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Flat Income Taxation, Redistribution and Labour Market Performance

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Abstract

A flat tax rate on labour income has gained popularity in European countries. This paper assesses the attractiveness of such a flat tax in achieving redistributive objectives with the smallest distortions to employment. We do so by using a detailed applied general equilibrium model for the Netherlands. The model is empirically grounded in the data and encompasses decisions on hours worked, labour force participation, skill formation, wage bargaining between unions and firms, and a wide variety of institutional details. The simulations suggest that the replacement of the current tax system in the Netherlands by a flat rate will harm labour market performance if aggregate income inequality is contained. Only flat tax reforms that reduce redistribution will raise employment. This finding bolsters the notions from optimal tax literature regarding the equity-efficiency trade off and the superiority of non-linear taxes to obtain redistributive goals in an efficient way.

Key words: Flat tax; Labour market; General equilibrium; Equity; Optimal taxation.

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1 Introduction

The flat tax has considerable appeal to many. In the German electoral campaign of 2005, Paul Kirchhof of the Christian Democratic Party promoted the flat tax for Germany. In the Netherlands, proposals for a flat income tax have been suggested by e.g. the Christian Democrats in 2001, the Liberal Party in 2005 and the Council of Economic Advisors in 2005. In promoting them, proponents generally advocate flat taxes for being simple and transparent. Moreover, they are generally perceived to be efficient in creating better incentives than the progressive tax structures that currently prevail in Western economies.

Flat tax reforms have gained further ground since a number of Central and Eastern European countries have introduced them over the past decade. In particular, Estonia and Lithuania introduced a flat tax in 1994 with rates of 26% and 33%, respectively. In 1995, Latvia followed with a flat rate of 25%. Nowadays, Georgia (12%), Russia and Ukraine (13%), Serbia (14%), Romania (16%) and Slovakia (19%) have all introduced flat income taxes. In some of these countries, the introduction of the flat tax has come along with a rise in tax revenues and a boost in economic growth. It feeds perceptions about the favourable economic implications of flat-tax reforms.

Yet, the economic effects of flat tax reforms have hardly been studied rigorously (Keen et al., 2008). An exception is perhaps the Russian flat tax, which was analysed in more detail by Ivanova et al. (2005). They conclude that there is no evidence for strong positive revenue or economic effects of the Russian flat tax reform. It appears that the simultaneous improvements in administration and compliance have been responsible for the surge in tax revenues. The Russian experience thus teaches us little about the economic effects of the flat tax reform itself. It teaches even less about the economic effects of a flat tax in Western Europe, where countries have very different economic and social structures. How would flat tax reforms affect economies in these grown-up welfare states?

Since there is no Western European country that has a flat tax, its likely consequences need to be assessed on the basis of either economic theory and/or model simulations. This is the purpose of this paper. In particular, we first discuss the lessons from the literature on optimal income taxation regarding the optimality of a linear income tax. The optimal tax models, however, are very stylized and usually do not apply actual data. We therefore supplement the theoretical insights with simulations using an applied general equilibrium model. The model is empirically grounded in Dutch data and encompasses decisions on hours worked, labour force participation, skill formation, wage bargaining between unions and firms, and a wide variety of institutional details. Moreover, the model distinguishes a large number of household types and employs micro data to calibrate the income distribution for each of these types. With the model, we explore the consequences of three flat tax reforms for the income distribution and the labour market: (i) a proportional flat income tax of 29% where the general tax credit is abolished; (ii) a flat tax of 38% where the general tax credit is unchanged as compared to the current situation;

(iii) a flat tax of 43% that allows for an increase in the general tax credit so as to keep our aggregate inequality index (the Theil coefficient) at the same level as before the reform. The latter choice follows the methodology adopted by Davies and Hoy (2002).

Our simulations reveal that a flat tax reform can improve labour market performance in the Netherlands, but only if larger income inequality is tolerated. If income inequality is contained through a higher general tax credit, a flat income tax harms labour market performance. This result is reminiscent of the optimal tax literature, showing that linear tax systems with a general tax credit are less efficient than non-linear tax systems to achieve a certain degree of income equality.

Note that the flat analyzed in this paper differs from the one proposed by Hall and Rabushka (1983). Similar to our case, their proposal contains a single tax rate on all labour income, combined with a fixed tax credit to render the system progressive. In addition to that, their flat tax applies also to income from interest, the return to equity and profits. In particular, investment is fully tax deductible for corporations so that the system effectively boils down to a cash-flow tax. Interest and dividends are not tax deductible at the firm level so it also resembles a comprehensive business income tax. In this paper, we pay no attention to this second component of the Hall-Rabushka flat tax, i.e. the taxation of capital income.

The rest of this paper is organized as follows. In section 2, we discuss the flat tax in the context of the theory of optimal income taxation. Section 3 explains the model that is used to explore the labour market implications of our tax reforms. Section 4 presents the analysis of two flat tax reforms in the Netherlands. Section 5 elaborates on other arguments for a flat tax, which cannot be assessed with the model. Finally, section 6 concludes.

2 Optimal income taxation

The Dutch government aims at reducing inequality. To that end, it uses progressive taxation, social benefits and tax credits that either or not depend on earned income. This redistribution of income does not come free. Indeed, income taxes reduce the price of leisure and household production relative to consumption, thereby inducing substitution away from labour supply towards untaxed activities. This reduces welfare in the presence of an income tax since the value of extra production from additional labour exceeds the social costs from foregone leisure. The government thus faces a trade-off between equity and efficiency.

In light of this trade-off between equity and efficiency, the question is how the government can obtain the best combinations between them. Following the seminal contribution by Mirrlees (1971), the literature on optimal taxation has derived the optimal structure of the income tax in the presence of equity concerns and labour-supply distortions. It reveals that the optimal marginal tax schedule depends on four factors. First, there are two factors that determine the benefits from redistribution, namely (i) pre-tax income inequality and (ii) social preference for redistribution. If pre-tax inequality is large and society features much aversion against

inequality, the government should put much effort in the redistribution of incomes from high to low-ability agents. The social benefits from equality should be weighed against the efficiency losses induced by redistribution. These efficiency costs are determined by the following two factors: (i) elasticity of labour supply of various agents; (ii) population density at various incomes. The elasticity of labour supply determines the classical distortionary impact of marginal tax rates on the consumption/leisure choice. The larger is the elasticity, the bigger is the distortionary impact of redistributive taxation and the less redistribution is optimal. Moreover, the optimal tax depends on the population density at various margins. If density is higher at some point in the income distribution, a marginal tax creates larger aggregate distortions so that the optimal tax rate is lower.

The optimal-tax literature reports a variety of results with respect to the optimal marginal tax schedule. In general, these findings can be understood by the variation in assumptions on the above factors. Mirrlees (1971) simulates the optimal marginal tax schedule for a utilitarian social welfare function, Cobb-Douglas preferences in consumption and leisure, and a log-normal distribution of abilities. He concludes that "… the most striking feature of the results is the closeness to linearity of the optimal tax schedules" (p.206). Subsequent contributions have raised doubts on this optimality of the linear income tax schedule. Tuomala (1990) finds that the optimal marginal tax schedule is sensitive to the underlying assumptions. In fact, the optimal structure is non-linear if social welfare functions feature relatively high inequality aversion and if labour supply responses are different between agents. The non-linear structure is more efficient because it employs more information on individual earnings so that it can achieve the same redistribution with less dead weight loss.

The older simulations in the literature typically found hump-shaped optimal tax schedules where marginal tax rates are generally declining with income over a wide range (cf. Tuomala, 1990). These simulations used bounded, synthetic log-normal distributions for skills and CES-utility functions with elasticities of substitution smaller than one, such that labour supply curves are backward bending at zero non-labour income. These features are less attractive from an empirical point of view. Actual income distributions are not bounded and appear to look more like the Pareto distribution especially near the top. The Pareto distribution eliminates the result of a zero marginal tax at the top as well, see Diamond (1998). And, labour supply generally features a non-negative uncompensated wage elasticity of labour supply, which rules out the backward bending labour supply curve.

More recently, Diamond (1998) and Saez (2001) have used empirical pre-tax income distributions for the United States and a uniform positive labour supply elasticity to show that the optimal marginal tax structure typically features a U-shaped pattern: high at the bottom and top of the distribution and low for middle incomes. This result is driven by population densities. Intuitively, a negative average tax for the poor is necessary to redistribute income. It should be phased out with income in a range where the population density is not so high. In the United States, this is just above the minimum income. Beyond this level, the optimal marginal tax falls

as population density increases and marginal taxes create large aggregate distortions in labour supply. It may rise again for higher incomes if inequality aversion is sufficiently large.

Most contributions to the literature thus suggest that a non-linear tax structure is more efficient than a linear structure, i.e. a flat tax. The reason is that the flat tax is informationally inferior to the non-linear tax because the government does not employ information on individual or household earnings under a linear income tax. With the same amount of dead weight loss, the non-linear tax structure redistributes more income than the linear income tax and vice versa (Saez, 2001).

Redistributive policies may also distort decision margins other than the marginal consumption/leisure choice. Examples are the extensive margin of labour supply, the search and acceptance behaviour of the unemployed, the schooling or training decision of workers, and wage demands in a unionized labour market. This may change the optimal tax results. For instance, Saez (2002) shows how participation distortions reduce the optimal marginal tax rates at the bottom of the income distribution to limit the distortions on job-search. Moreover, elasticities may vary with income, which further modifies the equity-efficiency trade-off. Optimal tax models would become analytically intractable if they would include a large number of decision margins or a larger degree of heterogeneity in elasticities and empirical income distributions. A way to explore flat tax reforms in a more complex but also more realistic setting is, therefore, to adopt an applied simulation model that includes these aspects. This will be done in the next sections.

3 An applied framework for the Netherlands

This section presents our applied general equilibrium model – MIMIC – that is used to explore flat tax reforms in the Netherlands.[1] The model encompasses various decision margins, such as effects on labour supply, human capital formation and equilibrium unemployment. A distinctive feature of MIMIC is a disaggregated household model. The large number of household types, together with microdata for the income distribution, make that MIMIC is best described as a mix of a microsimulation model and a general equilibrium framework. The model pays due attention to the institutional details of the Dutch tax and social insurance systems, which makes it especially relevant for policy analysis.

Labour supply

MIMIC contains a disaggregated household model aimed at describing the impact of the tax-benefit system on labour supply and the income distribution. First, the model accounts for heterogeneity in various dimensions, including skill, cohabitation, the presence of children,

[1] See Bovenberg *et al.*, 2000 for a core version of MIMIC. A description of the full model and its calibration can be found in Graafland et al., 2001.

whether household members participate or are eligible for social benefits, and age. Overall, the model distinguishes 40 different household types.

Within each type, we make a further distinction with respect to discrete options for labour supply. For instance, primary earners can choose their optimal working time between the options 80%, 100% and 120% of a full-time equivalent. Secondary earners and singles face more options. Thereby, secondary earners in couples can opt for voluntary non-participation. Empirical studies suggest that participation distortions are indeed relatively important for aggregate labour supply (Blundell, 2001). The particular option an individual chooses is derived from utility maximisation, with consumption and leisure as arguments, subject to a household budget constraint. The preference for leisure is heterogeneous across agents. We use a uniform distribution of this preference parameter to calibrate the high share of part-time work of secondary earners and single persons in the Netherlands. Hence, part-timers feature a relatively high marginal utility of leisure. In determining labour supply of couples, we assume that each partner makes an individual decision, given an average income from his or her spouse.

In interpreting the labour supply responses to changes in prices and incomes, the traditional income and substitution effects are at work. Hence, if the marginal tax rate declines, labour supply increases on account of the substitution effect. A lower average tax exerts a positive income effect, which reduces labour supply. Based on a meta analysis of labour-supply elasticities by Evers et al. (2005), we set utility parameters such that the uncompensated labour-supply elasticity equals 0.5 for secondary earners, 0.1 for primary earners and 0.25 for singles.

Within each combination of household-hours type, we employ a wage distribution based on Dutch microdata. We distinguish 10 income classes for each group and base the density of each class on the data for 1992. The average wage levels in the model are updated on the basis of realised wage growth in the Netherlands until 2006. For each income class, we derive disposable income by applying the Dutch tax-benefit system to the gross incomes. The after-tax disposable incomes and the marginal tax burdens determine labour supply behaviour.

Labour demand

Labour demand for high-skilled and low-skilled workers is derived from firms that maximise profits subject to a CES production technology. The first-order conditions reveal that labour demand depends on the relative wage costs for the respective types of labour. Based on time series estimates for the Netherlands, the substitution elasticity between high-skilled and low-skilled workers is set at 1.15. The substitution elasticity between capital and labour is set at 0.25. Economic profits originate from monopolistic competition without free entry. Hence, firms set prices as a mark-up over marginal production costs. This setting allows for endogenous terms-of-trade effects. As the export elasticity is set at a high value of – 5 for this small open economy, these effects are of minor importance for our simulations.

Union bargaining

Wages are obtained from a right-to-manage model. In bargaining over wages, trade unions exploit their monopsony power to reap part of the rents earned in production. However, by setting wages above the market clearing level, trade unions create unemployment which they value negatively. Unions thus face a trade off between high wages and low unemployment. An important specification in the right-to-manage model is the fall-back position of the trade union. In our model, it depends on unemployment benefits and an untaxed informal wage. The latter is modelled as a function of labour productivity and the price of consumption. Labour productivity is a proxy for the wage rate in the black market, while the price of consumption reflects the value of household production. This specification yields a non-linear wage equation in which several institutional variables enter. The non-linear equation has been estimated using Dutch time-series data (see Graafland and Huizinga, 1999). In linearised form and evaluated in the initial equilibrium of MIMIC, it reads as:

$$log\ W = log\ h + 0.3\ log\ RR - 0.6\ log(1-Ta) + 0.1\ log(1-Tm) - 0.1\ log\ U$$

where W is the real producer wage and h stands for labour productivity. The positive coefficient for the replacement rate (RR) reflects larger bargaining power of the union if social benefits increase. Higher benefits thus raise wage demands. The elasticity of 0.1 for the unemployment rate (U) is consistent with a consensus estimate from empirical studies reported by Blanchflower and Oswald (2005). The average tax rate enters the wage equation via $(1-Ta)$. This is because the untaxed informal wage is part of the outside option of the union. Higher average labour taxes therefore strengthen the relative bargaining position of the union and increase wage demands. The marginal tax rate enters the wage equation via $(1-Tm)$. This term exerts a positive effect on wages. Hence, progressive income taxes mitigate labour-market imperfections. Intuitively, tax progression makes it less attractive for unions to bid for high wages because a larger share of wage claims is transferred to the government instead of the workers. Therefore, trade unions will reduce wage claims, thereby reducing involuntary unemployment (see e.g. Bovenberg and Van der Ploeg, 1994). Empirical evidence supports this effect of tax progression on wages for a number of countries and in particular for the Netherlands (Tyrvainen, 1995; Sørensen, 1997; Graafland and Huizinga, 1999; Van Ewijk and Tang, 2000). Hence, while progressive taxes hurt welfare by reducing labour supply, participation and human capital, they can improve welfare by reducing equilibrium unemployment. Some degree of tax progression can therefore be efficient in an imperfect labour market.[2]

[2] MIMIC also contains a search-matching framework that further affects the labour-market and the impact of institutional changes. This part of the model is especially important for reforms that are very much targeted to specific groups in the labour market. As it is of minor importance for the flat tax reforms, we do not discuss this part of the model in great detail. For a more detailed description, see Graafland et al. (2001).

Human capital

When human capital formation is endogenous, marginal income taxes not only affect the quantity of labour supply but also on its quality.[3] In MIMIC, the skill composition of the labour force is endogenous as people choose the amount of on-the-job training. In particular, after-tax wage differentials determine the incentive for agents to improve their skill. Larger wage dispersion encourages education and training and raises the share of skilled workers in the labour force. Based on empirical studies, the elasticity of skill premium is calibrated at 0.5, see e.g. Kuhry (1998). The costs of training are modelled as an effort cost.

Government

Government behaviour is exogenous in MIMIC. The model describes the most important details of the Dutch income tax system, including the rate structure and a number of tax credits and allowances. The structure in the personal income tax is summarized in Table 3.1. In 2006, it contains a general tax credit of almost 2 000 euro, an in-work tax credit with a maximum of 1 350 euro and a number of specific tax credits targeted to certain groups. While the tax system is in principle individualized, this does not apply to the general tax credit. In particular, non-participating partners in couples can transfer their credit to their working spouse. The various tax credits imply that employed people do not pay tax for at least the first 10 000 euro of their income. Beyond this level, a piecewise linear tax structure applies, with rates moving from 34.15% to 52%. The highest rate is paid on incomes above 52 000 euro.

Table Error! Style not defined..**1 Income taxation in the Netherlands in 2006 (excluding employee insurances)**[a]

	Bracket length euro	Tax rate[c] %	Tax payers 1 000 persons	Taxable income bln euro
Personal income tax (Box1)[b]				
First bracket	17 046	34.15	5 174	158.5
Second bracket	13 586	41.45	4 069	62.4
Third bracket	21 598	42.00	2 171	24.8
Open bracket		52.00	425	8.7
General tax credit		1 990		
Earned income tax credit		Maximum 1 357		

[a] Projection, *CPB Macro Economic Outlook 2006*, September 2005.
[b] Box 1 contains income from labour and housing. Income from capital is taxed separately.
[c] The tax rates of the first two brackets comprise social security contributions at a rate of 31.70% for state old-age pension (aow: 17.90%), exceptional medical expenses (awbz: 12.55%) and survivor benefits (anw: 1.25%). Taxpayers over the age of 65 are not required to pay aow contributions and face a tax rate in the first two brackets of 16.25 % and 23.55 % respectively.

In analyzing (flat-tax) reforms with MIMIC, we consider equal-revenue changes (see also e.g. Bhattarai, 2007). In particular, our flat-tax reforms are balanced-budget on an ex-ante basis, i.e.

[3] Jacobs (2005) and Bovenberg and Jacobs (2005) show that optimal marginal income taxes are lowered when learning is taken into account.

before the endogenous behavioural consequences are taken into account. Hence, tax revenue changes in response to adjustments in labour supply or unemployment do not feed back into additional changes in the income tax rate in our simulations. Instead, we assume that the government budget is closed ex-post by changes in public consumption. The ex-post impact on public consumption thus provides a measure for the tax revenue implications induced by behavioural responses to the reform. We prefer this approach to closing the government budget with the income tax rate ex-post because it allows us to distinguish between the effects of the reforms and the effects associated with endogenous feedback effects.

Note that MIMIC essentially is a comparative static analysis. Therefore, the effects of flat-tax reforms should be interpreted as the structural, long-term implications of the flat tax reforms.

4 Simulating a flat income tax

The analysis focuses on three flat-tax reforms in the Netherlands. They differ with respect to the tax rate and the general tax credit. In the first version, the general tax credit remains unchanged. A flat tax rate of 38% is found to keep the government budget balanced in this case. In the second flat-tax reform, we increase the general tax credit by 1 400 euro and raise the flat tax rate to 43% to keep the government budget balanced.[4] The choice for this second reform is governed by its impact on our aggregate inequality index, the Theil coefficient. It is an indicator that equals 0 if all N persons have the same income and reaches a maximum of $\ln(N)$ if all income accrues to one person. The Theil coefficient remains unaffected by this reform. In a third flat-tax reform, a 29% flat tax goes along with an abolishment of the general tax credit. This transforms the Dutch income tax into a proportional system – although the in-work tax credit is unchanged and means-tested benefits remain in place.[5]

In presenting the results of our analysis, we concentrate on the income distribution and the labour market (compare e.g. Castañer et al., 2004). We present the ex-ante effects on the income distribution, showing scatter plots based on micro simulations for 40,000 Dutch households. The labour-market effects of the flat tax reforms are obtained from simulations with the MIMIC model.

[4] We increase the tax credit only for people with a positive income, not for non-participating partners. This avoids overcompensation of single earner couples. In the simulations, we assume that there is no problem associated with take up of the credit, *e.g.* because the tax bill becomes negative. Hence, the credit can be interpreted as a payable transfer, i.e. a negative income tax. In both reforms, we maintain the reduced rate in the first two brackets for the elderly above 65. Hence, the tax structure for the elderly is not flat.

[5] If the public budget would be closed ex-post by changes in tax rates, endogenous revenues effects associated with behavioural responses would feed back into changes in the tax rate. In that case, we would arrive at flat tax rates of, respectively, 37%, 43.5% and 26%. The economic effects will then be reinforced by this extra change in tax rates.

Impact on the income distribution

Figure 4.1 shows the income effects of the 38% flat income tax reform. Households are distinguished in four groups: one-earner couples, two-earner couples, single workers and single benefit recipients. The figures show the results from simulations for 40.000 households, where each point in the scatter represents one household. We see that the reform is especially harmful to people with low incomes, which is due to the rise of the tax rate in the first bracket from 34% to 38%. The reduction in income is about 3.5% for couples with an income of around 25 000 euro and for singles below this level of income. Singles and one-earner couples with a median income of 29 500 euro also lose, but to a lesser degree than the lowest incomes. For incomes of around 31 000 euro, the reduction in the marginal rate in the second tax bracket more or less outweighs the impact of the higher rate in the first bracket, i.e. this is the break even point. People relying on government assistance generally lose as they typically collect lower incomes than employees. People with high incomes gain, up to 10 to 12% for the highest income groups among working singles and couples. The figures suggest that these benefits accelerate at around 55 000 euro, which is where the top marginal income tax rate of 52% in the current system starts to apply. Overall, the flat tax reform is found to redistribute income from low to high incomes. The aggregate Theil measure rises by 6.4 percent.

With the 43% flat-tax reform, the higher general tax credit of 1 400 euro favours especially low income groups; the higher tax rate of 43% hurts especially people collecting high incomes. Therefore, the 43% flat-tax reform yields smaller distributional effects than the first. This is shown in Figure 4.2. We see that people earning low incomes generally lose only little from the reform (one-earner couples) or even gain (singles and two-earner couples). For these people the higher credit more than compensates for the increase in the flat tax rate. For very high income levels, the reduction in the marginal tax from 52 to 43% still reduces the tax burden on a major share of their income. Hence, these people gain, although less than under the 38% flat-tax reform. Again, we observe that the income gains start to accelerate at around 55 000 euro, i.e. where the 52% top marginal tax rate starts. The middle income groups typically lose as the rise in the tax rate to 43% applies to the lion share of their income. The higher tax credit only partially compensates for this. Therefore, the 43% flat-tax reform redistributes the tax burden from very low and very high incomes towards the middle groups. We thus observe a U-shape pattern for the income effects in Figure 4.2. By construction of the reform, the aggregate Theil coefficient does not change compared to the current system. Hence, overall inequality is broadly unchanged.

Figure 4.3 shows the distributional effects of the 29% flat tax in which the general tax credit is abolished. The scale on the vertical axis in Figure 4.3 differs from that in Figures 4.1 and 4.2 as the income effects are considerably larger. Indeed, the effects range between plus and minus 25%. The pattern is very similar to the 38% flat tax though: the lower income groups lose considerably while the higher income groups gain considerably. The break-even point is somewhere around 25 000 for singles and between 40 000 and 55 000 euro for couples.

Figure 4.1 **Income effects according to household type of a 38% flat tax in 2006 (% changes)**

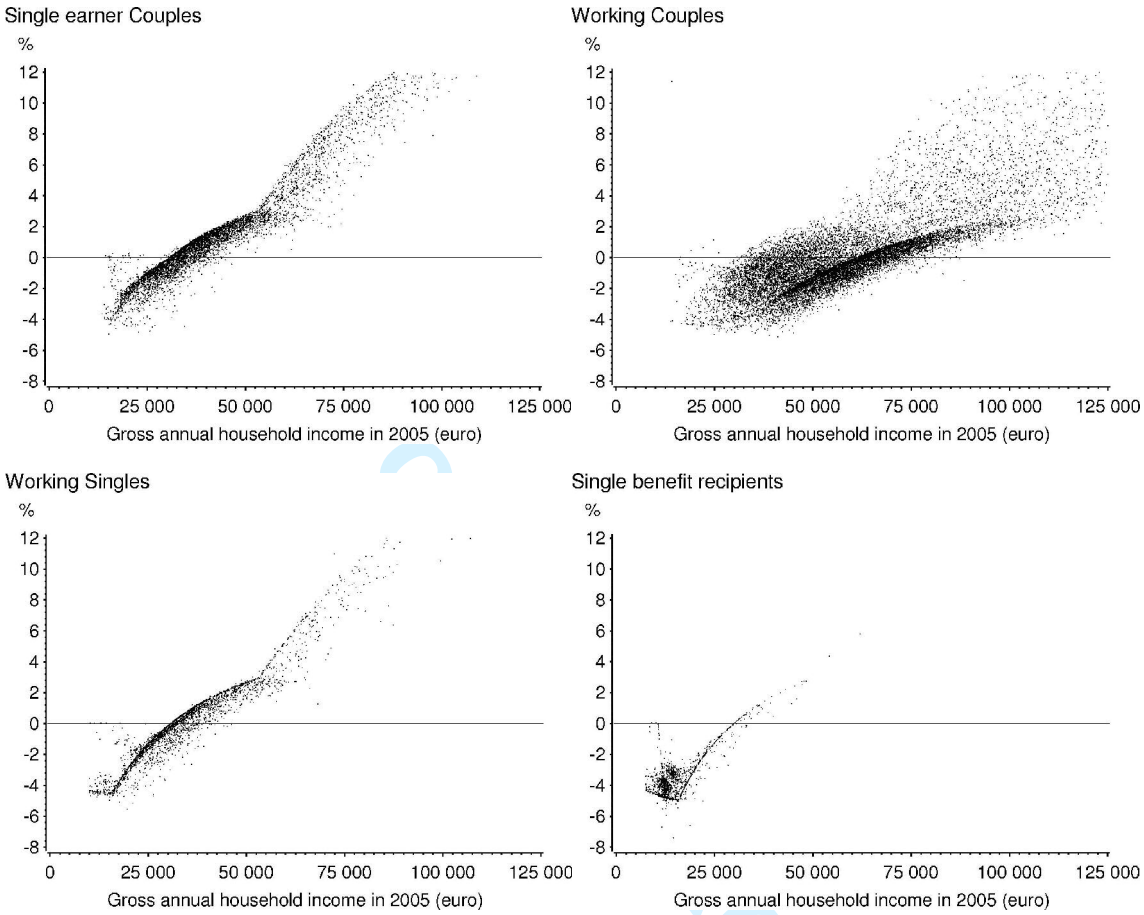


Figure 4.2 **Income effects according to household type of a 43% flat tax and a 1 400 euro higher tax credit in 2006 (% changes)**

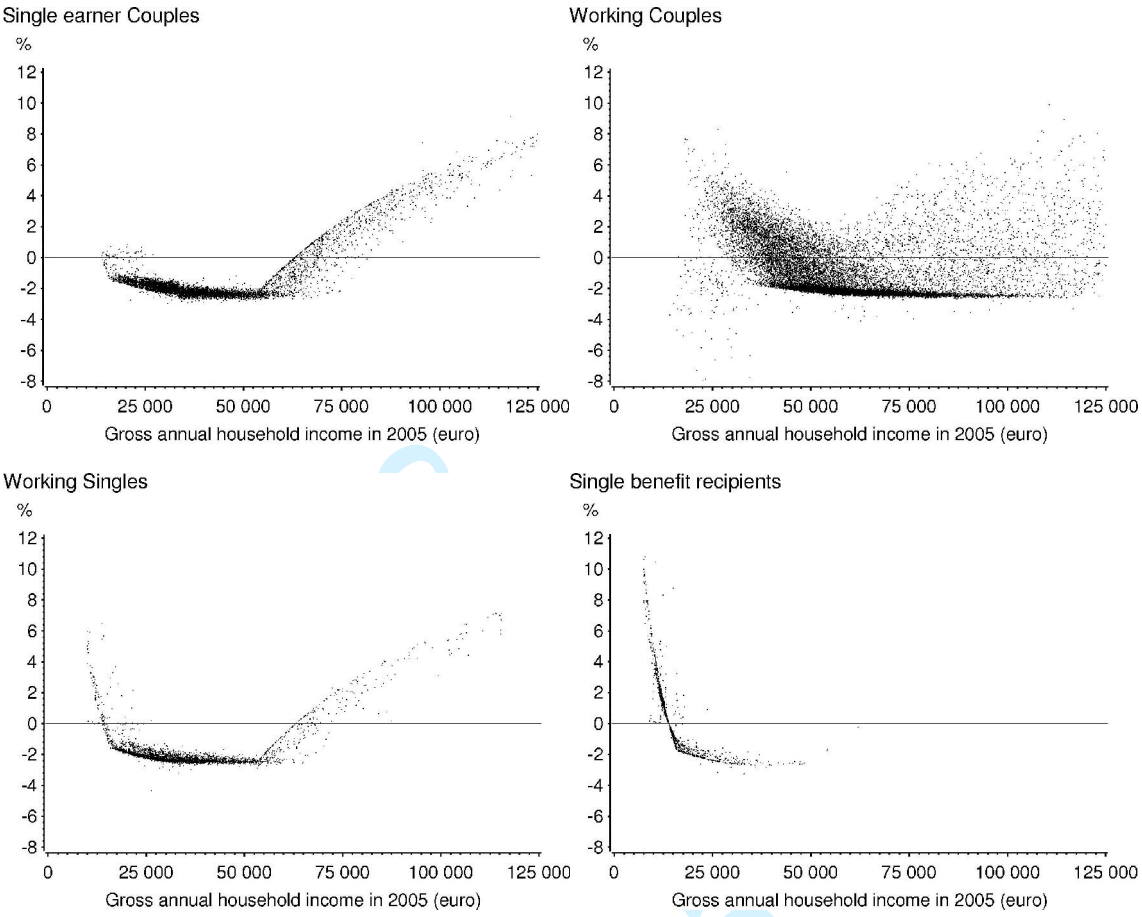
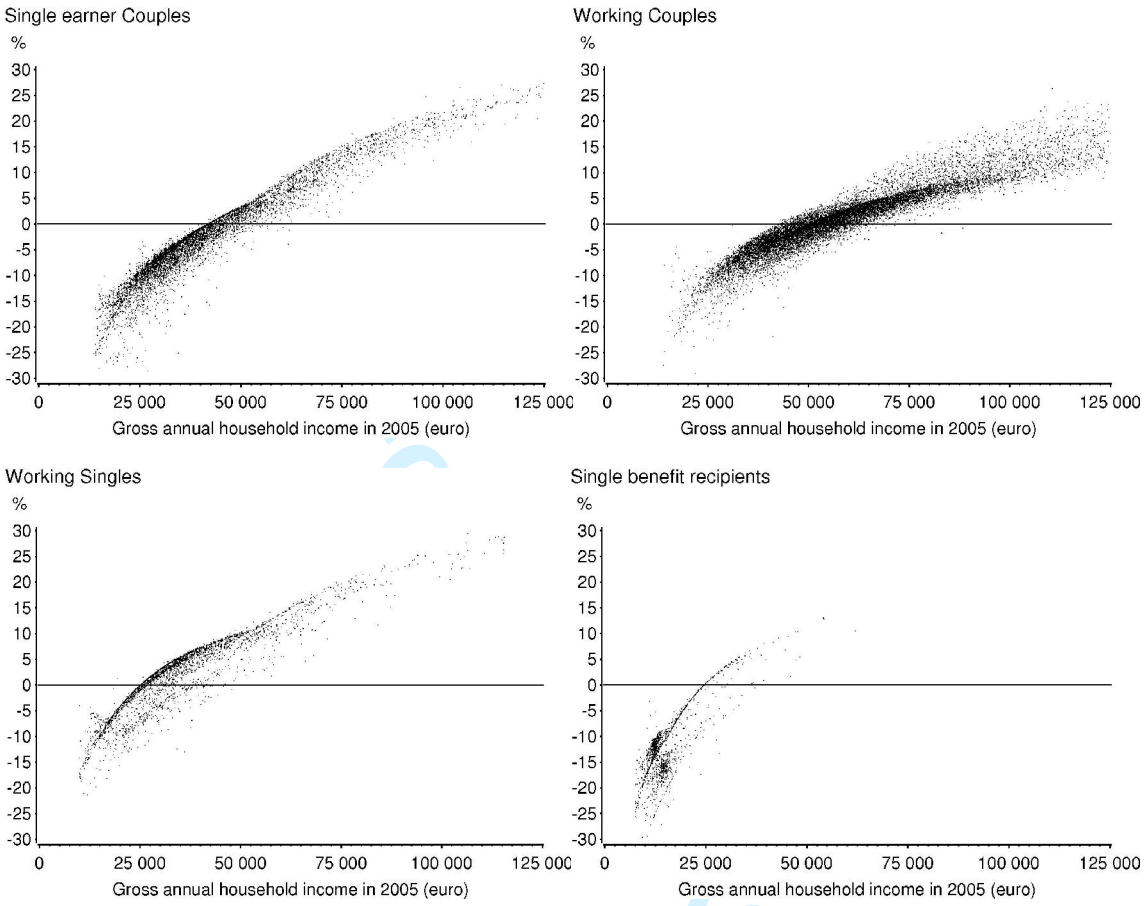


Figure Error! Style not defined.**.3 Income effects according to household type of a 29% flat tax and a zero tax credit in 2006 (% changes)**



Labour market implications

Table 4.1 shows the labour market effects of three flat tax reforms. With the 38% flat-tax reform, the first column of Table 4.1 shows that the marginal tax rate falls by 2.9% on average across individuals.[6] This lower marginal tax increases labour supply incentives due to substitution from leisure to consumption. Overall, labour supply expands by 0.9%. The increase in hours worked does not apply to all individuals, however. On the one hand, most primary earners and single persons face lower marginal tax rates as they are taxed at the margin in the higher tax brackets. Hence, these groups raise hours worked. On the other hand, many secondary earners in couples hold part-time jobs where they are taxed at the margin in the first bracket. The increase in the tax rate from 34% to 38% in the first bracket discourages non-

[6] Rym and Koray (2004) discuss alternative methods to compute the average marginal tax rate. We take the weighted mean of all working individuals, where gross incomes are used as weights.

participating partners to occupy small part-time jobs. Accordingly, the female participation rate drops by 2%. Other partners increase their hours worked due to lower marginal tax rates in the higher tax brackets. This compensates for the lower participation rate so that the overall effect of the flat tax reform for the labour supply of partners is negligible. Lower marginal tax rates also encourage training by increasing income differences between skills. This raises the transition rate from low to high-skilled labour. The share of high-skilled labour supply is found to expand by 0.8%.

The equilibrium unemployment rate falls slightly. This is the result of two offsetting effects. On the one hand, benefit recipients typically collect lower incomes than workers. Hence, the replacement rate falls. This increases job search and reduces the reservation wage in the search-matching model. Moreover, it moderates wage claims in the bargaining model, where the lower replacement rate reduces the bargaining position of the workers due to a less attractive outside option. On the other hand, the lower marginal tax exerts upward pressure on wages in the bargaining model. On balance, the first effect dominates so that the unemployment rate falls by 0.1%. The effect is concentrated among the low-skilled where the replacement rate falls most.

The favourable labour-market effects of the reform cause a broadening of the tax base so that tax revenues expand ex-post. This effect shows up in higher public consumption, which rises by 0.5% of GDP. Overall, we can conclude that the 38% flat-tax reform causes more inequality. At the same time, it reduces distortions in labour supply, training and unemployment. Hence, it illustrates the classical trade-off between equity and efficiency.

The second column of Table 4.1 shows the labour-market effects of the 43% flat-tax reform. We see that aggregate labour supply distortions become larger, rather than smaller: labour supply falls by 0.3%. The reason is that the marginal tax burden is shifted from people at the bottom and top of the income distribution towards the middle incomes. On the one hand, the lower marginal tax at the bottom encourages non-working partners to participate in small part-time jobs. Moreover, high-skilled primary earners who face a lower marginal tax rate raise their hours worked. On the other hand, the higher marginal tax on middle incomes exerts negative effects on hours worked. This latter distortion is relatively large for two reasons. First, it affects the more densely populated group of middle incomes, which renders the distortions larger. Second, it affects secondary earners and singles who feature larger elasticities than male breadwinners. Indeed, the simulations suggest a fall in labour supply of partners and singles of 0.1% and 1.1%, respectively.

By construction, the 43% flat tax reform does not increase overall income inequality: the Theil coefficient does not change. Also the effects on human capital formation and the share of high-skilled labour supply are negligible. Due to the fall in hours worked, aggregate employment falls by 0.3%. Hence, while the 43% flat-tax reform avoids an increase in aggregate inequality, it fails to yield positive labour market effects. In fact, the reform comes along with negative effects on labour supply and employment. It suggests that the 43% flat tax achieves redistributive goals in a less efficient way than the current Dutch tax system.

The third column of Table 4.1 shows the effects of the 29% flat-tax reform. It moves in opposite direction compared to the second column, i.e. it benefits the higher incomes who gain relatively much from the lower income tax rate, at the expense of lower incomes who currently benefit relatively much from the general tax credit. This reform thus further reduces the progression of the tax system and moves the income tax towards a proportional income tax. As a result, the inequality index rises sharply by more than 20%. At the same time, labour supply expands by 4%, and the share of high-skilled labour rises by 1.7% due to improved learning incentives. It shows the same equity-efficiency trade-off as in the first column of the table, but in a more extreme form.

The simulation results with MIMIC match with the insights from optimal tax literature. That literature suggests that a non-linear tax structure is typically more efficient than a linear (flat) tax system in reducing inequality because it better exploits information about the variation in income densities and elasticities. In fact, the general tax credit appears to be too crude an instrument to achieve the desirable degree of equality. In MIMIC, a flat tax fails to improve labour-market performance if income inequality is to be maintained. In the model, not only income densities and the variation in elasticities matter, but distortions are reinforced through endogenous human capital formation but mitigated by pre-existing distortions on the labour market.

Table Error! Style not defined..**1** **Long-term effects of two flat tax proposals on the labour market**[a]

	Flat tax 38% Tax credit 2000 euro	Flat tax 43% Tax credit 3400 euro	Flat tax 29% Tax credit zero
Inequality index (Theil coefficient)	6.4	0.0	20.6
Labour supply in hours	0.9	– 0.3	4.0
primary earners	1.2	0.1	2.8
secondary earners	– 0.3	– 0.1	4.2
single persons	0.8	– 1.1	4.7
Female participation rate	– 2.0	1.5	1.9
Share of high-skilled labour supply	0.8	0.0	1.7
Employment	1.1	– 0.3	5.3
low skilled	– 2.1	– 0.4	– 2.0
high skilled	2.4	– 0.2	8.2
Unemployment rate (absolute change)	– 0.1	– 0.1	– 0.3
Production	1.2	– 0.1	5.1
Public consumption in % GDP (closure rule)	0.5	– 0.2	1.8

[a] The 38% flat tax involves a revenue-neutral replacement of the existing tax structure by a single rate; The 43% flat tax is accompanied by a rise in the general tax credit of 1 400 euro. The 29% flat tax is accompanied by an abolishment of the general tax credit. The rate for elderly people is 17.9% lower in the current first two tax brackets. All figures are expressed in relative changes unless indicated otherwise.
Source: MIMIC simulations.

5 Tax arbitrage and simplification

Flat tax proposals have also been motivated by other arguments than their labour-market implications. In this section, we discuss these arguments and explore whether they can validate the introduction of a flat tax.

Under a flat income tax, the government requires only information about aggregate labour income to determine tax liabilities. Indeed, there is no need for an individualised tax rate so that the tax can be levied simply as a payroll tax on employers. This may save on administrative and compliance costs. However, these savings on administrative costs evaporate if the government still needs to collect information on household or individual incomes for the determination of means-tested benefits, tax credits, subsidies or tax exemptions. Related to this is the argument of increased transparency of a flat tax for taxpayers. Also this ignores the income dependent schemes. In fact, the complexity and lack of transparency of the tax system is not caused by the rate structure, but by the determination of taxable income, which is complicated due to exemptions, deductions and credits to e.g. housing, pensions, schooling, children, cars, traveling costs, and the like. Removing these parts of the tax code can simplify the system and broaden the tax base considerably, but this is different from the adoption of a flat tax rate.

Another possible advantage of the flat tax is that it reduces tax arbitrage. For instance, the flat tax is neutral with respect to the division of lifetime income across years and thus reduces intertemporal tax arbitrage. However, the opportunities for intertemporal arbitrage are already mitigated as in the current system people have the option to divide their income equally across three subsequent years. Still, intertemporal arbitrage remains important as the Dutch tax system applies a tax rate that is 17.9%-points lower for people above 65 than for people below 65. This encourages postponement of income to the old age. Yet, this form of intertemporal arbitrage does not depend on the progressive tax structure, but on the low tax on elderly. There are also other forms of tax arbitrage, e.g. between corporate and personal income or between labour and capital income. As long as the flat tax applies only to labour income and different tax rates apply to different sources of income, these forms of arbitrage will not disappear, however. Indeed, it would require an integrated approach along the lines of the Hall-Rabushka proposal for a flat tax, not just a flat rate on labour income, to alleviate this arbitrage.

A flat rate is also argued to be more neutral with respect to the division of labour between partners in a household. Rising marginal tax rates give excessive incentives to men to engage in household production compared to women -- given that men earn more than women. Under a flat tax, in contrast, the marginal tax rate will be equal for both partners. This form of neutrality is, however, inefficient when differences in labour elasticities between men and women are taken into account. Indeed, Ramsey principles suggest that elastic tax bases should be taxed less than inelastic ones so that marginal tax rates for women should be lower than for men (Boskin and Sheshinsky, 1983). Accordingly, the government needs to trade off distortions in the division of labour within families and distortions in the labour market.

A flat tax is sometimes said to reduce political opportunism, which arises due to special interests and lobby groups. This argument is flawed because not the rate structure serves special interest groups, but the myriad of exceptions, exemptions and deductions does. Changing the rate structure is not a targeted policy to serve the special interest groups, too costly in budgetary terms and completely transparent to the general public. A flat tax is therefore unlikely to fundamentally affect political distortions.

6 Conclusions

Should countries with a grown-up welfare state follow the example of Central and Eastern European countries and adopt an income tax structure with a single, flat tax rate? This paper analyzes different versions of a flat tax in the Netherlands by looking at their effects on the income distribution and labour-market performance, using an applied general equilibrium model combined with a microsimulation model for households. We find that flat tax reforms have the potential to stimulate labour supply and reduce unemployment. For instance, a 29% flat tax with no general tax credit is found to raise aggregate employment by 5.3%. A less extreme 38% flat tax that leaves the general tax credit at its current level raises employment by 1.1%. Such proposals, however, come at the expense of more inequality. Thus, they illustrate the classical trade-off between equity and efficiency. If we construct a flat tax that does not affect aggregate income inequality, our simulations suggest that it will not alleviate labour market distortions. Instead, labour supply and employment will decline. The reason is that the flat tax shifts the marginal tax burden towards the densely populated middle groups and to partners and singles who feature relatively high elasticities of labour supply. For Western European countries that are unwilling to sacrifice in terms of equity, flat tax reforms are thus unlikely to improve efficiency.

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