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Feminism and Labour Supply in the Nordic Countries*

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People in the Nordic countries of Denmark, Finland, Iceland and Sweden work more than the countries' high tax rates would lead us to predict. This observation is explained by a shared belief system that emphasises women's rights to labour market participation.

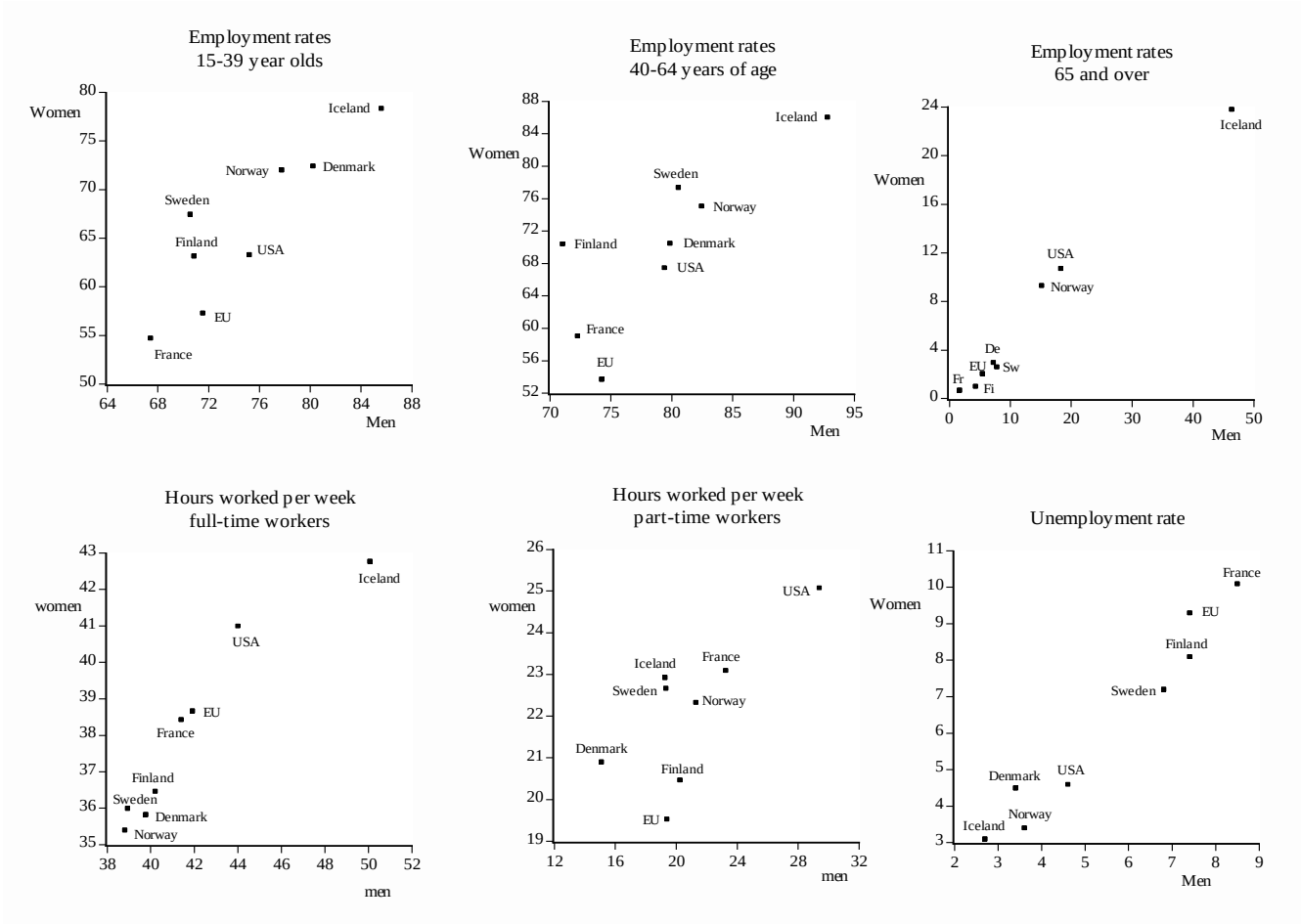
I. Introduction

The Nordic countries of Denmark, Finland, Iceland, Norway and Sweden have combined impressive economic performance and extensive welfare states.[1] These countries do well in terms of output per capita, unemployment, labour force participation and productivity growth. As shown in Figure 1 the countries have impressive employment-to-population ratios in spite of being welfare states.

The comparison between Continental Europe and the United States has spurred much research whereas fewer studies have focused on the performance of the Nordic countries. The findings that a large fraction of the difference in output per capita between France, to take one European country, and the US that is explained by differences in hours worked has led some to conclude that higher taxes in Europe are to blame for the difference in output. However, data from the Scandinavian countries suggests that high taxes do not need to suppress labour supply. Moreover, these countries do not fit well with the idea that wage inequality raises hours of work (see Bell and Freeman (2001)) by increasing the monetary rewards to effort, since their net-of-tax level of inequality is low by international standards.

* We thank Olafur Isleifsson, Katrin Olafsdottir and Stefan Olafsson for comments.
[1] Government expenditures as a ratio to GDP in year 2001 were 43% in Iceland, 44% in Norway, 48% in Finland, 55% in Denmark and 57% in Sweden, in comparison to 52% in France and 35% in the United States. Source: Eurostat.

Labour supply



The employment rate is calculated as the ratio of employment and working-age population. Source: Eurostat & U.S. Bureau of Labor Statistics.

In this paper it is argued that what sets the Nordic countries apart from other countries is a set of beliefs that affect the social infrastructure in these countries as well as having a direct impact on labour force participation decisions. In particular, these nations share a strong belief in men and women having equal rights to participate in the labour market. This belief system is essentially a part of feminism, defined as the belief that women have equal political, social, intellectual and economic rights to men. Feminism in the workplace affects the structure of government expenditures as well as the behaviour of unions and individual workers. It may thus explain the high employment rates found in Scandinavia.

This paper complements the work of Rogerson (2007) and Ragan (2006) who show how differences in the structure of government spending imply different elasticities of hours of work with respect to tax rates, i.e. that it is possible that workers in Scandinavia work more because of the structure of government spending in spite of high levels of taxation. However, they do not attempt to explain why the structure of government spending differs. They also maintain that preferences do not differ across countries. We will argue that feminism in Scandinavia may both explain the structure of spending as well as having a direct impact on women's labour market participation.

We start by setting the stage by doing growth accounting across countries for a sample of countries that includes the five Scandinavian countries.

II. Level accounting

Assume a Cobb-Douglas aggregate production function for the firm. Specifically,

$$Y_t = A_t^{1-\theta} K_t^{\theta} H_t^{1-\theta} \tag{1}$$

where K_t denotes the capital stock, H_t is total hours worked and A_t is an efficiency parameter. A measure of H_t is the average numbers of hours worked in employment $\overline{H}_t$ times the number of people in employment E_t. Let N_t denote the working-age population between 15-64 and let S denote the total number of hours a person can work in a year without any leisure. Specify 100 hours available in a week. Then S is 100 times 52 for a year. Let y_t, k_t and h_t be variables which are calculated by dividing each of the uppercase variables by $S \cdot N_t$; $k_t = K/(N_t \cdot S)$, and similarly for y and h. This gives

$$y_t = A^{1-\theta} k_t^{\theta} h_t^{1-\theta} \quad (2)$$

where a key parameter is the share of capital in national income, θ. By taking the logarithm and subtracting $\theta log(y_t)$ from both sides and rearranging we get.

$$\log(y_t) = \log(A_t) + \frac{\theta}{1-\theta} \log(\frac{k_t}{y_t}) + \log(h_t) \quad (3)$$

The data is described in Table 1. Using the years 2001-2003 as a benchmark,[2] the table gives the average GDP per person (15-64), hours worked per week, the capital-output ratio[3] and GDP per hour, calculated by dividing the first column with the second one.

Table 1. Labour supply, productivity and GDP 2001-2003

	GDP per person (15-64) U.S. = 100	Hours worked per week (15-64) U.S.=100	Capital-output ratio (k/y)	GDP per hour U.S. = 100
Denmark	81	89 (23.0)*	2.85	90.9
Finland	74	87 (22.6)	2.57	85.4
Iceland	86	118 (30.6)	2.57	73.1
Norway (without oil)	87	78 (20.3)	2.65	111.1
Sweden	81	89 (23.1)	2.37	90.7
France	77	72 (18.6)	2.51	107.4
U.S.	100	100 (26.0)	2.06	100.0

* Number of weeks in parentheses.

Equipped with this data and equation (3) above one can proceed to calculate proportional differences between the U.S. and each of the other countries. One needs only determine the value of the parameter θ, which is measured by the share of capital in national income and given the value 0.3224 for all the countries.[4] This gives the decomposition shown in Table 2.

[2] .See Appendix A2 for data sources.

[3] Capital output ratios originate from Christophe Kamps (2005), http://ideas.repec.org/a/taf/applec/v29y1997i5p563-79.html. The series used is the private total net capital stock, volume (billions in national currency at 1995 prices), beginning-of-year stock, excluding government capital stock; and gross domestic product, market prices (billions in national currency at 1995 prices). Source: OECD Analytical Database, June 2002.

[4] As in Prescott (2004).

Table 2. Level accounting relative to the U.S. 2001-2003

	Percentage relative to U.S.			
	GDP per person (15-64) U.S. =100	Productivity factor	Capital factor	Labour factor
Denmark	-19	-21	15	-11
Finland	-26	-22	10	-13
Iceland	-14	-34	10	18
Norway (without oil)[5]	-13	0	11	-22
Sweden	-19	-15	6	-11
France	-23	-1	9	-28

Note that in contrast to previous studies, productivity in France is slightly lower than in the U.S.[6] However, the labour factor is much smaller in France than in all the other countries, which explains why GDP per person is lower in France than in the U.S.

The Nordic countries – with the exception of Norway – have somewhat lower levels of productivity than both the U.S. and France.[7] The labour factor is higher than in France but smaller than in the U.S. in four of the countries. What is interesting from our perspective is that while high taxes and welfare benefits appear to lower the French labour factor 28% below the US one, the Nordic countries perform much better in this regard and Icelanders actually work significantly more in spite of higher taxes.

[5] In the case of Norway, the value added from extraction of crude oil and natural gas was 17.8% of GDP on average 2001-2003. See Statistics Norway www.ssb.no/oljev_en/arkiv/tab-2005-07-11-01-en.html. We have taken this into account to correct for in the productivity factor. When the oil sector is included in the data for Norway we get the results that GDP per person is 6% above the US level, the productivity factor 24% higher, the capital factor 10% higher and the labour factor 22% lower. The main difference is that output per person is much higher than in Table 2 and also measured productivity.

[6] Prescott (2002) used capital/output ratios from OECD published in 1997 where France had capital output ratio of 2.2 and the U.S. 2.3. A higher capital output ratio for France in this paper gives lower productivity compared to the U.S. which explains the difference between our results and those of Prescott.

[7] The low level of productivity in the Nordic countries does come somewhat as a surprise. In a study of 127 countries, Hall and Jones (1999) find that productivity is largely dependent on social infrastructure: Corruption, impediments to trade, government interference in production and rent seeking affects output per capita directly through productivity and indirectly through capital accumulation and education. However it is not obvious why social infrastructure is less conducive to productive activities in the Nordic countries than in France and the United States. The Nordic countries are also no more open to trade than other European economies and the level of competition is comparable, see Baily and Solow (2001).

III. Labour supply

The labour supply decision is modelled by describing the consumption/labour supply decision of the representative household where preferences over consumption (*c*) and hours worked (*h*) now and in the future are described as

$$E\left\{\sum_{t=0}^{\infty}\beta^{t}\left[\log(c_t)+\alpha\frac{(1-h_t)^{1-\gamma}}{1-\gamma}\right]\right\} \tag{4}$$

subject to $c_t=(1-\tau)h+T, c\geq 0, 0\leq h\leq 1$, where *t* denotes time, β is the discount factor reflecting the pure rate of time preference, α is the parameter describing the intensity of the disutility from working, γ is the inverse of the coefficient of intertemporal substitution, and *E* is the expectations operator. The per-period time endowment is normalized to one. This means that if on average the working-age population works 25 hours a week, then $h = 0.25$ as there are about 100 hours of non-sleeping time a week.

The first-order conditions for utility maximisation follow;

$$\frac{1-\tau}{(1-\tau)h+T}=\alpha(1-h_t)^{-\gamma} \tag{5}$$

The left-hand side shows the marginal benefit of working longer hours *h* in terms of higher consumption while the right-hand side has the marginal cost of longer hours due to the disutility of working. Assume that tax revenues are rebated back to the consumer in a lump-sum fashion every year, which eliminates the income effect from taxation. Inserting the government's budget constraint $\tau h = T$ into the condition and assuming γ=1 gives,

$$\frac{\alpha h}{1-h}=1-\tau \tag{6}$$

where the left-hand side has the marginal rate of substitution between consumption and leisure and the right-hand side the marginal rate of transformation. The condition can also be rewritten as

$$\frac{\alpha c}{1-h}=1-\tau \tag{6'}$$

and gives the point of tangency between an indifference curve and a budget line in the c-h space.

Equation (6) can be used to describe the possible reasons proposed for differences in labour input between countries. These either have to do with the slope of the budget line 1-τ or the slope of the indifference curves. While Prescott (2004) emphasises the effect of differences in tax rates τ on the slope of the budget line and the point of tangency, Blanchard (2004) claims that preferences differ between Europe and the US. According to Prescott, lower output per capita in France can be accounted for by fewer hours of work that he attributes to a higher tax wedge that lowers the opportunity cost of leisure. Blanchard, in contrast, attributes fewer hours of work in France to the French having a stronger preference for leisure, which makes them increase their leisure as real income has increased.[8] In the case of Scandinavia, it is not clear whether preferences or the budget line explain their labour inputs.

Without loss of generality, one can change the model to become identical to Prescott's (2004) formulation by introducing firms that employ labour and use capital in production. The production function becomes

$$y_t = k_t^{\theta} \left(A_t h_t \right)^{1-\theta} \tag{7}$$

The firms maximise output net of wage costs *wh* and get the first-order condition follows

$$w_t = \left(1-\theta\right) \frac{y_t}{h_t} \tag{8}$$

The household's maximisation problem is the same as before except that the period *t* budget constraint becomes

$$(1+\tau_c)c_t + (1+\tau_i)i_t = (1-\tau_h)w_t h_t + (1-\tau_k)(r_t - \delta)k_t + \delta k_t + T_t, \tag{9}$$

where τ_c is the tax on consumption, τ_i the tax on investment, τ_h the marginal tax rate on labour income, τ_k the tax rate on net capital income, w_t the real wage, r_t the rental price of capital, δ the rate of depreciation and T_t denotes transfers as before.

The labour and consumption taxes can be combined into one effective marginal tax rate on labor income. It is the fraction of additional labor income that is taken in the form of taxes

$$(1-\tau) = \frac{1-\tau_h}{1+\tau_c} \tag{10}$$

[8] A related idea is due to Phelps (2007) who argues that European culture has over time become less entrepreneurial as reflected in differences in attitudes towards initiative, risk taking and so forth.

where (1-τ**)** is the amount of consumption a worker can get from a unit produced with labour and consumption taxation. This gives

$$\tau = \frac{\tau_h + \tau_c}{1+\tau_c} \tag{10'}$$

An equation for labor supply can be derived from two first-order conditions. The first is equation (6') as before that makes the marginal rate of substitution between consumption and leisure equal to the after tax real wage and the second is the profit-maximizing condition that requires that workers be paid their marginal product, equation (8) above. Combining the two equations gives the following equilibrium for labour supply:

$$h_t = \frac{1-\theta}{1-\theta+\frac{c_t}{y_t}\frac{\alpha}{1-\tau_t}} \tag{11}$$

This expression gives current labour supply as a function of the current value of the fraction of gross income consumed, c_t/y_t and the current tax rate τ_t. The variable c_t/y_t captures the inter-temporal effect of taxes and other factors on labor supply, whereas the variable $(1-\tau_t)$ captures the intra-temporal distortion to the relative prices of consumption and leisure. We set $\alpha = 1.58$ as in Prescott (2004).

Based on the model description, tax rates for all of the countries can be calculated (see Appendix A3 for detailed derivations). The intra-temporal tax wedge defined by equation (10) gives the units of consumption goods a worker loses per unit produced due to labour and consumption taxation. Hence $1-\tau$ measures the units of consumption a worker can consume from a unit produced once taxes have been taken into account. The tax rates are shown in Table 3.

Table 3. The intra-temporal tax wedge 1-τ and average consumption-output ratio 2001-03

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.
Social security tax	0.02	0.20	0.05	0.16	0.24	0.27	0.11
Marginal income tax	0.59	0.31	0.30	0.23	0.34	0.16	0.20
τ_h	0.62	0.51	0.36	0.39	0.57	0.42	0.31
τ_c	0.37	0.31	0.30	0.31	0.31	0.20	0.10
1-τ	0.28	0.38	0.49	0.47	0.32	0.48	0.62
c/y	0.69	0.67	0.75	0.61	0.72	0.76	0.81

Finally, equation (11) is used to calculate predicted hours and these are compared to hours actually worked in Table 4.

Table 4. Actual and predicted hours

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.
Hours, h	23.0	22.6	30.6	20.3	23.1	18.6	26.0
Predicted h	15.1	19.9	21.5	21.5	16.5	21.7	25.2

Predicted hours match actual hours for the U.S. and the French are predicted to work less, which they do, but the French work even less than their high tax wedge leads us to predict. In contrast, there is an underestimate for Denmark, Finland, Iceland and Sweden. What needs to be explained is why these nations work more than the model predicts while the French work somewhat less. What distinguishes these Nordic countries from others is the surprisingly large labour supply in spite of high taxes. These are high-performance countries[9] that have chosen to live with a large public sector.

Looking back at equation (11) and its derivation one can conclude that the Nordic countries either have different preferences, as captured by α, or a different structure of taxation and government spending. Rogerson (2007) and Ragan (2006) show how differences in the structure of government spending imply different elasticities of hours of work with respect to tax rates, i.e. that it is possible that workers in Scandinavia work more because of the structure of government spending in spite of high levels of taxation.

[9] In year 2001, Norway ranked 4th, Iceland 6th, Denmark 7th, Finland 15th and Sweden 17th in terms of PPP-adjusted GDP in the world. Sweden had fallen from 4th place in 1970 to 8th place in 1980 and then 17th in 2001. In contrast, Iceland started out in 19th place in 1970 and Norway in 16th place and Finland in 18th place. Denmark has consistently ranked highly, 6th in 1970 and 9th in 1980.

However, they do not attempt to explain why the structure of government spending differs. We will argue that the culture found in Scandinavia may both explain the structure of spending as well as having a direct impact on women's labour market participation through the form of the utility function.

IV. Distinct culture

A distinguishing feature of the culture of the Nordic countries is a belief system that values the labour market participation of women and does not agree with the statement that pre-school children suffer with working mothers. The table below shows answers to questions taken from the World Values Survey (http://www.worldvaluessurvey.org).

Table 5. Attitudes towards women participating in the labour market

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.
Men should have more right to a job than women -- % disagree	87.7	82.2	93.5	79.4	93.1	67.6	81.3
Pre-school child suffers with working mother -- % disagree or strongly disagree	78.4	56.2	63.5	-	59.9	42.3	-

Period: 1999, except Norway for which the data from 1996 are used.

The answers show that Nordic respondents are much more supportive of equal rights to a job than their French counterparts. Also, most of the Nordic countries are more in favour of women's rights to work than the average U.S. respondent. Iceland and Sweden are at the top of the list, while Norway is just below the U.S. while way ahead of France. Responses to the second question are not available for Norway and the U.S. but show that a much higher proportion of respondents in Denmark, Finland, Iceland and Sweden disagree with the statement that pre-school children suffer with working mothers. Comparable data for a wider data set confirm the special status of the Nordic countries when compared to a larger set of countries, including Australia, Austria, Poland and Spain. Of the remaining OECD countries, the Netherlands comes close to the Nordics in believing in equal rights to a job while Canada is on par with the Nordics.[10]

[10] International Social Survey Programme (1994), taken from Jaumotte (2003).

The Nordic nations also put great emphasis on the workplace as a place for social interaction and a place where people can achieve their goals.

Table 6. Important in a job

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.A.
Important in a job: pleasant people to work with -- % mentioned	77.5	74.1	82.9	-	84.2	64.9	-
Important in a job: that you can achieve something -- % mentioned	54.9	56.1	80.6	74.4	72.3	50.3	83.7

Period: 1999, except Norway which is 1996.

Finally, Danes, Finns, Norwegians and Swedes share a high level of trust in other people, much more so than the French or the Americans. For some reason, Icelanders do not share this positive belief.

Table 7. Trust

	Denmark	Finland	Iceland	Norway	Sweden	France	U.S.
Most people can be trusted -- % agree	64.1	56.8	39.3	64.8	63.7	21.4	35.5

Period: 1999, except Norway which is 1996.

The differences in values between the countries coincide with differences in the welfare systems and differences in labour market outcomes. The essential feature of the Nordic welfare state is an emphasis on employment; benefits are to a great extent contingent on participation in the labour market. Some policies stimulate labour force participation of women such as a neutral tax treatment of second earners relative to single individuals, childcare subsidies and paid parental leave; see Jarnoutte (2003) and OECD (2004). Immervoll and Barber (2005: 21-5) and Arnaldur Kristjansson (2008) show that the cost of child care as a ratio to average wages is much lower in the five Nordic countries than in France, and especially in the United States.[11]

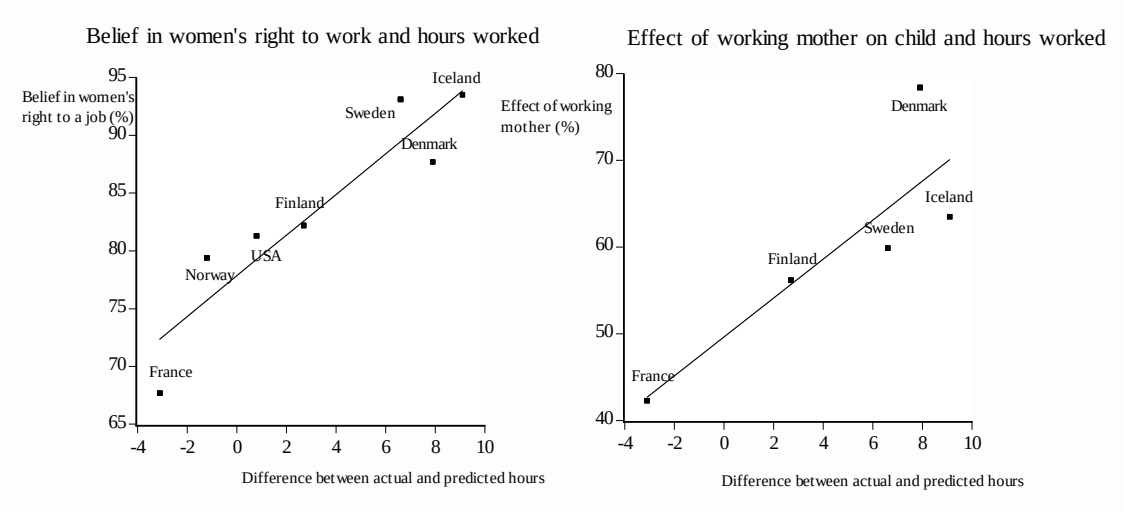
The subsidised child care in Scandinavia is but one manifestation of the employment-promoting structure of government expenditures and taxation. By making entitlements contingent on employment status, these countries have fostered a culture of work. In

[11] The cost of keeping two children in pre-school for a couple earning average wages is, according to Kristjansson (2008), 19% of income in the US, 18% in France, 9% in Denmark, 8% in Finland, 12% in Iceland, 11% in Norway and 6% in Sweden. Every child is guaranteed entry in Denmark, Finland and Sweden and, in spite of there not being a guarantee, there is adequate supply of day-care in Iceland.

addition, the system of taxes and benefits that form the welfare system is internalised by labour unions and taken into account during wage negotiations. Furthermore, as emphasised by Andersen (2008), the provision of employment-contingent social insurance enhances the attractiveness of the labour market when compared to home production by offering not only a pecuniary compensation but also a social insurance system that protects income during sickness; occasional unemployment spells; pregnancies; disability, and so on.[12]

However, one does not need to measure the institutional differences as such; culture is all that is needed. Feminism as a belief system can explain the discrepancy between the predicted and actual hours of work in Table 4. Differences in beliefs, in particular when it comes to attitudes towards women participating in the labour market, can explain the discrepancy between hours predicted and hours worked in Table 4 above. The fit is surprisingly good as shown in the figure below.

Figure 2. Feminism and labour supply



[12] The work ethics of Icelanders resemble those of American even more than those of the other Nordic nations. They value initiative; work is important in their lives; and they tend to like competition more than the Scandinavians (see Olafsson, 2003 and 2008). These attitudes have influenced labour unions in that they have put less emphasis on shortening the length of the working week than their counterparts in Denmark, Finland, Norway and Sweden (see Olafsson, 2007). Olafsson (2008) explains the American-type work ethics and attitudes towards work by a "settlers' mentality" that can also be found in North America, Australia and New Zealand.

With only seven observations, the correlation between the discrepancy in hours worked, on the one hand, and belief in women's rights to a job, on the other hand, is 0.96 and the corresponding correlation between the discrepancy and the proportion claiming that pre-school children do not suffer from having working mothers is 0.85 with only five observations.

Figure 1 and Table A1 show that the different belief system shows up in higher employment rates but not in more hours worked per full-time employee. Also, that it is in the rates of labour force participation of women where the main difference between the countries lies.

There remains the issue of causality. The correlation shown in Figure 2 does not prove that culture affects the outcome and not the other way around. It is also possible that other factors – for example an egalitarian politician or labour union leader – in the past had the effect of making the structure of taxes and government spending in the Scandinavian countries conducive to women's participation, which then gradually made them more feminist in their outlook on life. However, we note that the strong preference is revealed consistently since the beginning of the 1990s in the World Values Survey (earlier results not available). Moreover, survey evidence from the European Union countries (OECD, 2001) shows that preferences for female participation are stronger than actual female participation rates indicate. Thus 24.9% of Swedish couples consist of the man working full-time and the woman being out of the labour force while only 6.6% of couples find this to be a preferred status and 66.8% prefer the woman to be employed full-time while only 51.1% find themselves in that position. Similar numbers for Finland are 32.8% and 10.2% for the non-working wife and 80.3% and 49.3% for the fully employed wife. This indicates that it is preferences that are driving labour-market outcomes and not the other way around.

V. Conclusions

We have found that the Nordic countries – Denmark, Finland, Iceland and Sweden – have high labour force participation in spite of heavy taxation. This is manifested in high employment rates for women. However, hours per full-time employed workers are fewer than in France and the U.S., with the exception of Iceland. A possible explanation for

these observations was found in feminism as a belief system that emphasises the rights of women to participate in the labour market independently of whether they have had children and does not consider mothers' employment to be detrimental to a pre-school child's development.

Future work will explore whether the belief system affects labour force participation mainly directly through individual preferences affecting the participation decision or, alternatively, indirectly through social infrastructure, such as the composition of government spending.

References

Alesina, Albert and Edward Glaeser (2004), *Fighting Poverty in the U. S. and Europe: A World of Difference*, Oxford University Press.

Alesina, Alberto, Edward Glaeser and Bruce Sacerdote (2005), "Work and Leisure in the U.S. and Europe: Why so Different?" *NBER Macroeconomic Annual*.

Andersen, Torben M. (2008), "Trading off Efficiency and Equity – A Scandinavian Puzzle?, *Timarit um Viðskipti og Efnahagsmal*, special issue.

Baily, Martin N. and Robert M. Solow (2001), "International Productivity Comparisons Built from the Firm Level," *Journal of Economic Perspectives*, 15 (3), 151-172.

Bell, Linda A. and Richard Freeman (2001), "The Incentive for Working Hard: Explaining Hours Worked Differences in the US and Germany," in G. Wong and G. Picot, eds., *Working Time in Comparative Perspective*, Kalamazoo, MI: Upjohn Institute.

Blanchard, Olivier (2004), "The Economic Future of Europe," *Journal of Economic Perspectives*, 18 (4), 3-26.

Kamps, Christophe (2005), "New Estimates of Government Net Capital Stocks in 22 OECD Countries 1960–2001," IMF Working Paper No. 04/67.

Hall, Robert E. and Charles I. Jones (1999), "Why Do Some Countries Produce So Much More Per Worker Than Others," *Quarterly Journal of Economics*, 114 (1), 83-116.

Inglehart, Roland (2006), *World Values Surveys 1981-2004*, Ann Arbor: University of Michigan (http://www.worldvaluessurvey.org).

Jaumotte, Florence (2003), “Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries,” OECD Economics Department Working Paper, No. 376, OECD Publishing.

Kristjansson, Arnaldur S. (2008), “Velferðarkerfið og barnafjölskyldan,” manuscript, University of Iceland.

OECD (2001), *Employment Outlook*, Paris.

OECD (2004), “Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries,” OECD Economics Department, May.

Olafsson, Stefan (2003), “Contemporary Icelanders - Scandinavian or American,” *Scandinavian Review*, 91, 1.

Olafsson, Stefan (2007), “Launþegahreyfingin á nýrri öld: Stað og horfur,” in Isleifsson and Sigurdardottir, editors, *Samfélagsleg áhrif verkalýðshreyfingarinnar á 20. öld - Framtíðarsýn á 21. öld*, Reykjavík: Reykjavíkurakademían and Efling, 101-120.

Olafsson, Stefan (2008), “Working Nation: The Mindset of the Enterprising Icelanders,” *Nordic Labour Journal*, vol. 13.

Phelps, Edmund S. (2007), “Macroeconomics for a Modern Economy,” *The American Economic Review*, 97 (3), 543-561.

Prescott, Edward C. (2002), “Prosperity and Depression,” *The American Economic Review, Papers and Proceedings*, 92 (2), 1-15.

Prescott, Edward C. (2004), “Why Do Americans Work So Much More Than Europeans?” NBER Working Paper Series # 10316.

Ragan, Kelly S. (2005), “Taxes, Transfers and Time Use: Fiscal Policy in a Household Production Model,” unpublished manuscript, Stockholm School of Economics.

Rogerson, Richard (2007), “Taxation and Market Work: Is Scandinavia an Outlier?” NBER Working Paper Series # 12890.

Appendix A1:

Table A1. Labour force participation, 2000-2004

	15-24 years			25-64 years			Over 65 years		
	Men (3)	Women (4)	(3)/(4)	Men (1)	Women (2)	(1)/(2)	Men (5)	Women (6)	(5)/(6)
Denmark	75.17	68.76	1.09	85.84	77.41	1.11	1.60	3.91	0.41
Iceland*	75.02	74.64	1.01	95.60	87.60	1.09	55.60	72.60	0.77
Finland	50.45	51.08	0.99	82.60	76.99	1.07	1.64	6.25	0.26
Norway	67.47	61.76	1.09	88.35	79.44	1.11	8.47	14.19	0.60
Sweden	53.59	51.22	1.05	86.83	81.27	1.07	6.27	14.99	0.42
US	73.65	63.00	1.17	87.65	72.49	1.21	9.38	17.73	0.53
France	32.57	25.96	1.25	84.89	70.17	1.21	0.92	1.89	0.49

* Age categories for Iceland are: 16-24, 25-54 and 55-74. Source: Statistics Iceland, Eurostat & U.S. Bureau of Labor Statistics.

Appendix A2: The data

To calibrate the model requires some heavy data requirements. Furthermore for the national income accounts data to be consistent with the theoretical framework some modifications and assumptions are called for. Table A2 lists the variables used and their sources in the OECD database.

Table A2. The data and their sources

Our ref.	Dataset table or variable:	Currency or other reference	Countries	Years
1	Details of Tax Revenue – Government Total	National currency, current prices, millions	Individual table for each	2001-2003
2	11-Government expenditure by function	National currency, current prices, millions	Individual table for each	2001-2003
3	1-Gross domestic product	National currency, current prices, millions	Individual table for each	2001-2003
4	1-Gross domestic product	US $, constant prices, constant PPPs, OECD base year, millions	Individual table for each	2001-2003
5	12--Main aggregates of general government	National currency, current prices, millions	Individual table for each	2001-2003
6	Annual National Accounts - Volume 2, 1970-2005 - Detailed aggregates- Consumption of fixed capital & taxes less subsidies on products	National currency, current prices, millions	All countries in one table	2001-2003
7	Labor force survey by sex and age	Population 15-64 annual frequency	All countries in one table	2001-2003
8	Labor force survey by sex and age	Total Employment annual frequency	All countries in one table	2001-2003
9	OECD Factbook 2007: Economic, Environmental and Social Statistics	Average hours actually worked. Hours per year per person in employment	All countries in one table	2001-2003

Variables and references

Variable:	Reference table:	Variable in table:
Y_t	3	B1_GE: GDP
C_t	3	P31S14: Final consumption expenditure of households & P31S15: Final consumption expenditure of non-profit institutions serving households
G_t	3	P3S13: Final consumption expenditure of general government
G_{mil}	2	020: Defence
I_t	3	P5: Gross capital formation
IT_t	6	Direct taxes less subsidies
Social Security Tax	1	2000 Social security contributions
Direct Taxes	1	Total tax revenue code: 1100 Of individuals
Depreciation	6	Consumption of fixed capital
$\bar{H}_t$	9	Average hours actually worked. Hours per year per person in employment
E_t	8	Total Employment annual frequency
N_t	7	Population 15-64 annual frequency

Appendix A3: The tax wedge

The theory has households paying the taxes. Consequently, it is necessary to adjust the national income accounts to be consistent with this theoretical framework. The adjustment consists of treating indirect taxes less subsidies as net taxes on final product by removing net indirect taxes as a cost component of GDP and reducing the final product components correspondingly.

We adopt the Prescott methodology (2004) and assume that two-thirds of indirect taxes net of subsidies falls directly on private consumption expenditures and that the remaining one-third is split evenly between private consumption and private investment. Writing OECD variables in capital letters we have the following expression for indirect taxes on consumption, IT_c;

$$IT_c = \left[\frac{2}{3} + \frac{1}{3}\frac{C}{C+I}\right] IT \tag{A1}$$

where C is OECD private consumption expenditures, I is OECD private investment, and IT is net indirect taxes. In the model, consumption c and output y can now be calculated as

$$c = C + G - G_{mil} - IT_c \tag{A2}$$

and

$$y = GDP - IT \tag{A3}$$

where G_{mil} denotes military expenditures.

There are two taxes on labour income, the income tax τ_{inc} and the social security tax τ_{ss}. The social security tax is calculated as

$$\tau_{ss} = \frac{SST}{(1-\theta)(GDP - IT)} \tag{A4}$$

where SST denotes social security taxes, IT is net indirect taxes, and θ is measured by the share of capital in national income. The (average) income tax rate is calculated as

$$\tau_{inc} = \frac{DT}{GDP - IT - Depreciation} \tag{A5}$$

where DT denotes government revenues from direct taxation. Direct taxes are those paid by households and do not include corporate income taxes. The expression for the consumption tax rate is

$$\tau_c = \frac{IT_c}{C - IT_c} \tag{A6}$$

The Prescott methodology then calculates the marginal labour income tax rate as

$$\tau_h = \tau_{ss} + 1.6 \cdot \tau_{inc} \tag{A7}$$

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