



# Analyzing female labor supply – Evidence from a Dutch tax reform<sup>☆</sup>

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## ARTICLE INFO

### Article history:

Received 28 October 2010  
Received in revised form 10 January 2012  
Accepted 31 January 2012  
Available online 10 February 2012

### JEL classification:

H24  
J22  
J38

### Keywords:

Uncompensated wage elasticity  
Labor force participation  
Working hours  
Endogeneity

## ABSTRACT

Among OECD countries, the Netherlands has an average female labor force participation, but by far the highest rate of part-time work. This paper investigates the extent to which married women respond to financial incentives. We exploit exogenous variation caused by a substantial Dutch tax reform in 2001. Our main conclusion is that the positive significant effect of the tax reform on labor force participation dominates the negative insignificant effect on working hours. The latter contradicts the common empirical finding of positive wage elasticities. Our preferred explanation is that women respond more to changes in tax allowances than to changes in marginal tax rates.

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## 1. Introduction

Since Heckman (1974) female labor supply has been an important topic for economic research. A major contribution to this literature has been made by Blundell et al. (1998), who show that changes in tax rules can be used to estimate wage elasticities. They investigate a series of modifications in marginal tax rates over a relatively long observation period. A related literature focuses on the importance of financial incentives, such as earned income tax credits, on labor force participation decisions (e.g. Eissa and Hoynes, 2004; Eissa and Liebman, 1996). We contribute to these literatures by investigating the effects of a very substantial Dutch tax reform in 2001.

In 2001, labor force participation rates of prime-age women in the Netherlands were close to those in the UK or US. However, part-time work among women is much more common in the Netherlands than in any other OECD country. Whereas, on average, in the OECD about 25% of the prime-age working women work less than 30 hours per week, this is over 55% in the Netherlands (OECD, 2004). The high rate of part-time work allows substantial room for increasing labor supply. It is generally believed that female labor supply is more responsive to financial incentives than male labor supply (e.g. Meghir

and Phillips, 2010). Therefore, Dutch policymakers have a strong interest in stimulating female labor supply. This could increase economic growth and contribute towards dealing with the costs of an aging society. Indeed, one of the most important motivations for the Dutch tax reform in 2001 was to make work financially more attractive for women.

The key elements of the tax reform were the reduction of marginal tax rates, and the replacement of tax allowances by tax credits. Both elements might affect the force participation decision and hours of work decision. The second element, however, is more likely to affect the participation decision due to the elimination of perverse disincentives to work (particularly for women with a high-income partner). Tax allowances and tax credits are both transferable between partners. Whereas the tax credit is a fixed amount, the benefit of the tax allowance depends on the marginal tax rate of the partner. For non-working women with a high-income partner, transferring the tax allowance to the partner is more beneficial than starting working at a low income. The reason is that when working (and earning more than 4000 euro annually), women had to use their own allowance at a low marginal tax rate, while when not working it would be transferred to their partner with a higher marginal tax rate. The change from allowance to tax credit can be considered as a reduction in the fixed costs of working. Saez (2002) stresses the importance of financial incentives for the decision to participate in the labor force. There are two relevant margins to investigate, labor force participation (extensive margin) and hours of work (intensive margin).

In the empirical analysis, we focus on prime-age women who are either married or cohabiting. Our empirical model is similar to the

<sup>☆</sup> Thanks to Hans Bloemen and Ian Walker for useful comments.

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model used in [Blundell et al. \(1998\)](#). However, we study a much shorter time period with a substantial tax reform rather than a series of smaller tax modifications. Tax reforms provide useful natural experiments to study the effect of financial incentives on female labor supply (see [Blundell and MaCurdy, 1999](#); [Eissa, 1995](#); [Eissa and Hoynes, 2004](#)). Because the tax reform generates exogenous variation in after-tax wages, it allows to deal with the simultaneity of working hours and after-tax wages. This simultaneity can arise, for example, because unobserved preferences or ability affect both wages and working hours, or because working hours have a direct effect on after-tax wages due to the progressive tax system. Obviously, the tax reform does not depend on individual characteristics, past choices and working hours. In the empirical model, the after-tax marginal wage will be instrumented using the tax reform. Since the tax reform was introduced at one specific moment, we should control for trends in working hours. Furthermore, we exploit the fact that the tax reform affected different groups differently to deal with self selection into employment.

In the empirical analysis, we use the Dutch Labor Force Survey collected by Statistics Netherlands, which is a repeated cross-section containing information on (weekly) working hours, and detailed information on the socioeconomic structure of the household. We link this to the Social Statistical Database on Jobs, which contains administrative information on jobs and gross income. Finally, we add taxable income registered by the tax offices. The overlapping period of the three databases is from 1999 to 2005.

Within our parameterized selection model we find that the estimated uncompensated wage elasticity is about  $-0.13$ , but not significantly different from zero. This suggests that the tax reform which increased after-tax hourly wages did not increase female labor supply. However, the tax reform had a substantial positive effect on labor force participation, which we attribute to the shift from allowance to tax credit. Female labor force participation increased by 2.4 percentage-points. Simulations with our estimated model show that the positive effect on labor force participation dominates the negative effect of wages. Whereas working women, on average, reduced weekly working hours by 0.04 hours, average working hours increased by 0.37 in the full population. The effect of the tax reform is highest for the lowest-educated women and decreases in level of education.

Our empirical results contradict earlier studies finding that the uncompensated wage elasticity is between 0 and 0.3 (see [Meghir and Phillips, 2010](#); for a survey). In particular, our results differ from those found in [Blundell et al. \(1998\)](#). As a sensitivity analysis we apply their grouping estimator, which gives a positive and significant uncompensated wage elasticity in the same order as found in [Blundell et al. \(1998\)](#). The grouping estimator might be less appropriate in our setting since our observation period contains a single tax reform. In that case it is only necessary to distinguish between the period before and after the tax reform, which can be done by a single instrument. The grouping estimator uses many instrumental variables of which in our case many are insignificant in the first-stage regression. In our setting the grouping estimator suffers from a weak instruments problem. The grouping estimator might perform better in situations in which there are a series of tax modifications rather than one substantial reform.

The outline of this paper is the following. [Section 2](#) provides details about the Dutch tax reform of 2001. [Section 3](#) introduces the empirical model. In [Section 4](#), we discuss our data. [Section 5](#) presents the estimation results, and [Section 6](#) concludes.

## 2. The Dutch tax reform

In this section, we provide details about the Dutch tax system. We mainly focus on elements relevant for this study, and particularly on changes which occurred during the tax reform in 2001.

The Dutch tax system is an individualized progressive tax system, with the exception of some tax credits and allowances which can be transferred between partners. Prior to 2001 all individuals had a general allowance and individuals only paid taxes on income above the allowance. There are also additional allowances for working and parenting, which we discuss below. Income above the allowances is taxed according to four income brackets with increasing marginal tax rates (including national insurance premiums). The tax allowances thus yield a higher tax reduction for high-income individuals with a higher marginal tax rate.

An important feature of the general allowance is that if the allowance cannot be fully used, the allowance is transferred to the partner.<sup>1</sup> Transferring the allowance is particularly beneficial if the partner's income falls in a bracket with a higher marginal tax rate. So working at a low income is financially relatively unattractive for women with a high-income partner.

The tax reform of 2001 replaced the general allowance by a tax credit. A tax credit is a fixed reduction on the total amount of taxes that an individual should pay. Like the general allowance, the tax credit is transferable between partners. However, if a woman increases labor supply, the total tax reduction to the family due to the credits remains the same. The tax reform removed some fixed costs of working, because the tax credit does not impose any disincentive effects of working at a low income.

The tax reform in 2001 also included a reduction of marginal tax rates. [Table 1](#) shows for each year the marginal tax rates for the four different income brackets in the Dutch tax system. The most substantial reduction occurred in the highest two brackets, where marginal tax rates were reduced by eight percentage-points. However, not only the marginal tax rates changed, but also the cut-off points of the brackets shifted (see [Fig. 1](#)).

The tax reform of 2001 not only replaced the general allowance by a tax credit, but also introduced new tax credits for parenting and the combination of working and parenting. The tax credit for parenting is transferable, but amounts to only 138 euro annually. The tax credit for working is more substantial, but not transferable. If an individual earns up to 50% of the annual (full-time) minimum wage, the tax credit increases by 150 euro per year. Above this, the tax credit further increases to 900 euro at an income level equal to the annual (full-time) minimum wage. [Fig. 1](#) shows the effective marginal tax rates at different taxable incomes in 2000 and 2001. When computing the effective marginal tax rates in the figure we take the nontransferable allowances and tax credits into account, but ignore the transferable allowances and tax credits. Taking account of the transferable allowances and tax credits would cause that the effective marginal tax rates at low incomes are not zero but dependent on the partner's income. The impact of the tax credit for working causes the drop in effective marginal tax rates between 8000 and 16,000 euro shown in [Fig. 1](#). The average annual taxable income of working women is about 15,000 euro.

The tax reform of 2001 reduced income tax for all individuals. As can be seen in [Fig. 2](#) the after-tax income was higher after the reform, and even more so for women with a high-income partner. However, some deductions were abolished. To compensate for the reduction in income tax, the government increased value added tax from 17.5 to 19% leading to a higher inflation rate in 2001 (see [Fig. 3](#)).<sup>2</sup> The decision on the tax reform was made in 1999, when the economy was booming. After that, economic growth slowed to almost zero in the first quarter of 2002. Around the same time the unemployment rate started to increase for the first time since 1994. [Fig. 4](#) shows the unemployment rate by level of education. It is clear that individuals with a lower level of education are more likely to be unemployed than

<sup>1</sup> Married and cohabiting couples have the same status in the Dutch tax system. If a partner has an annual income above 4000 euro, the allowance cannot be transferred.

<sup>2</sup> The value added tax on some essential goods, such as food, is only 6%.

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