Gender Norms, Work Hours, and Corrective Taxation*

Thomas Aronsson[1] and David Granlund[1,2]

[1]Department of Economics, Umeå School of Business and Economics, Umeå University, SE-901 87 Umeå, Sweden

[2]HUI Research, SE-103 29 Stockholm, Sweden

April 2013

Abstract

This paper deals with optimal income taxation based on a model with households where men and women allocate their time between market work and household production, and where households differ depending on which spouse has comparative advantage in market work. The purpose is to analyze the tax policy implications of gender norms represented by a market-work norm for men and household-work norm for women. We also distinguish between a welfarist government that respects all aspects of household preferences, and a paternalist government that disregards the disutility to households of deviating from the norms. The results show how the welfarist government may use tax policy to internalize the externalities caused by these norms, and how the paternalist government may use tax policy to make the households behave as if the norms were absent.

Keywords: Social norms, household production, optimal taxation, paternalism.

JEL classification: D03, D13, D62, D60, H21.

*Research grants from the Bank of Sweden Tercentenary Foundation, the Swedish Council for Working Life and Social Research, and the Swedish Tax Agency are gratefully acknowledged.

1 Introduction

Although women's hours of market work and men's contribution to household work have increased during the latest decades, women still do considerably more household work and less market work than men. According to the U.S. Bureau of Labor Statistics (2010), US wives do 80% more household work and spend one third less time in market work than their husbands. Also, women working full time in the labor market seem to do more household work than their male counterparts (Berardo, Shehan and Gerald, 1987; Sullivan, 2000; Gershuny and Sullivan, 2003). Therefore, Becker's (1981, Chapter 2) description of an efficient household, where the allocation of time between household work and market work is based solely on comparative advantage, might not give the whole picture. Instead, a considerable amount of evidence suggests that gender norms, or gender ideology more generally, are also important determinants of how spouses allocate their time (e.g., Perrucci, Potter and Rhoades, 1978; Ross, 1987; Greenstein, 1996; Bianchi et al., 2000; Geist, 2005). Gender norms may lead to lower utility through the (perceived) costs of deviating from the behavior prescribed by the norms. They may also reduce welfare through their influence on household behavior; e.g., by making women with a comparative advantage in market work, relative to their husbands, specialize in household work . For these reasons, it is relevant to analyze the policy incentives associated with gender norms and their effects on household behavior.

The purpose of the present paper is to analyze how gender norms, measured as a market work norm for men and household work norm for women, affect the incentives underlying optimal income taxation of households. Furthermore, we distinguish between a welfarist government which accepts all aspects of household preferences and attempts to internalize the externalities caused by the gender norms, and a paternalist (or non-welfarist) government which disregards the disutility faced by each household when deviating from the norms. This will be described more thoroughly below.

The literature on optimal income taxation of couples only includes a few earlier studies;

none of them incorporating effects of social interaction. Instead, major issues in this literature are whether joint taxation of couples is optimal (Schroyen, 2003; Brett, 2007; Cremer, Lozachmeur and Pestieau, 2007), and how secondary earnings ought to be taxed (Kleven, Kreiner and Saez, 2009). Our paper differs from the aforementioned studies primarily by focusing on the tax policy implications of work-related gender norms. We consider a model with two household-types, which differ with respect to whether the man or the woman has the comparative advantage in market work, i.e. earns the higher before-tax wage rate. In each household, the man and woman allocate their respective time-endowment between market work, household production, and leisure, and the time spent in household production generates a household public good.

We model the gender norms as a market work norm for men and a household work norm for women, as we interpret the evidence reported by Ross (1987), Bianchi et al. (2000) and Geist (2005) as supporting the existence of such norms. These scholars base their assessments of gender norms on the extent to which respondents agree or disagree with statements like "*It is much better for everyone if the man earns the main living and the woman takes care of the home and family*" and "*Preschool children are likely to suffer if their mother is employed*". In short, the responses suggest that such gender norms may exist, according to which the man should be the main achiever outside the home, while the woman's main responsibility is to take care of the home and family.[1] In our study, the norms are modeled as a weighted average of the time women in different household-types spend in household work and a weighted average of the time men in different household-types spend in market work, respectively, and

[1] Bianchi et al. (2000) use the answers to four questions included in the US National Survey of Families and Households; the two stated in the text and "*It is all right for mothers to work full time when their youngest child is under 5*"; and "*A husband whose wife is working full-time should spend just as many hours doing housework as his wife.*" Geist (2005) used four questions from the International Social Survey Program in her analyses of ten developed countries: two questions are similar to the first two used by Bianchi et al. and one is a reversed formulation of the first of these. The last is "All in all, family life suffers if the woman has a full-time job". The six questions used by Ross are similar, see Ross (1987, p. 823).

we assume that the households experience utility costs when deviating from any of these norms. Two interesting special cases - with very different implications for tax policy - follow when the norms are based on mean value and model value, respectively, for work hours.

As we indicated above, the analysis will be carried out both for a welfarist and a paternalist government. The objective function of the former accurately reflects the preferences of the households combined into a social welfare function, whereas the objective of the latter does not reflect the welfare cost to households of deviating from the gender norms (although the paternalist government is assumed to respect all other aspects of household preferences). Therefore, the welfaristic government attempts to internalize the externalities caused by the social norms, while the paternalist government wants the households to behave as if these norms were absent. Although the assumption of a welfarist government is by far the most common in other literature on optimal taxation in models with externalities, the distinction between the welfarist and paternalist government is, nevertheless, motivated because it is not clear a priori whether policy makers recognize the welfare benefits and costs to households of adjusting to gender norms, as these norms may run counter to ideals of gender-equality. Furthermore, both the welfarist and paternalist government can be found in other literature on optimal taxation, even if this distinction is novel (at least to our knowledge) in the literature on tax policy responses to social norms.

To our knowledge, the only earlier study dealing with the effects of social norms on optimal income tax policy is Aronsson and Sjögren (2010), which is based on a model with single-individual households and a welfarist government. They focus on a norm for the hours of market work in combination with a participation norm (that one should earn one's living from work instead of social benefits). Our study differs from theirs in at least four ways: (i) we consider a household model where each household contains two members; (ii) our model contains household production; (iii) we consider a mix of norms referring to market work for males and household work for females; and (iv), as mentioned above, we distinguish between a traditional welfarist government and a paternalist government from the point of view of the optimal tax policy.

The outline of the study is as follows. In section 2, we present the basic structure of the model, where each household decides upon its private consumption as well as the time spent in market work and household work by the male and female, and also characterize the household choices conditional on the tax policy decided upon by the government. Section 3 analyzes optimal corrective income taxation from the point of view of a welfarist government, whereas the optimal tax policy of a paternalist government is addressed in section 4. Section 5 summarizes.

2 The Model

The economy consists of two household-types, denoted by subscripts 1 and 2, each of which comprises a male and female, denoted by subscript m and f, respectively. The households differ with respect to the member's earnings potential in the labor market as represented by the before-tax hourly wage rates: in households of type 1 the man earns w^h and the woman $w^l < w^h$; in households of type 2 the opposite holds, i.e. the man earns w^l and the woman w^h. The number of households of type j is denoted n_j.

The utility function facing a household of type j is given by

$$U_j = u(c_j, x_j, z_{jm}, z_{jf}) - \frac{1}{2}\rho_j\left[\ell_{jm} - \overline{\ell_m}\right]^2 - \frac{1}{2}\kappa_j\left[d_{jf} - \overline{d_f}\right]^2 \quad \text{for } j = 1, 2, \tag{1}$$

where c denotes private consumption, x denotes a domestically produced household public good, and z denotes leisure. Leisure is, in turn, defined as a time endowment, Γ, less the time spent in household work, d, and in market work, ℓ, such that $z_{jm} = \Gamma - \ell_{jm} - d_{jm}$ and $z_{jf} = \Gamma - \ell_{jf} - d_{jf}$. The function $u(\cdot)$ is increasing in each argument, strictly quasi-concave, and all goods are normal.[2]

[2] We have chosen to use a household utility function for simplicity, since it guarantees internal efficiency within the households. Identical solutions to the ones derived below can be obtained with individual utility functions and cooperative behavior among the household members, given that both spouses have the same

The second part of equation (1) is a loss function, describing the utility loss of deviating from the norm for men's market work. We assume that $\overline{\ell_m} = [\beta_l \ell_{1m} + (1-\beta_l)\,\ell_{2m}]$, where $\beta_l \epsilon\,[0,1]$, i.e. the market work norm for men is given by a weighted average of the hours of market work supplied by men in the two household-types. Similarly, the third part of equation (1) describes the corresponding utility loss of deviating from the norm for women's household work. By analogy, we assume that $\overline{d_f} = [\beta_d d_{1f} + (1-\beta_d)\,d_{2f}]$, where $\beta_d \epsilon\,[0,1]$. Two special cases analyzed below are mean value norms where $\beta_l = \beta_d = n_1/(n_1+n_2)$, and modal value norms such that $\overline{\ell_m} = \ell_{im}$ and $\overline{d_f} = d_{if}$ if $n_i > n_k$. Notice also that although the norms are endogenous in the model, we assume that each household treats them as exogenous, meaning that the households behave automistically.

The household production function, $x_j = q(d_{jm}, d_{jf})$, is increasing in each argument and strictly concave. Since the household work by men and women are likely to be close substitutes, we also assume that $\partial^2 x_j/\partial d_{jm}\partial d_{jf} < 0$. Following Schroyen (2003), we do not consider a scenario where close substitutes to x_j can be bought in the market. The reason is that at least part of what is typically thought of as household public goods, such as a pleasant and caring home environment, might be difficult to accomplish solely through hired help. Furthermore, since such activities are not likely to be left entirely to one of the spouses, we will not analyze corner solutions in the choices of household work in what follows. Neither do we analyze corner solutions in the choices of market work.

2.1 Household choices

Let w_{jm} and w_{jf} denote the before-tax hourly wage rates of the man and woman, respectively, in household-type j: as mentioned above, for households of type 1, we have $w_{1m} = w^h$ and $w_{1f} = w^l$, whereas for households of type 2 the opposite applies so $w_{2m} = w^l$ and $w_{2f} = w^h$, where $w^h > w^l$. Also, suppose that income taxes are paid according to a flexible nonlinear schedule, and let T denote the household's income tax payment. The household budget

bargaining power.

constraint can then be written as

$$w_{jm}\ell_{jm} + w_{jf}\ell_{jf} - T(w_{jm}\ell_{jm}, w_{jf}\ell_{jf}) - c_j = 0 \quad \text{for} \quad j = 1, 2. \tag{2}$$

The tax function implies that individuals' marginal taxes may depend also on their spouse's income, and the two spouses typically face different marginal income tax rates. Each household chooses c_j, ℓ_{jm}, ℓ_{jf}, d_{jm} and d_{jf} to maximize their utility function in equation (1) subject to the budget constraint given by equation (2), as well as subject to the household production function and the following time constraints:

$$\Gamma = z_{js} + d_{js} + \ell_{js} \qquad \text{for } j = 1, 2 \text{ and } s = m, f. \tag{3}$$

Let $\omega_{js} = w_{js}\left[1 - T'_{js}\right]$ denote the marginal wage rate facing spouse s in household-type j, where $T'_{js} = \partial T(w_{jm}\ell_{jm}, w_{jf}\ell_{jf})/\partial\left(w_{js}\ell_{js}\right)$ is the marginal income tax rate. The first order conditions can then be written

$$\frac{\partial u_j}{\partial c_j}\omega_{jm} - \frac{\partial u_j}{\partial z_{jm}} - \rho_j\left[\ell_{jm} - \overline{\ell_m}\right] = 0 \tag{4}$$

$$\frac{\partial u_j}{\partial c_j}\omega_{jf} - \frac{\partial u_j}{\partial z_{jf}} = 0 \tag{5}$$

$$-\frac{\partial u_j}{\partial z_{jm}} + \frac{\partial u_j}{\partial x_j}\frac{\partial x_j}{\partial d_{jm}} = 0 \tag{6}$$

$$-\frac{\partial u_j}{\partial z_{jf}} + \frac{\partial u_j}{\partial x_j}\frac{\partial x_j}{\partial d_{jf}} - \kappa_j\left[d_{jf} - \overline{d_f}\right] = 0 \tag{7}$$

in which we have used the short notation $u_j = u(c_j, x_j, z_{jm}, z_{jf})$.

Notice first that in the absence of gender norms, the allocation of labor within each household would be determined by the household members' comparative advantages, meaning that the relative marginal wage rate would equal the relative marginal productivity in household work such that

$$\omega_{jm}/\omega_{jf} = \frac{\partial x_j}{\partial d_{jm}} / \frac{\partial x_j}{\partial d_{jf}}. \tag{8}$$

We may think of equation (8) as representing a production efficient outcome, as it is analogous to optimality condition for time-allocation within the household derived in standard models without norms (c.f. Becker, 1981).

For the analysis to be carried out later, it is convenient to solve equations (6) and (7) for d_{jm} and d_{jf} as functions of ℓ_{jm}, ℓ_{jf}, c_j and $\overline{d_f}$. This gives the following conditional supply functions for the hours spent in household production:

$$d_{js} = d_{js}(\ell_{jm}, \ell_{jf}, c_j, \overline{d_f}) \text{ for } j = 1, 2 \text{ and } s = m, f. \tag{9}$$

In the general case, none of the comparative statics of equations (9) can be signed unambiguously. Therefore, some of the discussion in sections 3 and 4 below are based on a more restrictive version of equation (1), where the function $u(\cdot)$ is additively separable such that

$$u(c_j, x_j, z_{jm}, z_{jf}) = a^c(c_j) + a^x(x_j) + a^m(z_{jm}) + a^f(z_{jf}) \tag{1a}$$

in which each sub-function is increasing and strictly concave. With equation (1a) at our disposal, the following comparative statics of the conditional supply functions are readily available:

$$\begin{aligned} \frac{\partial d_{jm}}{\partial \ell_{jm}} &< 0, \frac{\partial d_{jm}}{\partial \ell_{jf}} > 0, \frac{\partial d_{jm}}{\partial c_j} = 0 \quad \text{and} \quad \frac{\partial d_{jm}}{\partial \overline{d_f}} < 0 \\ \frac{\partial d_{jf}}{\partial \ell_{jm}} &> 0, \frac{\partial d_{jf}}{\partial \ell_{jf}} < 0, \frac{\partial d_{jf}}{\partial c_j} = 0 \quad \text{and} \quad \frac{\partial d_{jf}}{\partial \overline{d_f}} > 0. \end{aligned} \tag{10}$$

According to (10), an increase in the hours of market work by either household member reduces the time that this individual spends in household production, and increases the time the individual's spouse spends in household production, ceteris paribus.[3] Furthermore, an increase in the household work norm for women implies that women spend more time and men less time in household production. The absence of any direct effect of c_j on the conditional supply of household work is due to the separable structure of equation (1a), meaning that c_j does not appear in the first order conditions for d_{jm} and d_{jf}.

[3] This is consistent with empirical evidence presented in Sullivan (2000), who found that an increase in the hours of market work by the wife implies that she spends less time in household production, and that her husband spends more time in household production. Sullivan did not analyze the effects of changes in the hours of market work of husbands.

The production sector is competitive and consists of identical firms, which use high- and low-productivity labor as the only production factors. To avoid unnecessary complications, we also assume linear technology such that the before-tax wage rates, w^l and w^h, are fixed.

3 Welfarist Policy

We assume that both the welfarist government and the paternalist government maximize social welfare functions where all households are given the same weight. As we focus on corrective aspects of tax policy, and in particular how the use of such policy differs between a welfarist and paternalist government, we also assume that household-types are observable such that the government can redistribute between them on a lump-sum basis. Therefore, the only reason for distorting the labor supply behavior is to correct for the effects of social norms.[4]

The objective of the welfarist government is a conventional Utilitarian social welfare function, which is given by

$$W = \sum_j n_j U_j \tag{11}$$

where U_j denotes the utility function of a household of type j, as given in equation (1), and (as mentioned above) n_j denotes the number of households of type j. As such, the welfarist government recognizes the utility loss faced by each household if deviating from the social norms and will, therefore, try to internalize the externalities that the social norms give rise to.

Notice once again that $T(\cdot)$ is a nonlinear tax, through which the government is able to implement any desired combination of market work for both individuals and private consumption in each household-type. It is, therefore, convenient to write the public decision-problem as a direct decision-problem, i.e. as if the government directly decides upon the hours of

[4] This simplification is also motivated because the policy incentives that would otherwise follow from asymmetric information affect the welfarist and paternalist governments in a similar way.

market work for the man and woman, respectively, and the private consumption in each household-type. The marginal income tax rates that will implement the social optimum can then be derived by combining the first order conditions of the public decision-problem with those characterizing the households. Therefore, the government's budget constraint will be written in terms of work hours and consumption as follows:

$$\sum_j n_j[w_{jm}\ell_{jm} + w_{jf}\ell_{jf} - c_j] = 0. \tag{12}$$

Instead of substituting the response functions for d_{jm} and d_{jf} given in equations (9) into the objective function, we follow the equivalent approach of introducing the response functions as separate restrictions. This means that the government's decision-problem problem can be expressed as choosing c for each household type and choosing ℓ and d for both individuals in each household. The Lagrangean can then be written as

$$\begin{aligned} L &= W + \gamma \sum_j n_j \left\{ w_{jm}\ell_{jm} + w_{jf}\ell_{jf} - c_j \right\} \\ &+ \sum_j \left[\mu_{jm} \left\{ d_{jm} - d_{jm}\left(\ell_{jm}, \ell_{jf}, c_j, \overline{d_f}\right) \right\} + \mu_{jf} \left\{ d_{jf} - d_{jf}\left(\ell_{jm}, \ell_{jf}, c_j, \overline{d_f}\right) \right\} \right]. \end{aligned} \tag{13}$$

The first order conditions are given in the Appendix. We will now use these first order conditions to characterize the optimal tax policy of the welfarist government.

Since the welfare effects of changes in the social norms play a key role in the analysis, we begin by briefly characterizing these welfare effects. By using that the Lagrangean is equal to the welfare function at the social optimum, i.e. $W = L$, we show in the Appendix that the welfare effect of an increase in $\overline{d_f}$ and $\overline{\ell_m}$, respectively, can be written as

$$\frac{\partial W}{\partial \overline{d_f}} = \frac{\sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f} \right]}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d)} \tag{14}$$

$$\frac{\partial W}{\partial \overline{\ell_m}} = \sum_j n_j \rho_j \left[\ell_{jm} - \overline{\ell_m} \right]. \tag{15}$$

Equation (14) implies that the welfare effect of an increase in the household work norm depends on a weighted sum of differences between the actual time spent in household work by women and the behavior prescribed by the norm, ceteris paribus. Similarly, equation (15) means that the corresponding effect of an increase in the market work norm depends on a weighted sum of differences between the actual number of hours spent in market work by men and the number of work hours implied by the norm. The only difference between equations (14) and (15) refers to the feedback effect in the denominator of equation (14), which arises due to that the conditional supply of household work by women in equation (9) depends directly on $\overline{d_f}$. In accordance with earlier research on feedback effects in models with externalities, we impose a stability condition by assuming that the denominator of equation (14) is positive.[5]

To simplify the notation, we define marginal rates of substitution between leisure and private consumption for a given d_{jf} such that

$$MRS_{jf} = \frac{\partial u_j / \partial z_{jf}}{\partial u_j / \partial c_j} \quad \text{and} \quad MRS_{jm} = \frac{\partial u_j / \partial z_{jm} + \rho_j \left[\ell_{jm} - \overline{\ell_m}\right]}{\partial u_j / \partial c_j}, \tag{16}$$

as well as the following derivatives of the compensated conditional supply of household work by women in household-type j:

$$\frac{\partial \widetilde{d}_{jf}}{\partial \ell_{jf}} = \frac{\partial d_{jf}}{\partial \ell_{jf}} + MRS_{jf} \frac{\partial d_{jf}}{\partial c_j} \tag{17}$$

$$\frac{\partial \widetilde{d}_{jf}}{\partial \ell_{jm}} = \frac{\partial d_{jf}}{\partial \ell_{jm}} + MRS_{jm} \frac{\partial d_{jf}}{\partial c_j}. \tag{18}$$

The marginal income tax rates are characterized in Lemma 1.

Lemma 1. *With a welfarist government, the optimal marginal income tax rates can be written as*

$$T'_{1f} = -\frac{\beta_d}{\gamma n_1 w^l} \frac{\partial W}{\partial \overline{d_f}} \frac{\partial \widetilde{d}_{1f}}{\partial \ell_{1f}} \tag{19}$$

$$T'_{1m} = -\frac{\beta_d}{\gamma n_1 w^h} \frac{\partial W}{\partial \overline{d_f}} \frac{\partial \widetilde{d}_{1f}}{\partial \ell_{1m}} - \frac{\beta_l}{\gamma n_1 w^h} \frac{\partial W}{\partial \overline{\ell_m}} \tag{20}$$

[5] See Sandmo (1980) for an excellent discussion on stability in models with externalities and demand interactions.

$$T'_{2f} = -\frac{(1-\beta_d)}{\gamma n_2 w^h} \frac{\partial W}{\partial \overline{d_f}} \frac{\partial \widetilde{d}_{2f}}{\partial \ell_{2f}} \tag{21}$$

$$T'_{2m} = -\frac{(1-\beta_d)}{\gamma n_2 w^l} \frac{\partial W}{\partial \overline{d_f}} \frac{\partial \widetilde{d}_{2f}}{\partial \ell_{2m}} - \frac{(1-\beta_l)}{\gamma n_2 w^l} \frac{\partial W}{\partial \overline{\ell_m}} \tag{22}$$

Proof: see the Appendix.

Notice first that all marginal income tax rates depend directly on the norm for household work, whereas terms related to the norm for market work only affect the marginal income tax rates imposed on men. The reason is that the income tax is a perfect instrument for targeting the hours of market work (and, therefore, the norm for market work), while it is only an indirect (and imperfect) instrument for influencing the hours of household work. As long as $\beta_d \in (0,1)$ and $\partial \widetilde{d}_{jf}/\partial \ell_{jf} < 0$ for $j = 1, 2$ - where the latter always applies if (10) is fulfilled - the marginal income tax rates faced by women will have the same sign as $\partial W/\partial \overline{d_f}$. For instance, if an increase in $\overline{d_f}$ leads to higher welfare, ceteris paribus, there is an incentive for the government to increase the number of hours that women spend in household work (which leads to an increase in $\overline{d_f}$). In turn, this is accomplished by discouraging market work through higher marginal income taxation. The argument for lower marginal income taxation is analogous if $\partial W/\partial \overline{d_f} < 0$.

For men, the first term on the right hand side takes the opposite sign of $\partial W/\partial \overline{d_f}$ as long as $\beta_d \in (0,1)$ and $\partial \widetilde{d}_{jf}/\partial \ell_{jf} > 0$. The intuition is as follows: if $\partial W/\partial \overline{d_f} < 0$, there is an incentive for the government to discourage household work among women. This can be achieved by higher marginal taxation of their husband's labor income, which encourages them to substitute market work for household work. The argument for lower marginal income taxation is analogous if $\partial W/\partial \overline{d_f} > 0$. According to empirical evidence presented in Sullivan (2000), the amount of time an individual spends in household work is more sensitive to changes in the individual's own market work than to changes in the spouse's market work: for this reason, therefore, the first term on the right hand side of equation (20) is likely to be smaller in absolute value than the right hand side of equation (19), and the first term on the right hand side of equation (22) is likely to be smaller in absolute value than the right hand side of equation (21).[6] This size difference is reinforced in household-type 1 due to that the man earns the higher before-tax wage rate, and counteracted in household-type 2 where the woman earns the higher before-tax wage rate (which is seen from the denominator of the tax formulas).

The second term on the right hand side in the tax formulas for men serves to correct for the externality that each man imposes on other households due to the social norm for market work. This marginal tax component is proportional to the negative of $\partial W/\partial\overline{\ell_m}$. As such, if $\partial W/\partial\overline{\ell_m} > 0$ (< 0), there is an incentive to encourage (discourage) market work among men through a lower (higher) marginal income tax rate, which contributes to internalize this externality.

Finally, notice that the marginal income tax rates imposed on women take the same sign for both household-types, as long as both household-types contribute to the externality associated with the household work norm, i.e. if $\beta_d \in (0, 1)$. For men, on the other hand, the marginal income tax rate may differ in sign between the two household-types if $\partial W/\partial\overline{\ell_m}$ and $\partial W/\partial\overline{d_f}$ differ in sign. The reason is that the relative weight attached to $\partial W/\partial\overline{\ell_m}$ and $\partial W/\partial\overline{d_f}$ can differ across the tax formulas for the men, either because β_l and β_d differ from each other, and/or because $\partial\widetilde{d}_{1f}/\partial\ell_{1m}$ differs from $\partial\widetilde{d}_{2f}/\partial\ell_{2m}$.

Below we consider two obvious special cases, where the social norms are based on mean and model value, respectively. Consider first mean value norms, i.e. $\overline{d_f} = \sum_j n_j d_{jf}/\sum_j n_j$ and $\overline{\ell_m} = \sum_j n_j l_{jm}/\sum_j n_j$.

Proposition 1 *Suppose that taxes are set by a welfarist government. With mean-value norms such that $\beta_l = \beta_d = n_1/(n_1 + n_2)$, and if the households have the same preferences in the sense that $\kappa_1 = \kappa_2$ and $\rho_1 = \rho_2$, then all marginal income tax rates are zero.*

Proof. Use $\beta_d = n_1/(n_1 + n_2)$ and $\kappa_1 = \kappa_2$ in equation (14), and use $\beta_l = n_1/(n_1 + n_2)$ and

[6] Sullivan (2000, Table 5) finds that women who work part time instead of full time do 69 minutes more household work per day, while their husbands only do 13 minutes less household work per day, on average.

$\rho_1 = \rho_2$ in equation (15). Rearrange to obtain $\partial W / \partial \overline{d_f} = \partial W / \partial \overline{\ell_m} = 0$. Substitution into equations (19)-(22) gives $T_{1m}^{'} = T_{1f}^{'} = T_{2m}^{'} = T_{2f}^{'} = 0$.■

Proposition 1 reflects a case where corrective taxation is not used. The intuition is that with mean value norms and identical preferences, the welfare gain to one of the household-types of an increase in the norm is exactly offset by the welfare loss for the other household-type. Therefore, with a Utilitarian social welfare function, the net effect will be zero.

Clearly, if we allow the preferences for norm-adjustments to differ across household-types, such that $\kappa_1 \neq \kappa_2$ and/or $\rho_1 \neq \rho_2$, Proposition 1 will no longer apply. In that case, the mean value norms imply that equations (14) and (15) reduce to read

$$\frac{\partial W}{\partial \overline{d_f}} = \frac{1}{\Phi} (\kappa_1 - \kappa_2) \frac{n_1 n_2}{n_1 + n_2} (d_{1f} - d_{2f}) \tag{23}$$

$$\frac{\partial W}{\partial \overline{\ell_m}} = (\rho_1 - \rho_2) \frac{n_1 n_2}{n_1 + n_2} (\ell_{1m} - \ell_{2m}) , \tag{24}$$

in which we have used the short notation

$$\Phi = 1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \frac{n_1}{n_1 + n_2} - \frac{\partial d_{2f}}{\partial \overline{d_f}} \frac{n_2}{n_1 + n_2} > 0. \tag{25}$$

Equations (23) and (24) show that the qualitative welfare effects of increases in $\overline{d_f}$ and $\overline{\ell_m}$ depend on (i) which household-type that experiences the largest utility loss by deviating from the social norms and (ii) differences in work hours across household-types (household work for women and market work for men). To analyze the optimal tax policy in this more general setting, note first that $d_{1f} > d_{2f}$ and $\ell_{1m} > \ell_{2m}$, since the norms will never fully offset the effects of comparative advantage. Then, if $\kappa_1 < \kappa_2$ and $\rho_1 < \rho_2$, we have $\partial W / \partial \overline{d_f} < 0$ and $\partial W / \partial \overline{\ell_m} < 0$. In this case, and if the comparative statics properties in (10) apply, externality-correction calls for subsidization of women's market work at the margin, i.e. $T_{1f}^{'} < 0$ and $T_{2f}^{'} < 0$. The intuition is that more market work reduces the time spent in household work, which brings $\overline{d_f}$ down to a level more in accordance with the preferences of household-type 2 (which in this example experiences a larger utility loss that household-type 1 if deviating from the household work norm). Notice also that externality-correction in this case motivates positive marginal income tax rates for men. This is so for two reasons. First, by working fewer hours in the labor market, men will do more household work, which also contributes to reduce $\overline{d_f}$. Second, less market work among men decreases $\overline{\ell_m}$ to a more preferable level for household-type 2 (which experiences a larger utility loss than household-type 1 if deviating from the market work norm). On the other hand, if deviations from the social norms instead lead to higher utility losses for household-type 1 than for household-type 2, such that $\kappa_1 > \kappa_2$ and $\rho_1 > \rho_2$, tax policy implications opposite to those described above will follow.

Notice also that if one of the household-types cares more about deviations from one of the norms, while the other household-type cares more about deviations from the other norm, the marginal income tax rates for women are still signed if the comparative statics in (10) apply. This is so because, irrespective of the relative sizes of ρ_1 and ρ_2, externality-correction calls for marginal subsidization of women's market work if $\kappa_1 < \kappa_2$ and marginal taxation of women's market work if $\kappa_1 > \kappa_2$. However, if $\kappa_1 < \kappa_2$ and $\rho_1 > \rho_2$, or if $\kappa_1 > \kappa_2$ and $\rho_1 < \rho_2$, the two norms have opposite qualitative effects on the marginal income tax rates implemented for men, and it remains an empirical question which effect dominates the other.

Let us continue with modal value norms, where $\overline{d_f} = d_{jf}$ and $\overline{\ell_m} = \ell_{jm}$ for $n_j > n_k$.

Proposition 2 *Suppose that taxes are set by a welfarist government. With modal value norms, the marginal income tax rates are zero for women and men of the minority household-type. If $n_1 > n_2$ ($n_1 < n_2$), the marginal income tax rate for women of the majority household-type is negative (positive), and the marginal income tax rate for men of the majority household-type is positive (negative).*

Proof. If household-type 1 is the majority household-type, we have $n_1 > n_2$, meaning that $\beta_l = \beta_d = 1$ and $\overline{d_f} = d_{1f}$ and $\overline{\ell_m} = \ell_{1m}$. Equations (14) and (15) will then simplify to read

$$\frac{\partial W}{\partial \overline{d_f}} = \frac{n_2 \kappa_2 \left[d_{2f} - d_{1f}\right]}{\left(1 - \frac{\partial d_{1f}}{\partial \overline{d_f}}\right)} < 0 \tag{26}$$

$$\frac{\partial W}{\partial \overline{\ell_m}} = n_2\rho_2\left[\ell_{2m} - \ell_{1m}\right] < 0. \tag{27}$$

Substituting into equations (19)-(22) gives $T_{1f}^{'} < 0$, $T_{1m}^{'} > 0$ and $T_{2f}^{'} = T_{2m}^{'} = 0$. Instead, if household-type 2 is the majority household-type, so $n_1 < n_2$, we have $\beta_l = \beta_d = 0$ and

$$\frac{\partial W}{\partial \overline{d_f}} = \frac{n_1\kappa_1\left[d_{1f} - d_{2f}\right]}{\left(1 - \frac{\partial d_{2f}}{\partial \overline{d_f}}\right)} > 0 \tag{28}$$

$$\frac{\partial W}{\partial \overline{\ell_m}} = n_1\rho_1\left[\ell_{1m} - \ell_{2m}\right] > 0, \tag{29}$$

implying $T_{2f}^{'} > 0$, $T_{2m}^{'} < 0$ and $T_{1f}^{'} = T_{1m}^{'} = 0$.■

The intuition behind the first part of the proposition is that the minority household-type does not generate any externalities. As such, there is no reason for the welfarist government to distort the labor supply behavior of the minority household-type. The marginal income tax rates imposed on the majority household-type serve to reduce the differences between each norm and the corresponding number of work hours chosen by the minority household-type which, in this case, determines the welfare cost associated with the social norm. Therefore, it is the minority household-type's values of κ and ρ that affect the marginal taxes (not the corresponding values characterizing the majority household-type), since the majority household-type per definition will not divert from $\overline{d_f}$ and $\overline{\ell_m}$, respectively.

4 Paternalist Policy

The paternalist government differs from its welfarist counterpart in that it does not value the utility loss that each household-type faces if deviating from the social norms. Therefore, the contribution of a household of type j to the government's objective function is given by

$$V_j = u(c_j, x_j, z_{jm}, z_{jf}). \tag{30}$$

Equation (30) implies that, although the government attaches no weight on the utility costs faced by households due to that their actual hours of work deviate from the norms, it respects all other aspects of consumer preferences. As such, the government tries to counteract the effects of these norms on household behavior, i.e. induce each household to behave as if the norms were absent. The Lagrangean can then be written as

$$\begin{aligned} L &= \breve{W} + \gamma \textstyle\sum_j n_j \left\{ w_{jm}\ell_{jm} + w_{jf}\ell_{jf} - c_j \right\} \\ &\quad + \sum_j \left[\mu_{jm} \left\{ d_{jm} - d_m \left(\ell_{jm}, \ell_{jf}, c_j, \overline{d_f} \right) \right\} + \mu_{jf} \left\{ d_{jf} - d_f \left(\ell_{jm}, \ell_{jf}, c_j, \overline{d_f} \right) \right\} \right] \quad (31) \end{aligned}$$

where $\breve{W} = \sum_j n_j V_j$. The first order conditions are given in the Appendix.

Let us once again start by considering the welfare effect of an increase in each social norm, ceteris paribus. We show in the Appendix that

$$\frac{\partial \breve{W}}{\partial \overline{d_f}} = \frac{\sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f} \right] \frac{\partial d_{jf}}{\partial \overline{d_f}}}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} \left(1 - \beta_d\right)} \quad (32)$$

$$\frac{\partial \breve{W}}{\partial \overline{\ell_m}} = 0. \quad (33)$$

Equation (32) takes almost the same form as equation (14), i.e. almost the same form as under a welfarist government, which may seem surprising at first sight. Yet, the underlying mechanisms are different here. In the numerator of equation (32), the term $\kappa_j \left[d_{jf} - \overline{d_f} \right]$ appears because it reflects a discrepancy between the household's first order condition for d_{jf}, as given in equation (7), and the corresponding welfare change perceived by the government. With a paternalist government, $\overline{d_f}$ only affects the objective function of the government indirectly through d_{1f} and d_{2f}, which explains the derivative $\partial d_{jf}/\partial \overline{d_f}$ in the numerator of equation (32), whereas $\overline{d_f}$ directly affect the objective faced by a welfarist government (which is seen from equation (14) above). The feedback component in the denominator of equation (32) has the same explanation as in the welfarist setting. Notice also that since $\overline{\ell_m}$ does not enter the objective function of the paternalist government (neither directly nor indirectly), the corresponding welfare effect as given by equation (33) is zero.

The tax structure is characterized as follows:

Lemma 2. *With a paternalist government, the optimal marginal income tax rates take the form*

$$T'_{1f} = -\frac{1}{\gamma n_1 w^l}\left(\frac{\partial \breve{W}}{\partial \overline{d_f}}\beta_d + n_1\kappa_1\left[d_{1f} - \overline{d_f}\right]\right)\frac{\partial \widetilde{d}_{1f}}{\partial \ell_{1f}} \tag{34}$$

$$T'_{1m} = -\frac{1}{\gamma n_1 w^h}\left(\frac{\partial \breve{W}}{\partial \overline{d_f}}\beta_d + n_1\kappa_1\left[d_{1f} - \overline{d_f}\right]\right)\frac{\partial \widetilde{d}_{jf}}{\partial \ell_{jm}} - \frac{\rho_1}{\gamma w^h}\left[\ell_{1m} - \overline{\ell_m}\right] \tag{35}$$

$$T'_{2f} = -\frac{1}{\gamma n_2 w^h}\left(\frac{\partial \breve{W}}{\partial \overline{d_f}}(1-\beta_d) + n_2\kappa_2\left[d_{2f} - \overline{d_f}\right]\right)\frac{\partial \widetilde{d}_{2f}}{\partial \ell_{2f}} \tag{36}$$

$$T'_{2m} = -\frac{1}{\gamma n_2 w^l}\left(\frac{\partial \breve{W}}{\partial \overline{d_f}}(1-\beta_d) + n_2\kappa_2\left[d_{2f} - \overline{d_f}\right]\right)\frac{\partial \widetilde{d}_{2f}}{\partial \ell_{2m}} - \frac{\rho_2}{\gamma w^l}\left[\ell_{2m} - \overline{\ell_m}\right]. \tag{37}$$

Proof: see the Appendix.

By analogy to the corresponding tax formulas for a welfarist government in Lemma 1, notice that terms related to household work for women appear in all tax formulas, whereas terms related to market work for men only appear in the tax formulas for men. As before, the intuition is that the labor income tax constitutes a direct instrument for influencing the hours of market work, while it only provides an indirect instrument for influencing the hours of household work. Under the comparative statics summarized in (10), the sign of the first term on the right hand side of each tax formula depends on the sign of $\partial\breve{W}/\partial\overline{d_f}$. If $\partial\breve{W}/\partial\overline{d_f} > 0$, there is an incentive for the government to increase the marginal income tax rates for women and reduce them for men, since this policy change leads to an increase in $\overline{d_f}$. Instead, if $\partial\breve{W}/\partial\overline{d_f} < 0$, there is a corresponding policy incentive to reduce $\overline{d_f}$ through a lower marginal income tax for women and a higher marginal income tax rate for men.

Notice also that the market work norm affects the marginal income tax rates for men, despite that an increase in $\overline{\ell_m}$ does not influence social welfare with a paternalist government. Instead, the component $\rho_j\left[\ell_{jm} - \overline{\ell_m}\right]$ in equations (35) and (37) is due to a discrepancy between the household's and the government's first order condition for ℓ_{jm}: as such, the marginal income tax rate will be designed to offset the incentive effect of $\overline{\ell_m}$ faced by each household. The intuition behind the component $\kappa_j\left[d_{jf} - \overline{d_f}\right]$ in the marginal income tax formulas is analogous; it serves to offset the effect of $\overline{d_f}$ on the incentives to supply household work.

It is also interesting to observe that the parameter β_l, which measures the contribution of household-type 1 to the market work norm, does not affect the marginal income tax rates (other than indirectly through $\overline{\ell_m}$). Unlike the welfarist government described in the previous section, a paternalist government has no incentives to influence the level of $\overline{\ell_m}$; instead, the paternalist government attempts to offset the effect of $\overline{\ell_m}$ on the household's choice of work hours. As explained above, it does so through the final term on the right hand side of equation (35) and (37), respectively. This is contrasted by the observation that equations (34)-(37) contain the parameter β_d, which reflects the contribution by household-type 1 to the household work norm. The explanation for this discrepancy is that the paternalist government attempts to influence the level of $\overline{d_f}$ (despite that it is indifferent to the level of $\overline{\ell_m}$), since $\overline{d_f}$ influences d_{1f} and d_{2f}.

As in the previous section, we distinguish between mean value norms and modal value norms. Starting with the mean value norms such that $\beta_l = \beta_d = n_1/(n_1+n_2)$, equation (32) reduces to read

$$\frac{\partial \breve{W}}{\partial \overline{d_f}} = \frac{1}{\Phi}\left(\tilde{\kappa}_1 - \tilde{\kappa}_2\right)\left(\frac{n_1 n_2}{n_1+n_2}\right)\left(d_{1f} - d_{2f}\right) \tag{38}$$

where $\Phi > 0$ is defined by equation (25) in the previous section. The variable $\tilde{\kappa}_j = \kappa_j(\partial d_{jf}/\partial \overline{d_f})$ is a modified indicator of the disutility of an increase in $\overline{d_f}$ that the paternalist government attaches to household-type j, and the second part follows because $\overline{d_f}$ only affects household-type j's contribution to the social objective function indirectly through d_{jf}. We have we have derived the following result based on the assumption that the comparative statics in (10) apply:

Proposition 3 *Suppose that taxes are set by a paternalist government. With a mean-value norm for household work such that $\beta_d = n_1/(n_1+n_2)$, and if $\tilde{\kappa}_1 = \tilde{\kappa}_2$, the marginal income tax rates for high-wage earners are negative and the marginal income tax rates for low-wage earners are positive.*

Proof. If $\tilde{\kappa}_1 = \tilde{\kappa}_2$, it follows immediately from equation (38) that $\partial \breve{W}/\partial \overline{d_f} = 0$. Equations (34)-(37) then imply $T^{'}_{1m} < 0$, $T^{'}_{2f} < 0$, $T^{'}_{1f} > 0$ and $T^{'}_{2m} > 0$.■

Proposition 3 provides a useful benchmark for understanding paternalist policy, as it reflects a case where an increase in $\overline{d_f}$ has no influence on the social objective function. Therefore, the paternalist government has no incentive to change the level of $\overline{d_f}$, implying that the marginal income tax rates are determined solely by the incentive faced by this government to offset the effects that $\overline{d_f}$ and $\overline{\ell_m}$ have on household behavior. As such, since the norm counteracts specialization based on comparative advantage, the government will use tax policy to increase this specialization, which explains the marginal income tax rates in the proposition.

In the more general case where $\tilde{\kappa}_1 \neq \tilde{\kappa}_2$, an additional policy incentive arises due to the effect of $\overline{d_f}$ on the social objective function. A comparison between equation (38) and equations (34)-(37) shows that only the marginal income tax rates for the household-type with the highest value of $\tilde{\kappa}_j$ can be signed unambiguously (again under the assumption that (10) applies). For instance, consider the case where $\tilde{\kappa}_1 > \tilde{\kappa}_2$, in which $\partial W/\partial \overline{d_f} > 0$. This provides an incentive for the government to increase $\overline{d_f}$ by choosing $T^{'}_{1f} > 0$ and $T^{'}_{1m} < 0$ (both of which contribute to a higher d_{1f}). Furthermore, this policy choice also counteracts the effects that the two gender norms have on household behavior, which is desirable for a paternalist government. On the other hand, for households of type 2 there is a trade-off faced by the government between using tax policy to increase $\overline{d_f}$ and using it to counteract the effects that the norms have on household choices, meaning that none of the marginal income tax rates can be signed unambiguously.

The case where $\tilde{\kappa}_1 < \tilde{\kappa}_2$ implies an analogous modification of the corrective tax policy by comparison with Proposition 3. As in the proposition, we have $T^{'}_{2f} < 0$ and $T^{'}_{2m} > 0$, which in this case is desirable also because it contributes to reduce $\overline{d_f}$, while the marginal income tax rates implemented for household-type 1 can no longer be signed.

Turning to norms based on modal value, we have derived the following result based on the assumption that the comparative statics in (10) apply:

Proposition 4 *Suppose that taxes are set by a paternalist government. With modal-value norms, and if $n_1 > n_2$ ($n_1 < n_2$), the marginal tax rates for women are negative (positive) and the marginal tax rates for men are positive (negative).*

Proof. With modal-value norms, and if $n_1 > n_2$, equation (32) becomes

$$\frac{\partial \breve{W}}{\partial \overline{\overline{d_f}}} = \frac{n_2 \tilde{\kappa}_2 \left[d_{2f} - d_{1f} \right]}{\left(1 - \frac{\partial d_{1f}}{\partial \overline{\overline{d_f}}} \right)} < 0. \tag{39}$$

Since $\beta_l = \beta_d = 1$, $\overline{d_f} = d_{1f}$ and $\overline{\ell_m} = \ell_{1m}$, equations (34)-(37) imply $T_{1f}^{'} < 0$, $T_{1m}^{'} > 0$, $T_{2f}^{'} < 0$ and $T_{2m}^{'} > 0$. Similarly, if $n_1 < n_2$, equation (32) becomes

$$\frac{\partial \breve{W}}{\partial \overline{\overline{d_f}}} = \frac{n_1 \tilde{\kappa}_1 \left[d_{1f} - d_{2f} \right]}{\left(1 - \frac{\partial d_{2f}}{\partial \overline{\overline{d_f}}} \right)} > 0. \tag{40}$$

Therefore, $\beta_l = \beta_d = 0$, $\overline{d_f} = d_{2f}$ and $\overline{\ell_m} = \ell_{2m}$ and equations (34)-(37) imply $T_{1f}^{'} > 0$, $T_{1m}^{'} < 0$, $T_{2f}^{'} > 0$ and $T_{2m}^{'} < 0$.■

The sign of each marginal income tax rate in the majority household-type is here determined by the desire for the paternalist government to affect the household work done by women of the minority household-type, which is accomplished by influencing $\overline{d_f}$ through tax policy, while the marginal income tax rates implemented for the minority household-type are determined by the policy incentive to counteract the effects that the norms have on household behavior. For instance, if type 1 is the majority household-type, such that $n_1 > n_2$, the government will choose $T_{1f}' < 0$ and $T_{1m}' > 0$, which contributes to reduce $\overline{d_f}$. As such, this tax policy also reduces the household work done by women of the minority household-type, which have a comparative advantage in market work. Furthermore, we have the following marginal income tax rates for the minority household-type: $T_{2f}' < 0$ and $T_{2m}' > 0$, which lead women to switch from household work to market work and vice versa for men. The intuition for the case where type 2 is the majority household-type is analogous.

5 Summary and discussion

The present paper analyzes corrective tax policy in an economy with gender-related work norms, which are defined as a market work norm for men and household work norm for women. Such a study is motivated by the observation that women still do considerably more housework and spend less time in the labor market than men, despite that gender equality has been on the political agenda for a long time. Our study is based on an economy populated by households, where men and women allocate their time between market work and household production, and where households are divided in two types depending on whether the man or woman has the comparative advantage in market work (i.e. earns the higher before-tax wage rate). The market work norm is defined as a weighted average of the hours of market work supplied by men in different household-types, while the household work norm is analogously defined as a weighted average of the hours of household work supplied by women in different household-types. As such, norms based on mean value and modal value constitute special cases in our framework.

We also distinguish between a welfarist government and a paternalist government; the welfarist government respects all aspects of household preferences, whereas the paternalist government disregards the effects of the norms on household utility. A welfarist government designs the tax system to internalize the externalities caused by the social norms, as opposed to a paternalist government which designs the tax system to counteract the effects that these norms have on household behavior. The welfarist government is assumed to face a utilitarian social welfare function; the paternalist government uses a similar objective with the modification that the disutility to households of deviating from the norms is not included. In either case, the policy instrument faced by the government is a nonlinear tax on the income from market work.

With a welfarist government and mean value norms, tax policy is used to move the (endogenous) norms closer to the levels preferred by the household-type that experiences the largest utility loss if deviating from these norms. An immediate implication is that if the households have the same preferences, the corrective motive for taxation vanishes, since the welfare gain for one of the household-types of an increase in the value of the norm is exactly offset by a welfare loss for the other household-type. With norms based on modal value, on the other hand, there is no corrective motive for the welfarist government to tax the minority household-type, since such households do not generate any externalities. The marginal tax policy imposed on men and women of the majority household-type are designed to reduce the difference between the value of each norm (which, in this case, is determined by the behavior of the majority household-type) and the corresponding number of work hours chosen by the households of the minority type (which are those suffering from the norm).

With a paternalist government and mean value norms, there is an incentive to subsidize the market income for high income earners and tax it for low income earners at the margin. The intuition is that a paternalist government attempts to make the households behave as if the allocation of time were driven solely by comparative advantage. Finally, if the norms are based on modal value, the paternalist government has an incentive to tax men's earnings and subsidize women's earnings at the margin, if women have the comparative advantage in market work in the minority household-type. On the other hand, if men have the comparative advantage in market work in the minority household-type, the paternalist government instead subsidizes men's earnings and taxes women's earnings at the margin.

Future work may take several different directions. First, social norms are likely to evolve gradually over time instead of adjusting momentarily to policy, as we have assumed here. This suggests that a dynamic model might provide a richer framework for studying the policy implications of social norms; possibly in combination with numerical calculations to assess how the optimal corrective policies may change over time. Second, households may also invest resources to reduce their perceived cost of deviating from social norms, i.e. by altering their perception of these norms. As such, the welfare cost to households of deviating from such norms is likely to be reduced; yet at a cost, which may suggest a somewhat different role for public policy. We hope to address these issues in future research.

Appendix

The first order conditions for the welfarist government are written as

$$\frac{\partial L}{\partial c_j} = n_j \frac{\partial u_j}{\partial c_j} - \gamma n_j - \mu_{jf} \frac{\partial d_{jf}}{\partial c_j} = 0 \text{ for } j = 1, 2 \tag{A1}$$

$$\frac{\partial L}{\partial \ell_{1f}} = -n_1 \frac{\partial u_1}{\partial z_{1f}} + \gamma n_1 w^l - \mu_{1f} \frac{\partial d_{1f}}{\partial \ell_{1f}} = 0 \tag{A2}$$

$$\frac{\partial L}{\partial \ell_{2f}} = -n_2 \frac{\partial u_2}{\partial z_{2f}} + \gamma n_2 w^h - \mu_{2f} \frac{\partial d_{2f}}{\partial \ell_{2f}} = 0 \tag{A3}$$

$$\begin{aligned} \frac{\partial L}{\partial \ell_{1m}} &= -n_1 \left[\frac{\partial u_1}{\partial z_{1m}} + \rho_1 \left[\ell_{1m} - \overline{\ell_m} \right] \right] + \gamma n_1 w^h - \mu_{1f} \frac{\partial d_{1f}}{\partial \ell_{1m}} \\ &\quad + \sum_j n_j \rho_j \left[\ell_{jm} - \overline{\ell_m} \right] \beta_l = 0 \end{aligned} \tag{A4}$$

$$\begin{aligned} \frac{\partial L}{\partial \ell_{2m}} &= -n_2 \left[\frac{\partial u_2}{\partial z_{2m}} + \rho_2 \left[\ell_{2m} - \overline{\ell_m} \right] \right] + \gamma n_2 w^l - \mu_{2f} \frac{\partial d_{2f}}{\partial \ell_{2m}} \\ &\quad + \sum_j n_j \rho_j \left[\ell_{jm} - \overline{\ell_m} \right] (1 - \beta_l) = 0 \end{aligned} \tag{A5}$$

$$\frac{\partial L}{\partial d_{1f}} = \mu_{1f} + \sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f} \right] \beta_d - \sum_j \mu_{jf} \frac{\partial d_{jf}}{\partial \overline{d_f}} \beta_d = 0 \tag{A6}$$

$$\frac{\partial L}{\partial d_{2f}} = \mu_{2f} + \sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f} \right] (1 - \beta_d) - \sum_j \mu_{jf} \frac{\partial d_{jf}}{\partial \overline{d_f}} (1 - \beta_d) = 0 \tag{A7}$$

$$\frac{\partial L}{\partial d_{1m}} = \mu_{1m} = 0 \tag{A8}$$

$$\frac{\partial L}{\partial d_{2m}} = \mu_{2m} = 0. \tag{A9}$$

In equations (A6) and (A7), we have used the first order condition for women's household work, i.e. equation (7). Similarly, in equations (A8) and (A9), we have used the first order condition for men's household work given in equation (6). Since there are no externalities associated with d_{1m} and d_{2m}, household choices give the outcome preferred by the government, which explains why $\mu_{1m} = \mu_{2m} = 0$.

The first order conditions obeyed by the paternalist government can be written as

$$\frac{\partial L}{\partial c_j} = n_j \frac{\partial u_j}{\partial c_j} - \gamma n_j - \mu_{jf} \frac{\partial d_{jf}}{\partial c_j} = 0 \text{ for } j = 1, 2 \tag{A10}$$

$$\frac{\partial L}{\partial \ell_{1f}} = -n_1 \frac{\partial u_1}{\partial z_{1f}} + \gamma n_1 w^l - \mu_{1f} \frac{\partial d_{1f}}{\partial \ell_{1f}} = 0 \tag{A11}$$

$$\frac{\partial L}{\partial \ell_{2f}} = -n_2 \frac{\partial u_2}{\partial z_{2f}} + \gamma n_2 w^h - \mu_{2f} \frac{\partial d_{2f}}{\partial \ell_{2f}} = 0 \tag{A12}$$

$$\frac{\partial L}{\partial \ell_{1m}} = -n_1 \frac{\partial u_1}{\partial z_{1m}} + \gamma n_1 w^h - \mu_{1f} \frac{\partial d_{1f}}{\partial \ell_{1m}} = 0 \tag{A13}$$

$$\frac{\partial L}{\partial \ell_{2m}} = -n_2 \frac{\partial u_2}{\partial z_{2m}} + \gamma n_2 w^l - \mu_{2f} \frac{\partial d_{2f}}{\partial \ell_{2m}} = 0 \tag{A14}$$

$$\frac{\partial L}{\partial d_{1f}} = \mu_{1f} + n_1 \kappa_1 \left[d_{1f} - \overline{d_f} \right] - \sum_j \mu_{jf} \frac{\partial d_{jf}}{\partial \overline{d_f}} \beta_d = 0 \tag{A15}$$

$$\frac{\partial L}{\partial d_{2f}} = \mu_{2f} + n_2 \kappa_2 \left[d_{2f} - \overline{d_f} \right] - \sum_j \mu_{jf} \frac{\partial d_{jf}}{\partial \overline{d_f}} (1 - \beta_d) = 0 \tag{A16}$$

$$\frac{\partial L}{\partial d_{1m}} = \mu_{1m} = 0 \tag{A17}$$

$$\frac{\partial L}{\partial d_{2m}} = \mu_{2m} = 0 \tag{A18}$$

in which we have used the first order condition for women's and men's household work, as given in equations (7) and (6).

Derivation of equations (14), (15), (32) and (33)

To derive equation (14), take the derivative of equation (13) with respect to $\overline{d_f}$. This gives

$$\frac{\partial L}{\partial \overline{d_f}} = \sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f}\right] - \sum_j \mu_{jf} \frac{\partial d_{jf}}{\partial \overline{d_f}}. \tag{A19}$$

Then, use equations (A6) and (A7) to solve for μ_{1f} and μ_{2f} such that

$$\mu_{1f} = \frac{-\sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f}\right] \beta_d}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d)}, \tag{A20}$$

$$\mu_{2f} = \frac{-\sum_j n_j \kappa_j \left[d_{jf} - \overline{d_f}\right] (1 - \beta_d)}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d)} \tag{A21}$$

and substitute into equation (A19). Finally, use that $\partial L / \partial \overline{d_f} = \partial W / \partial \overline{d_f}$ and rearrange to obtain equation (14).

Equation (32) is derived similarly by taking the derivative of equation (31) with respect to $\overline{d_f}$ and the substituting for μ_{1f} and μ_{2f}, while using

$$\mu_{1f} = \frac{n_1 \kappa_1 \left[d_{1f} - \overline{d_f}\right] \left[\frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d) - 1\right] - n_2 \kappa_2 \left[d_{2f} - \overline{d_f}\right] \frac{\partial d_{2f}}{\partial \overline{d_f}} \beta_d}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d)}, \tag{A22}$$

$$\mu_{2f} = \frac{n_2 \kappa_2 \left[d_{2f} - \overline{d_f}\right] \left[\frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - 1\right] - n_1 \kappa_1 \left[d_{1f} - \overline{d_f}\right] \frac{\partial d_{1f}}{\partial \overline{d_f}} (1 - \beta_d)}{1 - \frac{\partial d_{1f}}{\partial \overline{d_f}} \beta_d - \frac{\partial d_{2f}}{\partial \overline{d_f}} (1 - \beta_d)} \tag{A23}$$

from equations (A15) and (A16).

Equations (15) and (33) are obtained directly by taking the derivative of equation (13) and (31), respectively, with respect to $\overline{\ell_m}$.

Proof of Lemmas 1 and 2

To derive equation (19), first note that equations (14) and (A20) imply

$$\mu_{1f} = -\beta_d \frac{\partial L}{\partial \overline{d_f}}. \tag{A24}$$

Next, solve equation (A1) for $n_1\ \partial u_1/\partial c_1$ and equation (A2) for $n_1\ \partial u_1/\partial z_1$. Dividing the latter expression by the former, while using $MRS_{1f} = (\partial u_1/\partial z_{1f})/(\partial u_1/\partial c_1)$ together with equation (A24) gives

$$MRS_{1f}\left(\gamma n_1 - \beta_d \frac{\partial W}{\partial \overline{d_f}} \frac{\partial d_{1f}}{\partial c_1}\right) - \gamma n_1 w^l - \beta_d \frac{\partial W}{\partial \overline{d_f}} \frac{\partial d_{1f}}{\partial \ell_{1f}} = 0$$

in which we have utilized $\partial L/\partial \overline{d_f} = \partial W/\partial \overline{d_f}$. Finally, using equation (17) and the household's first order condition for ℓ_{1f}, i.e. $w_{1f} - MRS_{1f} = T'_{1f} w_{1f}$, gives equation (19). Equations (20), (21) and (22) can be derived by analogous procedures.

Equation (34) is derived in the same general way as equation (19) by noticing that equation (32) and (A22) imply $\mu_{1f} = -\beta_d(\partial L/\partial \overline{d_f}) - n_1\kappa_1 \left[d_{1f} - \overline{d_f}\right]$, and then using equations (A10) and (A11) in the same ways as we used equations (A1) and (A2) above. The derivation of equation (35), (36) and (37), respectively, is also analogous to the corresponding procedure in the welfarist case.

References

Aronsson, T. and Sjögren, T. (2010) Optimal income taxation and social norms in the labor market, International Tax and Public Finance 19 (1), 67-89.

Becker , G. (1981) A Treatise on the Family. Cambridge, MA: Harvard University Press.

Berardo, D. H., Shehan, C. L. and Gerald, R. L. (1987) A Residue of Tradition: Jobs, Careers, and Spouses' Time in Housework, Journal of Marriage and Family 49, 381-390.

Bianchi, S., Milkie, M., Sayer, L., and Robinson, J. (2000). Is Anyone Doing the Housework? Trends in the Gender Division of Household Labor. Social Forces 79, 191–228.

Brett, C. (2007) Optimal Nonlinear Taxes for Families, International Tax and Public Finance 14, 225–261.

Cremer, H., Lozachmeur, J. and Pestieau, P. (2007) Income Taxation of Couples and the Tax Unit Choice, CORE Discussion Paper No. 2007/13.

Geist, C. (2005) The welfare state and the home: Regime differences in the domestic division of labour, European Sociological Review 21 (1), 23-41.

Gershuny, J. and Sullivan, O. (2003) Time use, gender, and public policy regimes, Social Politics 10 (2), 205-228 .

Greenstein, T. (1996) Husbands' participation in domestic labor: Interactive effects of wives' and husbands' gender ideologies, Journal of Marriage and the Family 58 (3), 585-595.

Kleven, H. J., Kreiner, C. T. and Saez, E. (2009), The Optimal Income Taxation of Couples. Econometrica 77, 537–560.

Perrucci, C. C., Potter, H. R. and Rhoades, D. L. (1978) Determinants of male family role performance, Psychology of women quarterly 3, 53-66.

Ross, C. (1987) The Division of Labor at Home, Social Forces 65 (3), 816-833.

Sandmo, A. (1980) Anomaly and Stability in the Theory of Externalities, The Quarterly Journal of Economics 94 (4), 799-807.

Schroyen, F. (2003) Redistributive Taxation and the Household: The Case of Individual Filings, Journal of Public Economics 87, 2527–2547.

Sullivan, O. (2000) The Division of Domestic Labour: Twenty Years of Change? Sociology 34, 437-456.

U.S. Bureau of Labor Statistics (2010) American time use survey – 2009 results, USDL-10-0855, US Departement of Labor.