The Service Sector and Female Market Work: Europe vs US*

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ABSTRACT

This paper studies cross-country differences in female employment and aggregate labor market hours over time, by quantifying the role of structural transformation and gender differences in sectoral labor productivity. Some countries have developed large service sectors, while others have not. These sectoral patterns can explain a large part of the cross-country differences in female employment and aggregate hours worked. Empirical evidence on why women predominately work in the service sector is provided. Consistent with previous studies, labor and consumption tax differences are able to explain large sectoral differences across countries. The key is households can produce a substitute for market services and women are, on average, less productive in sectors requiring more brawn, such as industry, giving them a comparative advantage to stay at home and work in the service sector. Therefore, an economy that imposes high taxes does not facilitate the movement of women into the labor market, causing service production to remain at home. This reduces the demand for market services, which feeds back into low total hours worked by women (and the total economy). Subsidies to female employment can circumvent the high tax effect, but lead to welfare loses.

Keywords: technological progress, sectoral labor allocation, cross-country differences, female labor supply, labor demand/supply, taxation.

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1 Introduction

Cross-country differences of hours worked in OECD countries since 1960 has been studied extensively. Tax differences are often posited as the main force leading to discrepancies in cross-country hours worked (Prescott, 2004), productivity differences (Rogerson, 2008), and the substitution of market to home production (Ragan, 2006; Rogerson, 2008; Olovsson, 2009). This research models the household as a single representative agent. However, McDaniel (2010) finds that changes in market work and home production vary to a large extent when disaggregated by sex, after analyzing time-use survey data across developed countries. This fact is particularly interesting in the context of one of the greatest phenomena of the 20th century, the rise in female labor force participation. This phenomena, however, has not been uniform, with Continental Europe experiencing a smaller rise in formal female employment compared with the US or the Nordic countries.\footnote{Given data availability, this study compares Germany, Sweden, and the US.}

The goal of this paper is to quantify the importance of sectoral labor reallocation and productivity differences in the rise of female employment and cross-country differences in aggregate hours worked.

To explain the large cross-country female employment differences, and its correlation with the service sector size, empirical evidence giving weight to a demand side (technology) story is provided. As with prior research, the model quantifies the importance of taxation and productivity in explaining aggregate hours worked. While there is a large body of related literature, the present exercise is useful for various reasons. Bick and Fuchs-Schündeln (2012) focus on a large set of countries to explain contemporaneous labor supply differences through taxes and Ngai and Petrongolo (2012) focus on the long run trends in the US and changes in structural transformation. Here both these topics are combined. Focusing on tax differences, structural transformation, and the entrance of women into the labor force in one model allows us to disentangle the contribution of each these facts in the fall (rise) of total hours worked, the size of the service sector, and gender employment differences.

Recent research has concluded that differences in total employment have come from a falling goods sector’s (industry and agricultural sector) employment share relative to the US and higher income tax rates (see Rogerson, 2008). While tax rates have increased in all of the developed
world since 1960, Continental Europe generally employs much higher tax rates, shifting hours from the market to the home. In contrast, Scandinavia has high taxes, but subsidizes market services such as childcare and elderly care. Some of the subsidies in Scandinavia are specifically target at working mothers, with generous maternity leave and comprehensive childcare. In productivity differences, Continental Europe has a substantially smaller service sector. The correlation between relative female employment change and aggregate service employment is around 0.82 from the 1980s onward for a large set of OECD countries (Rogerson, 2005). Rogerson (2008) finds when comparing aggregate employment between the US and Europe, most of the discrepancy is accounted for by differences in service sector employment. While there are small employment differentials in industry (slightly positive), Europe has an employment differential in services of -9.4 percent in the mid-1950s and -15.5 percent in 2000 compared to the US. Rendall (2010) provides empirical results for the United States showing that job requirements have shifted from physical attributes toward intellectual attributes since WWII, benefiting women through greater job opportunities, higher wages and increasing returns to education. A large portion of the decrease in physical requirements is due to a shift toward services, and away from heavy manufacturing, agriculture and mining.

This study develops a general equilibrium model based on the following three facts regarding the US, German and Swedish labor supply and sectoral labor allocation over time specifically.\(^2\)

1. Service sector employment has increased in all developed countries. While Sweden and the US have similar employment trends, a sizable gap with Germany persists.

2. American women’s labor force participation, age 15-64, rose from about 40 to 67 percent from 1960 to 2000. Sweden also has large female employment rates of 71 percent in 2000. However, Germany’s female employment has only risen to 58 percent.

3. American men’s labor force participation age 15-64, fell from about 82 to 78 percent from 1960 to 2000. The fall in Germany was 20 percentage points and 17 in Sweden.

Figure 1 provide trends over time in relative sectoral hours and aggregate hours. Female hours have off-set the fall in the of men’s working hours in the US and Sweden, but not in Germany.

\(^2\)Figures on employment rates are taken from the OECD database. Sectoral labor allocations are taken from the Groningen Growth and Development Centre 10-Sector database and EU KLEMS Database.
Given the empirical evidence, a general equilibrium model is developed to understand the evolution of female and male employment within the broad rise of the service sector. Men are assumed to have equal productivity across all sectors, while women’s average productivity in each sector is taken from wage gap data. Similar to Ngai and Pissarides (2008), households allocate time between the home and labor market, and choose consumption over three types of goods: market produced services, market produced goods and home produced goods/services. The model has two key assumptions. Similar to Rogerson (2008), households can produce a substitute for market produced services (e.g., childcare, elderly care, meals) using home production technology and labor time. Second, given US and European wage gap estimates, women have higher productivity in the service sector. Therefore, women generally prefer working in the service economy where occupations neither require great physical strength nor have adverse working environments.

In combining both taxes and structural transformation effects over time some simplifications are made compared to Bick and Fuchs-Schündeln (2012) and Ngai and Petrongolo (2012). While the former model different tax issues (e.g., average versus marginal) in detail, this paper uses representative households and an average tax measure. Ngai and Petrongolo (2012) model an endogenous wage gap to determine the quantitative contribution of structural change to female employment.
and wages. They find structural change can only explain a small part of the rise in female wages. Here, the closing wage gap is taken as exogenous, whether it is due to compositional effects, i.e., human capital as in Ngai and Petrongolo (2012), or a fall in discrimination. These simplifications allow the model to highlight the differences that have pushed women into the labor market. Most of the literature accounting for the rise in female labor force participation has focused on supply driven stories, i.e., improvements in home technology, such as the invention and marketization of household appliances (see, for example, Greenwood, Seshadri, and Yorukoglu, 2002, and references therein), the improvements in baby formulas (see Albanesi and Olivetti, 2006), rising female wages (see Jones, Manuelli, and McGrattan, 2003) and returns to experience (see Olivetti, 2006), or the effects of cultural, social, and intergenerational learning on labor supply (see Fernandez, 2007; Fogli and Veldkamp, 2007). Here, the rise in female labor force participation is driven by changes in market productivity (a shrinking wage gap) due to sectoral reallocation, changes in home productivity, and differences in taxes and subsidies.

The model is calibrated to match the growth experience of the US from 1960 to 2000. This study initially quantifies how much of the rise in female employment can account for the rise in the service sector, and how important structural change versus the closing gender gap is in accounting for the rise in female employment. Using the calibrated economy of the US, the higher tax implication can be analyzed. That is, how much would female employment have grown in the US with German style taxes and how large would the service sector have been? Furthermore, the differences between the US (low taxes) and the Swedish systems (high taxes and subsidized market services) with respect to social welfare losses are assessed in the context of the model by setting a subsidy to services, which is tied to women’s labor force participation, that matches female employment levels in the US.

From the features of woman’s sectoral productivity and home substitution, a rich set of dynamic results are presented, which are capable of generating both a convergence in female and male labor market outcomes and a rise in the service sector, if taxes remain low. That is, an economy that does not initially facilitate the movement of women into the labor market by, for example, imposing high taxes without the social benefits tied to working women in Scandinavia (e.g., subsidized full-day child care, elderly care) causes the production of services to remain in the home. As a
result, women do not enter the workforce and the growth of the service sector outside the home is considerably slowed. About half of the rise in service sector employment in the US is explained by the feedback effect of more women entering the labor market. Working women produce less services at home and, therefore, purchase more market services, increasing the demand for services. The high-tax Scandinavian system generates equally large female employment rates and service sector employment, but with a larger welfare cost compared to the US, through a tax-subsidy distortion.

As women’s productivity across sectors and changes in labor demand are the key motivations within this study, Section 2 provides a brief summary on the changing labor market. The general equilibrium model is outlined in Section 3, and Section 4 provides analytical results of productivity growth on labor supply, wages, and sectoral labor shares. Section 5 discusses the estimation and calibration procedure, and presents labor market trends across regions resulting from differences in taxation and work subsidies. Section 7 concludes.

2 Labor Market Requirements

In a related paper (see for details Rendall, 2010), job characteristics by the US census occupation and industry classifications from the 1977 Fourth Edition Dictionary of Occupational Title (DOT) and the 1991 Revised Fourth Edition Dictionaries of Occupational are reduced using principle component analysis to summarize aggregate labor market requirements. The 1977 and 1991 DOT were developed by the US Department of Labor, who evaluated approximately 40 job requirements for more than 12,000 occupations, documenting: (1) general educational development; (2) specific vocational training; (3) required working aptitudes; (4) temperaments or adaptability requirements; (5) physical strength requirements; and (6) environmental conditions. For example, general educational development measures the formal and informal educational attainment required to preform a job effectively by rating reasoning, language and mathematical development. Each reported level is primarily based on curricula taught in the US, where the highest mathematical level is advanced calculus, and the lowest level only requires basic operations, such as adding and subtracting two-digit numbers. Specific vocational preparation is measured in the number of years a typical employee requires to learn the job tasks essential to perform at an average level. Eleven
aptitudes required of a worker (e.g., general intelligence, motor coordination, numerical ability) are rated on a five point scale. Ten temperaments required of a worker are reported in the DOT, where the temperament type is reported without any numerical rating. An example of a temperament is the ability to influence people in their opinions or judgments. Physical requirements include a measure of strength required on the job, rated on a five point scale from sedentary to very heavy, and the presence or absence of tasks such as climbing, reaching, or kneeling. Lastly, environmental conditions measure occupational exposure (presence or absence) to environmental conditions, such as extreme heat, cold and noise.

Factor analysis or principal component analysis, similarly to Ingram and Neumann (2006), reduces the dimensionality of DOT job characteristics. That is, using principal component analysis, a linear relationship between normally distributed broad skill categories and the DOT characteristics is estimated from the associated correlation matrix. Using maximum likelihood estimation methods, three factors (brain, brawn and motor coordination), are determined to be sufficient in capturing the information contained in the 1977 and 1991 DOT characteristics. The aggregate factors are merged with the 1960 US Census data and the 1968 to 2000 Current Population Survey (CPS) data. Figure 2, which plots all 1977 occupational brain and brawn combinations by sector in 1970, clearly depicts the difference in brain and brawn requirements across sectors. Similarly, Goldin (1990) observes that as far back as the 1920s/1930s women made work choices based on the level of brawn required, which usually meant women preferred service sector jobs.

Clerical work was cleaner and less strenuous than manufacturing work ... It is understandable why young women preferred office work and why the growth of the clerical sector would lead to the continued employment of women after marriage and childbearing. ... If the considerable difference in the earnings of males and females in manufacturing was largely due to rewards to strength, then the replacement of brain for brawn work should have evened starting salaries. ... Although the difference in starting salaries implied by the earnings functions between unmarried male and female clerical workers

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3 For details on the estimation see Rendall (2010).
4 Census and CPS data is obtained from the IPUMS-USA (Ruggles, Alexander, Genadek, Goeken, Schroeder, and Sobek, 2010) and the IPUMS-CPS project (King, Ruggles, Alexander, Flood, Genadek, Schroeder, Trampe, and Vick, 2010).
Figure 2: Occupation Factor Requirements by Sector

was negligible, it was 47% in manufacturing. Extract from Goldin, Understanding the Gender Gap (1992) pp. 108-109

This evidence gives strong support to the hypothesis of productivity differences across sector employment rather than overall labor market discrimination. Decomposing gender wage gaps across sectors and countries provides further evidence of women’s higher productivity in the service sector. Figure 3 graphs US median female wages by sector relative to median male wages in the economy of individuals working at least 1,400 hours per year. The wage gap in services is consistently smaller from 1968 to 2000. The difference between the service and industrial gap averages around 7.2 percentage points.\(^5\) The gender gap closes similarly for both sectors, which could explain why structural change alone can only explain a small share of the closing wage gap. Cross-country results from the GGDC EU KLEMS datasets provide similar results. The EU KLEMS data provides hours information and labor compensation by aggregate age and education groups. The data only exists for Germany post-1990 (Sweden is not available). The wage gap differences between the service and

\(^5\)The wage gap in agriculture shows large fluctuations across time given the small number of observations, especially of women. Since, the female labor share in agriculture is close to zero, the results are omitted here.
industrial sector for middle skilled individuals aged 15 to 29 in Germany is on average 6.9, similar to the magnitude in the US. The general patterns hold for the older cohorts and other education groups as well. However, middle skilled individuals account for the bulk of German labor force.

3 General Equilibrium Model

The simulated economy consists of a representative two person household, a man and a woman; two competitive production sectors, industry and services; and a government. Labor reallocation is driven as in Rogerson (2008); Duarte and Restuccia (2010), by both non-homothetic preferences and differential sectoral productivity growth.

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6The rise in labor force participation was considerably greater for married women, thus the analytical model focuses on two person households. Adding single households does not result in further dynamics within the model, and does not affect any of the qualitative results. The simulation results will add single households to match the quantitative targets.
3.1 Government

The government, who solves a balanced budget, taxes individuals labor income at rate, $\tau$ (yielding the underlying cross-country differences over time). Tax revenues are rebated to households as a lump-sum transfer, $T$. The government also provides price subsidizes on market services, $v$, and/or rebates service goods indexed to women’s labor supply as in Ragan (2006), $\phi$.

$$\tau(w_{m,t}h_{m,t} + w_{f,t}h_{f,t}) = T_t + v_p s_t c_{s,t} + \phi h_{f,t},$$

where $w_{m,t}, w_{f,t}$ are male and female wages detailed below and $h_{m,t}, h_{f,t}$ are the respective labor supplies.

3.2 Production

The competitive sectors only use labor to produce final services and industrial goods $\{Y_s, Y_i\}$. By assumption, women are less productive in producing industrial goods than services (services require less brawn). Moreover, women also face “general” discrimination, that is, women’s productivity levels are $\{\tau_i, \tau_s\}$, where $\tau_i < \tau_s \leq 1$. The final sectoral output is linear in labor,

$$Y_{j,t} = A_{j,t} L_{j,t} \text{ for } j = i, s$$

where $L_{j,t}$ is aggregate labor supply and $A_{j,t}$ is total factor productivity for each sector $j$. Therefore, normalizing wages to one, relative prices are proportional to total factor productivity $p_{j,t} = \frac{1}{A_{j,t}}$.

3.3 Household Preferences

Household members are indexed with the subscripts $g \in \{f, m\}$ for their gender. The only difference between gender is their market productivity. There is no bargaining in the households and households solve a unitary utility $u(C, L)$, by allocating labor time of both agents to the market, home production, and leisure; purchasing goods, $c_i$, and services, $c_s$, in the market; and producing home produced service-substitutes at home, $c_n$. Since, there is no inter-temporal decision, the model
is a time-sequence of static maximization problems of,

$$\max_{\{c_{i,t}, c_{s,t}, h_{m,t}, h_{f,t}, n_t\}} \log (C_t) + \psi \frac{\ell_{t}^{1-\sigma}}{1-\sigma}$$

(3)

s.t.

$$p_{i,t}c_{i,t} + (1-v)p_{s,t}c_{s,t} = (1-\tau)(w_{m,t}h_{m,t} + w_{f,t}h_{f,t}) + T_t,$$

(4)

$$1 = h_{m,t} + n_{m,t} + \ell_{m,t},$$

(5)

$$1 = h_{f,t} + n_{f,t} + \ell_{f,t},$$

(6)

$$n_t = n_{m,t} + n_{f,t}.$$  

(7)

where $C$ is the consumption composite of services and goods (suppressing time subscripts), i.e.,

$$C = (a_{i}c_{i} + (1-a_{i})F(\hat{c}_{s}, c_{n})^{\frac{1}{\sigma}},$$

(8)

where $F(\hat{c}_{s}, c_{n})$ is the service composite, i.e.,

$$F(\hat{c}_{s}, c_{n}) = (a_{c}(c_{s} + \phi h_{f})^{\eta} + (1-a_{c})c_{n}^{\eta})^{\frac{1}{\eta}},$$

(9)

where $\hat{c}_{s} = c_{s} + \phi h_{f}$ are the total market purchased services, both privately and rebated by the government for female hours worked. Home production is linear in labor $c_{n} = A_{n}n$. Leisure of spouses are assumed to be perfectly complimentary, i.e., husbands and wives prefer spending time together when not engaged in work.\(^7\)

### 3.4 Wages

Since women always prefer to work in services, the simulation assumes that only a fraction $\lambda_t = \gamma \frac{h_{i,t}}{h_{t}}$ of women find employment in the service sector, where $\frac{h_{i,t}}{h_{t}}$ is employment share in industry for the economy at time $t$. Finding an industry job is more likely when the industry sector

\(^7\)The single household problem is identical, except for leisure, where leisure is enjoyed by the single agent alone.
is larger. Since wages are normalized to one, and men have equal productivity in all sectors, the wage gap equals,

\[ \text{Gap} = \frac{\tau_s h_{s,t} + \tau_i h_{i,t}}{h_{s,t} + h_{i,t}}, \]  

(10)

where \( h_{s,f,t} \) are hours worked of women that have wages \( w_{f,t} = \tau_s \) and work in the service sector, and \( h_{i,f,t} \) are hours worked of women that have wages \( w_{f,t} = \tau_i < \tau_s \) and work in the industrial sector.

### 3.5 Decentralized Equilibrium

An equilibrium, given productivity \( \{\tau_{s,t}, \tau_{i,t}\} \), market prices \( \{p_{i,t}, p_{s,t}\} \), and government prices \( \{\tau, v, \phi\} \), consists of the time path of households’ allocation \( \{c_{i,t}, c_{s,t}, h_{m,t}, h_{f,t}, n_t\} \), firm output \( \{Y_{i,t}, Y_{s,t}\} \) and government allocation \( \{T_t\} \) such that for all \( t \):

1. \( \{c_{i,t}, c_{s,t}, h_{m,t}, h_{f,t}, n_t\} \) solves the Household Problem (3);

2. \( \{T_t\} \) solves the government problem (1);

3. Markets clear, with
   a) The labor market, \( L_{j,t}^s = L_{j,t}^d \) for \( j = i, s \); and
   b) The goods market, \( c_{j,t} = Y_{j,t} \) for all \( j = i, s \).

### 4 Analytical Results

The firm’s problem is straightforward. Technical change in terms of total factor productivity, a rise in \( \frac{A_{i,t}}{A_{s,t}} \), leads to a fall in relative goods to service prices.

### 4.1 Household Optimization

For a household, the problem is similar to Ngai and Pissarides (2008). Specifically, the household problem can be solved in steps. The household solves three intertemporal choices, starting with the service consumption decision, proceeding to the goods consumption decision, and ending with the
leisure decision. Since men have a comparative advantage in the labor market, household members specialize, with the man entering the labor market first. As such, we will only analyze the case of $n_m = 0$, i.e., women spend at least a fraction of their time in the labor market. Time subscripts are omitted for all intertemporal decisions.

**Composite Service Consumption**

Households choose time to be allocated to home production, $n$, in maximizing (9) s.t. (4). The resulting first order condition can be summarized in terms of relative market services to home services,

$$\hat{c}_s \equiv \frac{c}{c_n} = \left(\frac{a_s}{1-a_s} \left(\frac{p_n}{(1-v)p_s} + \frac{p_n}{A_n}\right)\right)^{\frac{1}{1-\eta}},$$

(11)

where $p_n$ is an implicit home production price $p_n = \frac{w(1-\tau)}{A_n}$. As in Ngai and Pissarides (2008), services are “marketized” if $\hat{c}_s$ rises. The comparative statics for the “marketization” of services, if market and home services are gross substitutes, $0 < \eta < 1$, can be summarized as follows:

- $\frac{\partial \hat{c}_s / c_n}{\partial \tau} < 0$, that is, higher taxes discourage market work;

- $\frac{\partial \hat{c}_s / c_n}{\partial \tau_f} > 0$, higher brain demand encourages female market work ($\tau_f = 1(s=1)\tau_s + 1(s=0)\tau_i$);

- $\frac{\partial \hat{c}_s / c_n}{\partial \phi} > 0$, governments subsidies, e.g., on childcare for working mothers, encourages female market work; and

- $\frac{\partial \hat{c}_s / c_n}{\partial w / (1-v)p_s} > 0$, a fall in service prices through subsidies or technological progress through higher wages, encourages female market work.

**Composite Consumption/Industrial Goods Consumption**

Next households maximize (8), the final composite consumption, by choosing $c_i$. The first order condition can be summarized as relative market service to goods consumption,

$$\hat{c}_s \equiv \frac{c}{c_i} = \left(\frac{1-a_i}{a_i} \frac{p_i}{(1-v)p_s} \frac{p_n}{c_n} \left(\frac{\hat{c}_s}{F(\hat{c}_s, c_n)}\right)\right)^{\frac{1}{\eta}}.$$

(12)

$^8$The case with $n_m > 0$ is very similar, however, the implicit home production price will be different in the two cases.
Again, we can look at the comparative statics with respect to the key parameters. If services and goods are gross compliments, $\epsilon < 0$ and service types are substitutes, $0 < \eta < 1$:

- $\frac{\partial \hat{c}_s}{\partial c_i} > 0$, more service marketization leads to rise in relative market service consumption as $\frac{\eta - \epsilon}{1 - \epsilon} > 0$;

- $\frac{\partial \hat{c}_s}{\partial \tau} < 0$, higher taxes, lead to lower service marketization and, therefore, relatively less market service consumption (indirect effect through lower marketization, similarly this will be true for a smaller brain demand);

- $\frac{\partial \hat{c}_s}{\partial \phi} > 0$, again through the indirect effect of marketization, the government can artificially increase the relative service demand; and

- $\frac{\partial \hat{c}_s}{\partial v} > 0$, with a price subsidy on all service goods, the government can increase the relative services demand even further, through both an indirect effect through marketization and a direct price effect.

To summarize the comparative statics between different government actions, if a price subsidy is equivalent to the work subsidy, and the government only employs one at a time. The relative service share will be largest with the price subsidy and smallest without any subsidy, assuming the same tax rate for all economies, i.e.,

\[
(\frac{\hat{c}_s}{c_i})_{\{v>0,\phi=0\}} > (\frac{\hat{c}_s}{c_i})_{\{v=0,\phi>0\}} > (\frac{\hat{c}_s}{c_i})_{\{v=0,\phi=0\}}.
\]

In conclusion, large taxation will lead to a smaller service sector, as fewer women participate in the formal labor market and less services are marketized. The government can affect the relative sector demands by subsidizing consumption of services. However, a subsidy tied to women working is less powerful.

**Leisure**

To conclude the intertemporal choices of the household, individuals choose leisure by maximizing (3). The first order condition can be described in terms of relative leisure to consumption,

\[
\frac{\ell^a}{C} = \frac{1 - a_c}{a_c a_t} \frac{p_t}{w(1 - \tau)(2 - \tau^f) + (1 - v)p_s o \left(\frac{c_i}{C}\right)^{1 - \epsilon}}
\] (13)
where $\ell = \ell^m = \ell^f$. Leisure is greater with government price and work subsidies given equal tax rates. The Frisch elasticity of labor, is governed by $\sigma$, which is $\eta^i = \frac{\ell^i}{\sigma N^i}$ for individual type $i$.

### 4.2 Sectoral Labor Shares

Using market clearing, household allocation, and assuming women only work in services, $\lambda = 1$, labor shares in the economy are as follows,

$$
\frac{L_s}{L_i} = \frac{\hat{c}_s p_s}{c_i p_i} = \left( \frac{1 - a_i}{a_i} \frac{a_s}{(1 - v)} \left( \frac{\hat{c}_s}{F(\hat{c}_s, c_n)} \right)^{\frac{\eta - \epsilon}{\eta}} \right)^{\frac{1}{1 - \epsilon}} \left( \frac{A_s}{A_i} \right)^{\frac{\epsilon}{1 - \epsilon}} \tag{14}
$$

The labor share of services rise, with a faster relative productivity growth in industry, given $\epsilon < 0$. Moreover, marketization leads to a rise in service labor shares. Therefore, a rise in female wages leads to a rise in female employment and higher marketization, which ultimately translates into a rise in service sector employment.

In summary, this section shows that larger government taxation leads to a smaller service sector and less female labor force participation. Less female labor force participation in turn leads to a smaller service sector. In addition, low female wages also lead to less female employment and less service employment. Governments can increase female labor force participation, and, therefore, also the service labor share, by subsidizing female employment or the purchase of services. Subsidizing female employment through a rebate in services has the added effect of increasing service employment, e.g., more childcare facilities do not only provide services for households, but also employment opportunities for women.

### 5 Calibration

The model is calibrated to US tax rates and initial conditions are then adjusted to account for differences between Germany and the US. It is assumed that the US has reached its steady state by 2000 (there is evidence of flattening female labor force participation and gender wage difference in
Table 1: Tax Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>USA</th>
<th>DEU</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>28.43</td>
<td>39.32</td>
<td>30.80</td>
</tr>
<tr>
<td>2000</td>
<td>41.26</td>
<td>58.17</td>
<td>60.59</td>
</tr>
<tr>
<td>∆2000–1960</td>
<td>12.83</td>
<td>18.85</td>
<td>29.79</td>
</tr>
</tbody>
</table>

the last few years). Therefore, the results simulate two steady states in 1960 and 2000.

Tax rates are taken from McDaniel (2007). All three regions have seen rising tax rates over time. The increase has been larger in Europe. Average tax rates are computed using both income and consumption tax rates, i.e.,

$$\tau = 1 - \frac{1 - \tau_h}{1 + \tau_c},$$  \hspace{1cm} (15)

where $\tau_h$ is the sum of the average tax rate on household income and the average payroll tax rate, including both taxes paid by employer and employee, and $\tau_c$ is the average tax on consumption expenditures. Table 1 summarizes the tax rates from each region in 1960 and 2000.

Table 2 summarizes the calibrated parameters. The parameter governing the elasticity of substitution between home and market services, $\eta$, and the elasticity between goods and services, $\epsilon$, are taken from previous studies. Various studies have estimated $\eta$ on microeconomic and macroeconomic data. The resulting elasticities vary from 1.60 to 2.00 by Rupert, Rogerson, and Wright (1995), depending on whether households are married, single females or single males, to 2.30 by Chang and Schorfheide (2003). Aguiar and Hurst (2007) find an elasticity of 1.80, which implies an $\eta$ of 0.45, which is used in this calibration. Ngai and Pissarides (2008) suggest that, given price elasticities of the entire service sector of $-0.30$ to $-0.06$, in a model with home production the elasticity of 0.30 should be an upper bound, implying a value of $\epsilon = -2.30$, which is used in the calibration below.

Women’s sectoral productivity are taken from 3. Since the results do not control for selection effects, all country simulations use the same wage gap. Moreover, OECD data (see 4) shows the gender wage gap to be virtually identical in 2000 between the the US and Germany. Ngai and Petrongolo (2012) explain 6.5 percent of the closing wage gap because of a larger increase in human
capital of women compared to men. Here, the closing wage gap in both sectors takes as given the relative increase in human capital by women (only a representative household is modeled). The results below are for a wage gap difference of 7.2 percentage points. In some cases, using the EU KLEMS database yields a gap larger than 15 percentage points, therefore, the US gap of 7.2 is conservative. The fraction of two-person households is taken from CPS estimates. In 1960, 71.7 percent of the population lived in a two-person household and in 2000 the number falls to 55.3 percent. These estimates are likely a lower bound for 2000, since cohabitation is substantial and the model requires no distinction between marriage and cohabitation.

Productivity in all sectors is set to one in 1960, \( \{A_i1960 = A_s1960 = A_n1960 = 1\} \), since consumption share parameters \( \{\psi, \psi_s, a_i, a_s\} \) can be adjusted to account for relative productivity differences. Productivity growth rates are computed using value add by sector over time. Home productivity \( g_n \)

Table 2: *Calibrated Parameter Values*

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>( \epsilon )</th>
<th>( g_i )</th>
<th>( g_s )</th>
<th>( g_n )</th>
<th>( \psi )</th>
<th>( \psi_s )</th>
<th>( a_i )</th>
<th>( a_s )</th>
<th>( \gamma )</th>
<th>( \sigma )</th>
</tr>
</thead>
<tbody>
<tr>
<td>.45</td>
<td>-2.33</td>
<td>2.12</td>
<td>1.27</td>
<td>-.002</td>
<td>0.32</td>
<td>0.46</td>
<td>0.11</td>
<td>0.71</td>
<td>1.15</td>
<td>4.44</td>
</tr>
</tbody>
</table>


Figure 4: Gender Wage Gap by Sector
captures improvements in home technology over time. No good estimates exist on this growth rate (see for example Ngai and Petrongolo, 2012; Rogerson, 2008). Rogerson (2008) uses $g_n = -0.002$ in a similar model. Since, this study is interested in capturing the interaction of taxes, structural change and female employment, $g_n$ is set so as to match the rise in female employment. Results for both growth rates are given below. The probability that women find service sector employment, $\gamma$, is set to match the fraction of women in services in 2000. The probability of finding a job is allowed to vary with time, $\lambda_t = \gamma \frac{h_t}{H_t}$, consistent with the fact that the service sector is growing and should, therefore, make it easier for women to find the most desirable job. The value for $\gamma$ being close to one implies that in 1960, 26 percent of women can only find employment in industry (however, women can choose to work zero hours). In 2000, the share is 14 percent. While this friction might seem large, it is in fact reasonable given the representative household structure. The remaining preference parameters $\{\psi, \psi_s, a_s, a_i, \sigma\}$, the weight on leisure of married and single households, the relative taste for market services and industry goods, and the curvature on leisure are set in order to match the following six 1960 and 2000 targets:

- Relative services hours in 1960 and 2000;
- Female market hours in 2000;
- Male market hours in 2000;
- Single female to married female market hours in 2000; and
- A Frisch elasticity of 0.5 for men in 2000.

The model is primarily calibrated to 2000, since hours worked data is not always available for 1960.

5.1 Results

The model does well in matching all targets, with home productivity of $g_n = -0.002$. Table 3 shows the US data targets with the model results. Only values labeled with $\star$ were targeted in the calibration. The Frisch elasticity of labor for males (not reported in the table) is matched perfectly at 0.5 in 2000. The elasticity is 0.45 in 1960. For women the elasticities are 0.71 in 2000 and 1.03
in 1960. Micro estimates for male Frisch elasticities range from 0 to 0.5 for men and 0.5 to 2.2 for women (for a survey on Frisch elasticities see Reichling and Whalen, 2012) putting the resulting elasticities of the model within standard estimates.

The calibration underestimates the rise in female hours worked by 2.2 percentage points, and the fall in male hours by 2.9 percentage points. It explains roughly 77 percent of the rise in female hours observed in the US and 53 percent of the fall in men’s hours. It over estimates married women’s relative market hours in 1960, this is partially due to the simplified modeling of home production and perfect complementarities in leisure for spouses, and the inability to match the total rise in hours. In the model, men do no home production, while spouses’ leisure are perfect compliment. Without targeting total hours, the model does well in generating 54 percent of the total rise observed in the data.

Table 3: US Targets

<table>
<thead>
<tr>
<th></th>
<th>$H_s/H$</th>
<th>$H$</th>
<th>$H_m$</th>
<th>$H_f$</th>
<th>$H_f^<em>/H_m^</em>$</th>
<th>$H_{sf}/H_f^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960 Data</td>
<td>62.9</td>
<td>23.7</td>
<td>35.8</td>
<td>12.2</td>
<td>3.2</td>
<td>77.4</td>
</tr>
<tr>
<td>1960 Model</td>
<td>63.9*</td>
<td>25.7</td>
<td>33.0</td>
<td>14.5</td>
<td>1.9</td>
<td>79.0</td>
</tr>
<tr>
<td>2000 Data</td>
<td>75.6</td>
<td>26.0</td>
<td>30.4</td>
<td>21.6</td>
<td>1.2</td>
<td>86.9</td>
</tr>
<tr>
<td>2000 Model</td>
<td>73.8*</td>
<td>26.9</td>
<td>30.5*</td>
<td>21.6*</td>
<td>1.2*</td>
<td>86.9*</td>
</tr>
</tbody>
</table>

*aHours in 1960 are estimated using employment rates in 1960 and ratio of hours to employment in 1968.

*bEU KLEMS 1968 value.

Previous research has shown the importance of home technology improvements in pushing women into the labor market. Since, the paper aims to quantify the importance of structural change, taxes, and gender wages on female employment and service sector employment, it is important to match the total rise in female employment with the calibration. A home technology growth rate of $g_n = -0.0072$ does match the total rise in female employment from 1960 to 2000 in the US. Table 4 provides the estimates from table 3 above. The model now perfectly matches the magnitude of the rise in total hours worked in the US, allowing for a precise comparison of higher taxes and different structural change. It also does slightly better in matching the rise in service employment.
5.2 Counterfactuals

Counterfactuals to capture the importance of structural change, marketization, the feedback effect of women entering the labor market in service employment, and the changing gender wage gap, are provided. Table 5 provides estimates of changes in total hours, male hours, and female hours.

The first row provides the data equivalent. The second row restates the percentage point changes from the benchmark model with $g_n = -0.0072$. The first counterfactual assume only taxes increased, i.e., $g_i = g_s = g_n = 0$ and the wage gap remained at the initial 1960 level. This counterfactual is simply to show the effect of the 2000 tax rate on 1960 working time. The second counterfactual provides estimates for structural changes in the labor market over time. That is, $g_s$ and $g_i$ are as-in the benchmark; the growth rate of home technology is set to the growth rate of market services, $g_n = g_s$, to erase any effects from marketization of services; and the wage gap remains at the 1960 level (taxes are set as-in table 1). The third counterfactual estimates structural change, including marketization of services. Specifically, home technology grows at the benchmark value. The fourth and final counterfactual estimates the effects of the closing gender wage gap, while structural change is set to zero, $g_i = g_s = g_n = 0$. If 2000 tax rates were present in the 1960 economy, total hours would be 127 percent lower, mostly driven by a fall, rather than a rise, in female hours. Female hours are highly responsive to taxes, given their flexibility of choice in working at home when living in a two-person household. Single women’s hours are rather unresponsive. Structural change in the labor market without marketization also generates a fall in hours. Goods, which are substitutable with services, become cheaper. Therefore, households’ income goes further.

\[\text{Table 4: US Targets (Adjusted } g_n)\]

<table>
<thead>
<tr>
<th></th>
<th>$H_s/H$</th>
<th>$H$</th>
<th>$H_m$</th>
<th>$H_f$</th>
<th>$H^{m}/H^{m}$</th>
<th>$H_{sf}/H_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960 Data</td>
<td>62.9</td>
<td>23.7</td>
<td>35.8</td>
<td>12.2</td>
<td>3.2</td>
<td>77.4</td>
</tr>
<tr>
<td>1960 Model</td>
<td>63.3*</td>
<td>24.6</td>
<td>32.8</td>
<td>12.3</td>
<td>2.4</td>
<td>78.7</td>
</tr>
<tr>
<td>2000 Data</td>
<td>75.6</td>
<td>26.9</td>
<td>30.4</td>
<td>21.6</td>
<td>1.2</td>
<td>86.9</td>
</tr>
<tr>
<td>2000 Model</td>
<td>74.9*</td>
<td>26.0</td>
<td>30.4*</td>
<td>21.6*</td>
<td>1.2*</td>
<td>86.9*</td>
</tr>
</tbody>
</table>

\[9\text{ Appendix A provides, for comparison, the results with } g_n = -0.002.\]
Table 5: US Hours Counterfactual (Adjusted $g_n$)

<table>
<thead>
<tr>
<th></th>
<th>$\Delta H$</th>
<th>$\Delta H_m$</th>
<th>$\Delta H_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>2.3</td>
<td>-5.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Benchmark</td>
<td>2.4</td>
<td>-2.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>102</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>2000 Taxes in 1960</td>
<td>-2.9</td>
<td>-2.7</td>
<td>-1.9</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>-127</td>
<td>50</td>
<td>-20</td>
</tr>
<tr>
<td>Structural Change</td>
<td>-3.7</td>
<td>-2.9</td>
<td>-2.6</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>-161</td>
<td>53</td>
<td>-28</td>
</tr>
<tr>
<td>Structural Change and Marketization</td>
<td>0.1</td>
<td>-2.0</td>
<td>4.6</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>7</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Gap</td>
<td>0.1</td>
<td>-3.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>2</td>
<td>58</td>
<td>47</td>
</tr>
</tbody>
</table>

in the market and market services can be produced at home instead. Allowing for marketization and structural change can explain 50 percent of the rise in female hours, but only 7 percent of the total hours worked difference. Similarly, the changing gender wage gap explains 47 percent of changes in female hours worked, but again, hardly any of change in total hours worked.

Table 6 provides the decomposition of the change in service sector employment for the benchmark. These results provide insight into a number of interesting questions, such as: What has driven the large increase in service employment? How much of the rise in service sector employment can be explained by working women demanding more market services than stay-at-home women? How large is the feedback effect discussed in the Introduction? This table decomposes the rise in service sector employment by the portion driven by tax changes (recall taxes went up in all regions), and the portion driven by women entering the labor force and, therefore, substituting home for market services. The benchmark accounts for 91 percent of the rise in US service sector

Table 6: US Service Employment (Adjusted $g_n$)

<table>
<thead>
<tr>
<th>$\Delta H_s/H$</th>
<th>Tax</th>
<th>SC</th>
<th>SC plus Home</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>12.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchmark</td>
<td>11.6</td>
<td>-0.6</td>
<td>-1.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Explained (%)</td>
<td>91</td>
<td>-4</td>
<td>-9</td>
<td>37</td>
</tr>
</tbody>
</table>
employment. Decomposing the rise shows that higher taxes decreased service sector employment by 4 percent. Structural change (SC) in the labor market does not lead to an increase in female employment and, therefore, the feedback mechanism in table 6 is absent. Including the relative fall in home productivity, the decomposition for structural change and marketization explains roughly 37 percent. Relatively lower home productivity in the model incentivizes women to enter the labor market and, therefore, to substitute home for market services. In total, the decomposition on labor force participation of women shows that 47 percent of the rise in service sector employment, or 6 percentage points of the 11.6, is due to women entering the labor market and substituting home produced services for market services. The 6 percent are computed assuming the relative share of market services to home produced services does not change for households (the share in equation 11). There are a few effects here, while working women demand more market services, women working within the service sector in 2000 demand on average 7.7 percent more market services than women working in the industry sector. Consequently, as the industry sector shrinks, and women are more likely to find work in the service sector, the demand for market services increases even if women do not increase their intensive margin of work.

In conclusion, women entering the labor force increases service sector employment substantially. In addition, both structural transformation and changing female wages can account for roughly half of the increase in female hours. In terms of structural transformation, marketization is the driving mechanism.

5.3 Germany

As it has been argued, taxes result in less hours worked. If the US were to have had German tax rates in 2000, the service employment share would have been 1.40 percentage points lower, total hours worked would have decreased by 4.6 percentage points, with male hours decreasing by an additional 2.8 and female hours decreasing 6.2 percentage points (see table 7). The drop is large both for men and women. Nonetheless, since female employment still rises, 45 percent of the rise in service employment is explained by the larger demand of market services of working women.

However, as Rogerson (2008) argues, Europe was several years behind the US in terms of produc-
Table 7: *US Targets (German 2000 Tax)*

<table>
<thead>
<tr>
<th></th>
<th>$H_s/H$</th>
<th>$H$</th>
<th>$H_m$</th>
<th>$H_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 Data</td>
<td>75.6</td>
<td>26.9</td>
<td>30.4</td>
<td>21.6</td>
</tr>
<tr>
<td>2000 Model</td>
<td>73.5</td>
<td>22.3</td>
<td>27.7</td>
<td>15.4</td>
</tr>
<tr>
<td>2000-1960 Data</td>
<td>12.7</td>
<td>2.3</td>
<td>-5.4</td>
<td>9.3</td>
</tr>
<tr>
<td>2000-1960 Benchmark</td>
<td>11.6</td>
<td>2.4</td>
<td>-2.4</td>
<td>9.3</td>
</tr>
<tr>
<td>2000-1960 Model</td>
<td>10.2</td>
<td>-2.2</td>
<td>-5.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Activity levels in 1960. The effects of higher taxes and lower structural change on female employment are studied by setting the initial productivity levels $A_i, 1960$, $A_s, 1960$, and $A_n, 1960$ to match the relative hours in the German service sector, the hours of men in 1960 and the hours of women. Moreover, the growth rates for sectors are computed using changes in value add for Germany from 1960 to 2000, with annual growth rates of $g_i = 0.042$, $g_s = 0.033$. Home productivity is assumed to grow as-in the US, at $g_n = 0.0133$ or $-0.0199$ per annum slower than the service sector. All remaining preferences parameters are as-in the US. Gender wage gaps are unchanged given the OECD median wage gap evidence of figure 4.

Table 8 summarizes the results. The model is unable to match the hours worked of men in 1960.

Table 8: *German Targets*

<table>
<thead>
<tr>
<th></th>
<th>$H_s/H$</th>
<th>$H$</th>
<th>$H_m$</th>
<th>$H_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960 Data</td>
<td>40.2</td>
<td>28.8</td>
<td>35.1</td>
<td>18.9*</td>
</tr>
<tr>
<td>1960 Model</td>
<td>40.2*</td>
<td>29.3</td>
<td>31.5*</td>
<td>18.9*</td>
</tr>
<tr>
<td>2000 Data</td>
<td>67.0</td>
<td>19.8</td>
<td>21.8</td>
<td>17.8</td>
</tr>
<tr>
<td>2000 Model</td>
<td>50.8</td>
<td>25.6</td>
<td>27.2</td>
<td>19.7</td>
</tr>
</tbody>
</table>

*Hours in 1960 are estimated using employment rates in 1960 and ratio of hours to employment in 1968.

However, the model is able to explain 40 percent of the rise in service employment, 41 percent of the fall in total hours, 33 percent of the fall in male hours, and it only generates a very small rise in female hours. If taxes would have remained at the 1960 level instead, table 9 would look as

*Hours from the data in 1960 are estimated using employment rates by gender in 1960 and the ratio of hours to employment in 1968. Given the rough estimate of hours in 1960, the difference between the model and data is negligible.*
follows (see table 9). Under this tax assumption, the model now generates a small rise in hours

<table>
<thead>
<tr>
<th>Table 9: German Targets (1960 Tax)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>2000 Data</td>
</tr>
<tr>
<td>2000 Model</td>
</tr>
</tbody>
</table>

worked comparable to the US, with 1.5 percentage points. Men’s hours would only fall slightly by 1.0 percentage point and women’s hours would increase 6.7 percentage points. In comparison, the benchmark figures of the US are a fall of 2.4 percentage points for male hours and a rise of 9.3 percentage points for women. In summary, taxes can account for the bulk of the difference in hours worked between the US and Germany. Unlike, previous tax and hours studies, this is achieved with a standard Frisch elasticity of labor.\textsuperscript{11} This follows from modeling a two-person households where one spouse can stay home and the household benefits from specialization.

5.4 Sweden

Lastly, in comparing the tax policies of the US and Sweden we run a simple welfare experiment. Preference parameters are as-in the US, since the focus here is simply on comparing the year 2000 and data from the 1960s is mostly missing for Sweden in these data sources. The benchmark model is estimated using the tax rate of Sweden in 2000. Sweden has higher taxes, but provides large subsidies, especially in the form of childcare, elderly care, etc. Since there is no good estimate of the size of $\phi$, the government subsidies tied to female employment, $\phi$ is set to match US working hours in 2000. Two hypothetical “Swedish” economies are computed. First, all women have access to the subsidy. Second, only married women have access to the subsidy, as the subsidy can be dominated by childcare-related policies. The two computations provide a rough upper and lower bound. One is to assume all women have children regardless of their relationship status (i.e., if they have a partner or not). The other is to assume that only women with a partner have children and access to the subsidy. The resulting subsidies are $\phi = 0.3531$ if all women benefit and $\phi = 0.603$ if

\textsuperscript{11}Olovsson (2009) also generates hours differences between the US and Sweden with a Frisch elasticity of 0.5. However, he does not explicitly model or study women’s labor market choices.
only married women benefit, which correspond to 14 percent and 29 percent of all market services consumed, respectively. If only married women have access to the subsidy, the subsidy needs to be larger in order to generate the same female hours. In general, the higher tax-subsidy scheme, generates similar relative service hours of 74.7 compared to 74.9 in the benchmark. Men, however, only work 26.70 percent of their time, and total hours are 25.02. This matches well with Swedish data, where total hours worked was 23.5 in 2000. Hours of men are 29.5, slightly lower than in the US.

Table 10 summarizes the main welfare results. Welfare is computed as follows: we ask by how much both market goods and market service consumption would have to increase in the hypothetical “Swedish” economies to make individuals indifferent between the benchmark of low taxes and high taxes but subsidies. The distortions are sizable. If all women can benefit from the scheme, single men pay the largest price. Single men have little benefits from the subsidy and simply pay higher taxes to finance the subsidy. The benefit for men is a large service sector and, therefore, slightly lower prices. Moreover, married households still pay a cost, since dual earners are hit by higher taxes and only receive a small subsidy. Single women are the only beneficiaries from the scheme. Single women have to work regardless of taxes or subsidies. Consequently, a subsidy to hours worked brings in extra income. In contrast, if only married women benefit from the scheme, the higher tax regime is costly for all individuals. Now the average welfare cost rises from 4.4 percent to 12.2 percent in terms of market goods and service consumption loss.

\begin{center}
\begin{tabular}{|l|c|c|c|}
\hline
 & Married & Single Male & Single Female \\
\hline
All Women & 6.3  & 17.1  & -12.9  \\
Married Women & 4.1  & 25.7  & 18.7  \\
\hline
\end{tabular}
\end{center}

Table 10: Welfare Costs

6 Conclusion

To summarize, this paper develops a theory that can explain both a rise in services and a rise in female labor supply concurrently. The model is consistent with general trends in labor supply
(male and female). Moreover, the rise in female employment is a large contributor to the rise in service employment. Structural change accounts for roughly half of the increase and female employment generating more market service demand accounts for the other half. The model also accounts well for differences between Germany and the US in the service sector labor share and female employment over time. A high tax country will have a smaller service sector and lower female employment by subduing marketization. A simple computation of the social welfare loss of high taxes and subsidizing female labor force participation in Sweden, compared to an equivalent outcome in female labor force participation with low taxes and no subsidies, shows a non-negligible loss. However, while the rise in the service sector is important in explaining part of the rise in female employment, a striking conclusion is that high taxes are the main cause in generating lower market hours and lower female employment in Europe compared to the US.
References


Appendix A

The following table provides the counterfactuals for the case with $g_n = -0.002$. Since, this version did well in matching most of the trends in hours. The results here are similar to table 5 and 5. That is women’s feedback effect can account for 44 percent of the rise in service employment compared to 47 in the benchmark above. One marked difference is marketization has a much smaller effect on

| Table 11: US Hours Counterfactual ($g_n = -0.002$) |
|---------------------|---------|---------|---------|
|                     | $\Delta H$ | $\Delta H_m$ | $\Delta H_f$ |
| Data                | 2.3     | -5.4     | 9.3      |
| Baseline            | 1.2     | -2.5     | 7.1      |
| Explained (%)       | 54      | 47       | 76       |
| 2000 Taxes in 1960  | -2.9    | -2.7     | -2.0     |
| Explained (%)       | -127    | 49       | -21      |
| Structural Change   | -3.8    | -2.8     | -2.9     |
| Explained (%)       | -165    | 51       | -31      |
| Structural Change and Marketization | -1.0    | -2.2     | 2.4      |
| Explained (%)       | -42     | 40       | 26       |
| Gap                 | -0.2    | -3.0     | 3.7      |
| Explained (%)       | -8      | 56       | 40       |

women’s hours now. Only 26 percent of the total change compared to 50 percent in the benchmark are explained. The effect of male hours is similar in both cases. In contrast, the gender wage gap effect is only slightly smaller 40 percent to 47 percent.