w}{-\alpha(1-k_1) + 2\lambda a w T(1-(1-\alpha')(1-k_2))}.$$

It follows $\lambda = (2a'wT)^{-1}$ and

$$c_1^h = 2(a'/a)\alpha k_1 w T; \tag{21}$$

$$c_2^h = 2(a'/a)(1-\alpha)k_2 w T; \tag{22}$$

$$l_1^h = T - 2(a'/a)\alpha(1-k_1)T; \tag{23}$$

$$l_2^h = T - 2(1-\alpha')(1-k_2)T; \tag{24}$$

$$w = \frac{\beta}{1 + 2n(1 - (a'/a)\alpha(1-k_1) - (1-\alpha')(1-k_2))T}. \tag{25}$$

Substituting Eq. 25 in Eqs. 21 and 22 yields

$$c_1^h = \frac{\beta \alpha k_1}{a/(2a'T) + n(k_2 + \alpha(k_1 - k_2))}; \tag{26}$$

$$c_2^h = \frac{\beta(1-\alpha)k_2}{a/(2a'T) + n(k_2 + \alpha(k_1 - k_2))}. \tag{27}$$

Let us first compare the situation $\alpha > \alpha'$ with that of $\alpha = \alpha'$ under the restriction of Eq. 20. The second members' labor supply remains constant, whereas the first members' labor supply decreases as α increases. Hence, aggregate labor supply is reduced and the wage rate goes up. Moreover, first household members consume more and second household members consume less. Hence, with the restriction on labor supply in place, first household members are once again clear gainers and second household members remain clear losers from a global change in relative bargaining power that puts more weight on first household members.

Let us compare next the situation at $\alpha > \alpha'$ with and without the restriction. Without the restriction, aggregate labor supply is higher at $\alpha > \alpha'$ than at $\alpha = \alpha'$, whereas with the restriction it is less. In either case, the first household member supplies less labor as α increases, but this negative response is weaker with the restriction. At $\alpha > \alpha'$, all household members consume less of the composite good with the restriction than without it, as if in the first case the total time available to each household member were scaled down by the factor a'/a. Let ΔU_i^h denote the difference of the equilibrium utility without and with the restriction. Clearly, $\Delta U_1^h = \Delta U_2^h = 0$ at $\alpha = \alpha'$. Further

$$\begin{aligned}
\Delta U_1^h &= k_1 \ln[1/(2T) + n(k_2 + \alpha(k_1 - k_2))] \\
&\quad -k_1 \ln[a/(2a'T) + n(k_2 + \alpha(k_1 - k_2))] \\
&\quad +(1 - k_1)\ln a' - (1 - k_1)\ln a, \\
\Delta U_2^h &= k_2 \ln[1/(2T) + n(k_2 + \alpha(k_1 - k_2))] \\
&\quad -k_2 \ln[a/(2a'T) + n(k_2 + \alpha(k_1 - k_2))] \\
&\quad +(1 - k_2)\ln(1 - \alpha) - (1 - k_2)\ln(1 - \alpha'),
\end{aligned}$$

which implies $\partial \Delta U_1^h / \partial \alpha < 0$ and $\partial \Delta U_2^h / \partial \alpha < 0$. This shows that all household members benefit from the restriction if α rises. On the other hand, shareholders and the government suffer from it. The assertion of the proposition has been demonstrated.

5.4 Distribution of profits to households

So far we have assumed that industry profits accrue to an unspecified leisure class or are siphoned off and used by the government in a non-distortionary fashion. Now we are considering the opposite case where the households of population I own the entire industry. For simplicity, we might assume that the shares of the entire industry are held by a single investment fund and that each household h owns a proportion $\theta^h \geq 0$ of that fund, with $\sum_h \theta^h = 1$. Then, if the industry profit is π, household h receives capital or dividend income $\theta^h \pi$ in addition to labor income. More generally, we might assume that there exist finitely many firms labeled $j = 1, \ldots, m$ with respective profits π_j. Household h owns a proportion $\theta_j^h \geq 0$ of firm j and receives capital income (dividend payment, profit share) $\theta_j^h \pi_j$ from the firm. The household's total capital income is $\sum_j \theta_j^h \pi_j$. For each firm j, $\sum_h \theta_j^h = 1$.

In any case, when the households own the industry and receive capital income in addition to labor income, the analysis becomes more tedious, and it may prove impossible to determine the equilibrium values explicitly. On the other hand, we are now dealing with a closed model of the economy, and the first welfare theorem applies even with positive externalities and efficient collective household decisions. This has been shown for pure exchange economies in Haller (2000). The argument readily generalizes to economies with private ownership of production. Hence, in stark contrast to Proposition 4, we find:

Proposition 6 *Suppose that the households in population I own the entire industry. If a global change in relative bargaining power benefits (harms) one group of household members, say first members, then it harms (benefits) the other group. If a local change in relative bargaining power benefits (harms) a group of individuals, then it harms (benefits) some member of the rest of the population.*

The preceding proposition is reminiscent of the differential impact of pecuniary and non-pecuniary externalities in a general equilibrium model. While the former do not destroy Pareto-efficiency, the latter do in general unless they are internalized. In our model, non-pecuniary externalities occur only at the household level and are internalized by efficient collective decisions within households. Thus, the first welfare theorem still applies.

6 Robustness

Our analysis relies on a variety of simplifying assumptions which help to obtain a tractable solution. We address in the current section the robustness of our results with regard to several of these assumptions. The main results we focus on are: First, hard workers are bad company. Second, a global change in relative bargaining power where the hardworking member becomes more influential in each working class household can render the entire working class worse off. Third, a binding restriction on the number of hours an individual is allowed to work can benefit all workers.

6.1 Production and preferences

We have assumed a simple production function to determine the wage rate endogenously. Important for our results is that the marginal productivity of labor is sufficiently decreasing in the relevant region. Production functions of the type $f(L) = \beta \cdot L^{\tau}$ with $0 < \tau \leq \bar{\tau}$ for some $\bar{\tau} < 1$ would yield the same results. More sophisticated methods of wage determination, for instance collective bargaining, may but need not undo our findings. As long as the wage rate is responsive to aggregate labor supply in a similar way, the same results obtain. Regarding preferences, what is important is the substitutability of consumption and labor. Assuming CES utility functions with a sufficiently high elasticity of substitution between consumption and leisure would reinforce our results. CES utility functions, however, prove much less tractable when we consider changes of relative bargaining power.

The model allows for some albeit moderate degree of household and consumer heterogeneity. A slight variation of consumer characteristics across households, for instance replacing T by $T_i^h \approx T$, has only a minor effect on aggregate labor supply $L^s = \sum_{h=1}^n [l_1^h + l_2^h]$ and the wage rate given by $w = 1/(1 + L^s)$. Furthermore, a small fraction of households can be quite different from the typical ones, for example consist of single person households. Still, some of our analysis rests on a close to homogeneous household structure, which can be viewed as the outcome of assortative matching.

6.2 Richer household models

The literature has identified important features of household formation and household decisions such as existence of household production (Apps and Rees 2001), non-participation in the labor market (Donni 2003), presence of children (Browning et al. 2004), unearned income (Chiappori 1988), and other types of caring preferences (Chiappori 1992; Vermeulen et al. 2006). Analyzing all those features in our model is a large research program of its own. Here we confine ourselves to four observations.

Children The traditional way of considering children in household decisions is to treat them as local public goods. Assuming that children do not earn labor income, children can be incorporated as local public goods as indicated in Section 5.2. If parents devote part of their leisure time to child care, then a combination of the analysis in Sections 5.1 and 5.2 is promising. A nascent literature, most notably Lundberg et al. (2009), has assumed and investigated decision power of children. If we assume that children are consumers with bargaining power yet without labor income and that bargaining power shifts between parents, then our qualitative findings persist.

Household production Certain types of household production, like the production of local public goods using leisure as in Section 5.1 or using the consumption good (or income) in Section 5.2 or variations thereof, are readily accommodated. Arbitrary types of household production appear less amenable to analysis.

Non-participation in the labor market In our model, at least one household member works. In principle, it is possible that only one household member works. So far, we have ruled out this possibility by suitable restrictions on model parameters. When one household member does not work, the effects of a shift of relative bargaining power within the household are subtle. Suppose $k_1 > k_2$ and initially $(1-\alpha)(1-k_2) > 1/2$ so that the second household member does not work. If the hard worker gains more influence, the voluntarily unemployed spouse may still not participate in the labor market. However, if the hard worker's influence increases even more, the spouse's participation in the labor market may be induced.

Non-labor income If non-labor income is substantial, some effects can be weakened, neutralized or even reversed as we observe in Section 5.4: When households receive capital income, the negative effect of a lower wage rate on labor income is accompanied by a positive effect on profits and capital income.

6.3 Wage differentials

Wage rates tend to differ systematically between spouses. One possibility to account for such wage differentials is to stipulate that the second household member (hedonist) supplies $l_2^h\gamma$ efficiency units of labor, with $0 < \gamma < 1$, when he/she allocates l_2^h units of time to paid work. The parameter γ reflects the skill difference between household members as the first member is assumed to supply l_1^h efficiency units of labor if he/she allocates l_1^h units of time to work. Hourly wages differ accordingly. The consequences for our findings are as follows: Still hard workers are bad company if they gain more influence. However, the impact of higher bargaining power of hard workers is weakened as the consumption gains from higher labor supply of hedonists are smaller. The opposite conclusion holds if the first member (hard worker) has lower skills and faces lower hourly wages: If the hard worker gains more influence, the hedonist suffers more as he/she has to increase his/her labor supply more than with identical skills.

7 Discussion of restrictions on labor supply

In this section, we discuss our findings regarding limits of working hours. This literature includes several theories why working hours are limited. Among these theories is the standard argument that restrictions on working hours increase the relative scarcity of labor represented by a union. Alternative theories why working time is restricted stress firm-workers' externalities caused by agency problems, which has been developed by Lazear (1981), or by the specificity of human capital (Mincer 1974 or Becker 1971). Landers et al. (1996) develop an interesting theory of limits on working hours, as they may correct externalities between workers arising from promotion tournaments. Finally, Kessing and Konrad (2006) show that restrictions on working hours arise from the incentives of unions to impact on the redistribution outcome in a welfare state.

We add a new twist to this literature. Restrictions on labor supply can prevent hard workers from exerting too much pressure on their hedonistic partners to work more. A restriction on individual labor supply improves welfare of the working class population.

Why restrictions on working hours have not been observed in the USA might be explained by two differences between labor markets in the USA and Europe (see, e.g., Freeman 1993). First, labor has much less power to force regulation in the USA compared to continental Europe, and second, profit income is more widely dispersed in the USA than in continental Europe, and hence, the separation between a working and a leisure class is less pronounced in the USA which, in turn, may make welfare effects of labor supply constraint more ambiguous. Indeed, our model predicts that if profit income is widely dispersed among workers, hard workers will not support restrictions of working hours.

However, the story is not complete by looking only at working hours. In Germany and France, collective or governmental wage setting has contributed to the emergence and persistence of unemployment. Although we have not formally examined unemployment and real wage rigidity, the model can be extended in a straightforward way to such settings. While unemployed persons are harmed by restricting working hours and above market clearing wages in our extended model, employed individuals may benefit twice from such joint interventions in the labor market, in particular if they are hedonists. The joint determination of working hours and real wages creates two insider and outsider subclasses among the working class, depending on whether an individual is employed and whether an individual is a hedonist or a hard worker. The insider subclass consisting of hedonists benefits most by creating negative externalities for the unemployed and the leisure class. A formal analysis of the implications of unemployment is left to future research.

8 Conclusions

We interpreted a change of household preferences in the form of a shift of the utilitarian weights in the household objective function as a change in relative bargaining power. We found that such a change causes spillovers on other households. The size and sign of these spillovers depend on whether changes in relative bargaining power are local or global, intra-household externalities are fixed or variable, individual labor supply restrictions are binding or not, and whether working households own the production sector or not. The spillovers occur through the labor market. As a rule, they occur only when the two household members differ in their individual preferences, so that they can be labeled as “hard worker” and “hedonistic”. Otherwise, the change in relative bargaining power within a household does not affect the aggregate labor supply of the household (as inspection of Eqs. 13 and 17 plus Eq. 18 shows) and the labor market is shut down as channel for spillovers.

The framework may also be extended by considering richer family structures. In particular, incorporating children and home production is a fruitful line for future research. For instance, the presence of children likely tends to increase the amount and diversity of externalities generated in a household while leisure time will become more scarce. As a consequence, it might be even more advantageous for the working class to restrict work hours.

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Appendix 1: The bargaining environment

As a rule, there is a surplus to be divided by household members, for instance a surplus relative to the outside opportunities they would have as single individuals. The creation of such a surplus constitutes the rationale for household formation in the first place. The disappearance of any surplus can cause dissolution of the household. If in our context individuals have the same preferences for private consumption and leisure as household members, represented by

$$U_i^0 := k_i \ln c_i^h + (1 - k_i) \ln \left(T - l_i^h\right),$$

then the term $G_1^h + G_2^h$ constitutes a potential surplus resulting from formation of household h. But how will any potential surplus be divided among household members? Browning et al. (2006, p. 6) list a number of different approaches to model intra-household bargaining. They further state—and we concur—that there is no broad consensus which particular model to use. We follow them and many others and assume collective rationality of households. As mentioned in Section 2, serious objections have been raised against this assumption. But both the theoretical and the empirical literature appear to be split in this matter: Browning and Chiappori (1998, p. 1245) claim "support for our view that the collective model is a viable alternative to the unitary model."

Given that one assumes collective rationality, a particular efficient household decision in our context can always be obtained as the outcome of maximizing a utilitarian welfare function (Eq. 1) subject to the budget constraint (Eq. 2) and non-negativity constraints. While the weights α and $1 - \alpha$ are taken as exogenous by the household, they are not necessarily exogenous or constant over time. The literature (e.g., Browning et al. 2004, 2006; Chiappori and Ekeland 2006) tends to distinguish between so-called distribution factors and prices as variables that influence intra-household balance of bargaining power. We follow Basu (2006) and distinguish between endogenous, denoted x, and exogenous, denoted z, determinants of intra-household bargaining power. The labor incomes wl_1^h and wl_2^h would constitute endogenous factors and might be part of x. Exogenous factors could be non-labor income(s), legal provisions, the sex ratio in the marriage market, individual wealth at the time of household formation, etc. In the context of Basu (2006), $x = x(\alpha)$ and $\alpha = \widehat{\alpha}(x, z)$. Basu considers two conceivable scenarios: First, given z, the values of α and x are endogenously and simultaneously determined, where α is a fixed point of the composed mapping $\alpha \mapsto \widehat{\alpha}(x(\alpha), z)$ and $x = x(\alpha)$. Second, still $x = x(\alpha)$, but α adjusts to endogenous factors with a time lag: x_t, z_t, and α_t follow a dynamic process in discrete time t where $x_t = x(\alpha_t)$, $\alpha_t = \widehat{\alpha}(x_{t-1}, z_t)$. The latter scenario is the more plausible one.

Several qualifications are warranted in our context: (a) Some variables which are exogenous for the household, like the wage rate, are endogenously determined in the economy. (b) When we take a snapshot of the economy from time to time, some or all of the α's in various households may have changed, since the exogenous factors z_t (and possibly the endogenous factors x_t as well once homogeneity is lost) may affect bargaining power in different households differently over time. (c) The economy may experience other changes over time, for instance technological progress. In our context, the latter could be implemented by considering variations in the coefficient β of the production function. Technological progress simply means an increase in β. In general, such an increase, ceteris paribus, need not benefit all consumers, but it does in our model. If an individual benefits from a change of bargaining power, then the effect is enhanced by technological progress. In contrast, if an individual would suffer from a change of bargaining power without technological progress, then this effect and the impact of technological progress on the individual's welfare mitigate or offset each other.

On income pooling Prima facie, maximization of Eq. 1 subject to the household budget constraint (Eq. 2) suggests a unitary model of the household and income pooling. However, the distinction between presence and absence of income pooling cannot simply be reduced to a distinction between "one-pot" and "two-pot" households, the presence or absence of a common budget constraint. Income pooling stricto sensu means a common budget constraint plus constancy of the function $\widehat{\alpha}$. While we have not modeled any function $\widehat{\alpha}$ explicitly, its implicit assumption explains a possible shift of intra-household bargaining power over time and the conceivable absence of income pooling despite Eqs. 1 and 2.

Widespread shifts of intra-household bargaining power Here we mention just a few examples of how distribution factors and consequently relative bargaining power in households might change. Changes in divorce law can change the outside options of many household members. Duration and maturity of the partnership may erode (or accentuate) differences in bargaining power (and income pooling). Namely, the buildup of sizeable durable public goods, in particular housing, could erode differences in bargaining power and enhance income pooling—as may the buildup of mutual trust. On the other hand, differences in lifetime income may widen over time and cause more asymmetry in bargaining power. Hence, with an aging population, there might be widespread shifts of bargaining power. Such shifts might be mitigated or reinforced by legal changes, like changes in the spousal or survivor benefits of retirement systems. Not only past and current earnings but also future earning prospects can influence a person's intra-household bargaining power. For instance, less job security in traditional manufacturing may affect relative bargaining power in the respective households. Finally, in many cases, it may be difficult to separate cause and effect if there is a feedback loop of the form $x = x(\alpha)$, $\alpha = \widehat{\alpha}(x, z)$, which constitutes a challenge for theoretical and even more so for empirical investigations.

Appendix 2: Proof of Proposition 4

We shall explore the relationship in Proposition 3 for special parameter values which imply $\frac{\partial U_1^h}{\partial \alpha} < 0$. In particular, suppose that k_2 is very small, T is sufficiently large, and $g_1^h = g_2^h =: g$ for all h. Then we obtain approximately:

$$\frac{\partial U_1^h}{\partial \alpha} \approx \frac{g(-1+2g)}{(1-\alpha)(1-2g)+g} + \frac{(1-g-k_1)(1-2g-k_1)}{\alpha(1-2g-k_1)+g},$$

where we have used that

$$\frac{k_1}{\alpha} - \frac{n\,k_1(k_1-k_2)}{n\left(\alpha\,k_1+(1-\alpha)\,k_2\right)+\frac{1}{2T}} \approx 0.$$

If, in addition, $g+k_1$ is sufficiently close to one, the second term can be neglected. If, moreover, $g < 1/2$, the first term is negative and therefore $\partial U_1^h/\partial\alpha < 0$. Therefore, an increase in relative importance or power harms the first household member. This validates our claim.

Let us first discuss the assumptions made during the proof of the claim and then try to assess the result. We now return to the $\wedge$-notation with re-normalized utility coefficients. Then, $\hat{g}_1^h = \hat{g}_2^h = \hat{g}$ corresponds to $g_1^h = g_2^h =: g$, with $\hat{g} = g/(1+g)$. The condition $\hat{g} < 1/2$ amounts to $g < 1$, which means that the externality is less important than the own commodity consumption and leisure consumption combined. By choosing g and k_1 close to one, one obtains $\hat{g} + \hat{k}_1$ close to one. A very small k_2 yields a very small $\hat{k}_2$. Hence, the conditions are met if both the hardworking and the hedonistic trait are very pronounced and the externality is almost as important as consumption of the composite good and leisure combined.

Compared with an increase of α in Eq. 1, an increase of $\hat{\alpha}$ in Eq. 14 has two additional effects: The leisure term $\hat{g}_1^h \ln(T - l_2^h)$ weighs more heavily in the household's objective function, whereas the leisure term $\hat{g}_2^h \ln(T - l_1^h)$ has less weight. This is immediately reflected in the first member's optimal labor supply. Without the variable externality, the dependence on α assumes the form $-\alpha(1-k_1)$ in Eq. 5. With the variable externality, the dependence on $\hat{\alpha}$ takes the form $-\hat{\alpha}(1-\hat{k}_1-\hat{g}_1^h-\hat{g}_2^h)$ in Eq. 17. Under the assumptions made to demonstrate the claim, the latter equals approximately $\hat{\alpha}/2$. Hence, if workaholism is very pronounced and the externalities are strong, but not too strong, then an increase of $\hat{\alpha}$ has a strong positive effect on the first household member's labor supply.[5]

Notice that for $\hat{g}_1^h < 1/2$, $\hat{g}_2^h < 1/2$ and sufficiently small $\hat{k}_2$, $1 - \hat{g}_1^h - \hat{g}_2^h - \hat{k}_2 > 0$ holds. If so, the second members' labor supply goes up, while their composite good consumption goes down in response to an increase of $\hat{\alpha}$. Thus, there exist model parameter values such that a global shift of power or priorities within households makes everyone in population I worse off.

With respect to a local change in relative bargaining power, say in household h, an increase of $\hat{\alpha}$ from $\hat{\alpha}_*$ to $\hat{\alpha}^*$ harms all members of population I not belonging to household h. If again $1 - \hat{g}_1^h - \hat{g}_2^h - \hat{k}_2 > 0$, then the second member of household h will be harmed as well. The change can be detrimental to the first household member's welfare, too. The easiest way to arrive at this conclusion is to consider ceteris paribus an increase in n. The labor supply effect for the individual is independent of n. But the wage effect and, hence, the effect on this individual's composite good consumption become arbitrarily small as n goes to infinity. Hence, for sufficiently large n, the net effect of a given change from $\hat{\alpha}_*$ to $\hat{\alpha}^*$ on the first household member's utility is negative. Therefore, there are model parameter values such that a local shift of power or priorities within a household makes everyone in population I worse off.

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[5]Too strong externalities would imply a low labor supply and fairly large leisure consumption to begin with. This would translate into a small marginal utility of leisure so that the strong positive labor supply response causes only a weak negative welfare effect.

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