



**Master Thesis Tax Economics**

**The social welfare weights of single  
parents in the Netherlands compared  
to six European countries.**

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## Abstract

The Netherlands has a large number of difficult regulations regarding child support. Therefore, the Dutch government has introduced a tax reform on child support regulations in 2015. The aims of the tax reform are: simplifying the regulations regarding child support, stimulating labour participation and maintaining income support for the ones who need it the most. This tax reform has a great impact on the income and labour participation of single parents in the Netherlands. The main objective of this thesis is to investigate the Dutch government's preferences for redistribution pre- and post-reform and compare these to six other European countries (Belgium, Denmark, France, Germany, Ireland and the UK). Furthermore, I evaluate the current tax system regarding single parents in the Netherlands and determine if the aims of the tax reform have been achieved. In order to do this, I use the optimal taxation model of Saez (2002) and the inverted optimal tax model, which is introduced by Bourguignon and Spadaro (2012). The results of this thesis show that social welfare weights of the Netherlands pre- and post reform differ significantly from the six other European countries. The governments in most European countries value a guaranteed social assistance income for unemployed single parents more than optimally stimulating labour participation. However, the Dutch government has achieved the aims of the tax reform. Therefore, the findings of this study can be used as reference for other governments to improve the labour participation of single parents in their own country

# 1. Introduction

“The income inequality in the OECD countries is at the highest level for the past half century. The average income of the richest 10% of the population is about nine times that of the poorest 10% across the OECD countries” (OECD, 2016). Therefore, preventing the rising inequality becomes one of the most important topics on the political agenda in many countries.

According to the Centraal Bureau voor de Statistiek (2016a), the income inequality for the Netherlands is relatively small compared to other OECD countries. Despite the low average income inequality level in the Netherlands, there are still large income differences between household types in the Netherlands. The study of the Centraal Bureau voor de Statistiek (2016) shows that single parents with young children have the lowest income compared to other household types (most of the single parents are women). This is because of the high unemployment rate among the single parents. Moreover, the number of single parents in the Netherlands has risen from 360.000 in 1995 to 545.000 in 2015 (Centraal Bureau voor de Statistiek, 2016b). The rapid increase and the high unemployment rate of single parent households make this a very interesting group for policymakers in the Netherlands.

The study of Jongen et al. (2015) shows that single mothers with young children are very responsive to financial incentives. One of the most important reasons that single mothers do not have the preference to participate in the labour market is that working is not financially attractive. The income differences between working and the social assistance they receive are relatively small to create financial incentives.

To stimulate the labour participation of unemployed single parents, the Dutch government has introduced a tax reform in 2015 regarding child support regulations. The aims of this reform are: 1) to simplify the child support regulations, 2) to stimulate labour participation and 3) to maintain income support for the ones who need it the most (Wet hervorming kindregelingen, 2015). A recent study of the Centraal Bureau voor de Statistiek (2016c) shows that the tax reform of 2015 benefits the single parents with low incomes the most. However, the effect on the labour participation after the tax reform for single parents has not been studied yet.

Blundell et al. (2009) discuss the optimal tax and transfers system in the UK and Germany for single parents. Following the leads of Blundell et al. (2009), I study the tax reform for single parents in the Netherlands. Earlier research shows (Jongen et al., 2014) that single parents with young children have high labour supply elasticities. However, social welfare preferences for single parents have not been investigated in the Netherlands after the tax reform. The preferences can be translated into social welfare weights, which reflect the government's valuation of a particular household type in the society. Moreover, social welfare weights may help the government to recognize inequalities in the tax system and can also evaluate the current tax system. Furthermore, government preferences for redistribution of neighbouring countries might affect the tax system of a country. Therefore, it is interesting to investigate the social welfare weights in the Netherlands pre-reform (2014) and post-reform (2015) and to compare these to the social welfare weights of neighbouring countries.

The following research question will be answered in this thesis:

***How do the social welfare weights for single parents of the Dutch government in 2014 and 2015 compare to the social welfare weights of six other governments in the EU?***

This thesis has the aim to analyse the Dutch tax system for single parents pre reform (2014) and post reform (2015) and to compare the government's preferences in the Netherlands to Belgium, Denmark, France, Germany, Ireland and UK. Furthermore, I carry out robustness analyses on the optimal tax rates in the Netherlands and the UK.

In order to find the optimal tax rates, I use the optimal taxation model of Saez (2002). This model calculates the optimal marginal tax rates at every income level in terms of the relevant elasticities of taxable income and the properties of the wage distribution. The "CPB Netherlands Bureau for Economic Policy Analysis" (CPB, 2015) provides Microtax and Singletax. Microtax is a tax benefit calculator for the Netherlands to calculate the actual net incomes and net taxes at every income level. Singletax is a simulation model in which both the optimal taxation model (Saez, 2002) and the inverted tax model (Bourguignon and Spadaro, 2012) are implemented.

The results of the optimal taxation model of Saez (2002) show that the UK government provides more transfers to unemployed single parents than the Dutch government. Furthermore, I carry out robustness analyses on the income distribution, the

intensive elasticity, the extensive elasticity and the government's budget constraint to investigate which of these parameters has the largest impact on the level of the optimal tax rates between the UK and the Netherlands. The results of the analyses show that the government's budget constraint and the income distribution have the largest impact on the level of the optimal tax schedule. Therefore, it is of great importance to take the income distribution and the budget constraint into account when governments structure a welfare program.

For the simulations of the social welfare weights of the seven European countries, I use the inverted optimal tax model, which is introduced by Bourguignon and Spadaro (2012). Both simulations require the country specified data on income distributions, elasticities, the shares of the population and the actual tax rates of a country. This data is provided by the "CPB Netherlands Bureau for Economic Policy Analysis" (CPB, 2015) for the Netherlands. The country specified data of the UK is obtained from the paper of Blundell et al. (2009), where I use the OECD tax benefit calculator to find the actual net incomes and net taxes.

Unfortunately, the income distributions of Belgium, Denmark, France, Germany and Ireland (for further reading these countries are referred as "the five other European countries") are not available. Therefore, I use the Gini-indices to overcome this lack of information. I divide the countries into two groups with comparable Gini-indices. The first group has comparable Gini-indices to the Netherlands and the second group has comparable Gini-indices to the UK. An assumption for this thesis is: when countries have comparable Gini-indices, they also have similar income distributions. Following this assumption, the income distribution of the Netherlands and the UK are applied to the five other European countries. I find empirical evidence (Bargain et al., 2013; Immervoll et al., 2007) to support the classification of the five other European countries in these two groups.

However, applying the country specified income data of the Netherlands and the UK to the other five European countries may affect the outcomes of the simulations. Therefore, the results of this thesis are not able to precisely represent the government's preferences for redistribution in these countries. Nevertheless, the results do provide an indication of the government's valuation on single parents in each income group, because the actual net taxes and net incomes of the five other European countries are used for the simulations. The

findings of this study can be used as reference for other governments to improve the labour participation of single parents in their own country.

The results of the inverted tax model (Bourguignon and Spadaro, 2012) show that the social welfare weights in 2014 (pre-reform) as well as in 2015 (post-reform) are the highest for the unemployed single parents in the Netherlands. However, the social welfare weight of the working poor has increased after the reform. This indicates that the tax reform is stimulating labour participation more compared to the situation in 2014, which fulfills one of the aims of the tax reform. The other two aims of the tax reform (simplifying the regulations regarding child support and maintaining income support for the ones who need it the most) are also achieved by reducing the regulations regarding child support and the increase in net income for the working poor.

Moreover, Belgium, Germany, the Netherlands and Denmark all show negative social welfare weights in their tax system. This implies that Pareto improvements (a different allocation that makes at least one group better off, without making any other group worse off) can be made in the current tax system. According to the results, the pre- and post-reform social welfare weights of the Netherlands differ significantly from the five other European countries and the UK. However, the governments of the most European countries allocate the highest social welfare weight to the unemployed single parents. This indicates that the governments in these countries value a guaranteed social assistance more than optimally stimulating labour supply of single parents.

This thesis is structured as follows: chapter 2 provides the literature review on the optimal taxation theory. Chapter 3 outlines the history of the Dutch tax system regarding child support regulations and presents the tax reform of 2015. Chapter 4 introduces the optimal taxation model of Saez (2002) and describes the implementation of this model. Chapter 5 discusses the results of the optimal tax schedules of the Netherlands and the UK and provides robustness analyses. Chapter 6 describes the inverted tax model introduced by Bourguignon and Spadaro (2012) and shows the findings on social welfare weights in the seven European countries. Chapter 7 presents the main findings and conclusions. Chapter 8 shows the shortcoming and recommendations of this thesis.



## 2. Literature review

### 2.1 The optimal taxation theory

The first part of the literature review describes the developments in the optimal taxation literature in the last decade. It presents the foundation and conditions of optimal taxation models that the present day studies are based on. Furthermore, it provides explanations for the features of optimal marginal tax rates and social welfare weights.

Mirrlees (1971) introduces a model that solves the optimal non-linear income tax problem. His model focuses on the intensive margin, where individuals can only choose how many hours they want to work. Individuals do not have the choice to enter or leave the labour market. Since this model assumes every individual participates in the labour market, the government does not have to offer transfer programmes (for example social assistance) for the unemployed individuals. Therefore, transfer programmes are ruled out in this model. Furthermore, the earning abilities can not be observed by the government. Therefore, Mirrlees uses the total labour income earned to overcome the lack of information on earning abilities. The total labour income is comprised of the labour hours supplied and the hourly wage of individuals. A model based on these two parameters makes it possible to find all labour income levels. However, the model of Mirrlees (1971) only takes the intensive margin into account. The crucial role of the extensive margin is introduced by Diamond (1980). He provides a model where hours and wages are fixed, but individuals can choose whether or not to participate in the labour force market (extensive margin). Furthermore, he finds positive marginal tax rates for the ones who are paying taxes. Negative marginal tax rates may occur for some individuals with subsidized work.

Saez (2002) presents a model that combines the ideas of both Mirrlees (1971) and Diamond (1980). His model allows individuals to choose whether they want to work and how many hours they want to work. He shows that optimal tax rates might turn negative when the extensive elasticity is large compared to the intensive elasticity. Optimal tax rate formulas are derived as a function of the behavioural elasticities estimated by the empirical literature, which is also applied to the models of Mirrlees (1971) and Diamond (1980). Using the estimates of intensive and extensive behavioural elasticities, it is possible to assess the

optimal shape and the optimal size of the transfer program. In order not to discourage the participation of the working poor, there is an important role for some form of Earned Income Tax Credit (EITC). The new trend in many OECD countries is the introduction of various in-work benefits, which make work more financially attractive.

Immervoll, Kleven, Kreiner and Saez (2007) compare the effects of the traditional welfare program (where the unemployed individual receives a guaranteed income from the government) and the in-work benefits (e.g. earned income tax credit) in 15 countries in the European Union. They use a model of labour supply with responses along the intensive and extensive margins and the EUROMOD microsimulation model to estimate current marginal and participation tax rates. Their results show that increasing redistribution through traditional welfare programmes leads to negative labour supply responses on the intensive and extensive margin, while introducing an in-work benefit results in positive labour supply responses along the extensive margin. However, when a government has an extremely high preference for redistribution and puts a much higher social welfare weight on the unemployed individuals than on the working poor, it is possible that increasing traditional welfare will be more desirable than introducing in-work benefits.

Blundell, Brewer, Haan & Shephard (2009) apply the optimal tax formula derived by Saez (2002) to empirically discuss the optimal tax and transfer design for single mothers in Germany and the UK. The authors combine the theory of optimal taxation with both country specific tax and benefit micro-simulation models and country specific structural models of labour supply. They find that in-work credits (credits that stimulate labour participation of the individuals with low incomes) with negative marginal tax rates are not optimal, even when the government's preferences for redistribution are low. Furthermore, by reversing the optimal tax problem, they find that the actual tax and transfer schedules in both countries are only optimal if governments attach a much higher social welfare weight to incomes received by the non-workers than by the working poor.

Sorensen (2010) presents a summary of examples from the recent literature on optimal taxation to convince the reader that the recent theory can offer useful guidance for practical tax policy. Many recent empirical studies (Saez, 2001) indicate that the size of the elasticities can be quite large at the bottom of the income distribution, which means that financial stimuli have a strong impact on the incentive to participate in the labour market. In

terms of the optimal taxation theory, it suggests that subsidies and transfers are requirements for an optimal tax system. The findings in recent theoretical and empirical research are of great interest for policy makers, because they explain which policies are most effective in reducing the disincentives to work. Sorensen's study suggests that a recent contribution in the theory of optimal taxation has moved closer to the real world of policymaking.

Jacquet, Lehmann & Van der Linden (2013) propose a new method to analytically determine the sign of optimal marginal tax rates in a model with both intensive and extensive margins. In order to do this, they consider an economy where individuals are heterogeneous across two dimensions: the skill level and disutility of participation to the labour market. Their contribution shows that the implication for the "first-best" setting (where the government observes the skill of workers but not the skill of the unemployed nor the disutility of participation of anyone) is also valid for the second-best setting (where the government does not observe individuals' types). They find a mild sufficient condition guaranteeing non-negative marginal tax rates everywhere. Furthermore, their simulations show that the marginal tax rates should be non-negative everywhere and that the participation tax should be discontinuous at zero earnings. Finally, their analysis emphasizes that introducing an extensive margin substantially reduces the optimal marginal tax rates.

## **2.2 The role of social welfare weights**

The first part of this chapter describes whether it is possible to justify the characteristics of existing systems through several optimal tax arguments. The standard approach consists of verifying whether the social welfare function implied by the actual redistribution schedule is "reasonable", and in particular whether marginal social welfare weights are always decreasing and positive. In the second part of this chapter, I describe the relevant role of social welfare weights in present-day policymaking and show why it is important to reveal social welfare weights. Social welfare weights show how much a government values a particular group of individuals in the society, given the budget constraint. Furthermore, social welfare weights help policymakers or scientists to recognize inequalities in a tax system and contribute to policy debates on redistribution such that Pareto

improvements can be made. Moreover, the revealed social welfare weights might evaluate the current tax system and provide directions for the design of new regulations.

Stern (1977), Christiansen and Jansen (1978), Ahmad and Stern (1984) and Decoster and Schockkaert (1989) are the first people to study the inverted optimal tax method on indirect taxes. Bourguignon and Spadaro (2012) introduce the inverted optimal tax model for direct taxation. They make the first attempt to reveal the implicit social welfare preferences by applying an optimal inverse technique to direct taxation, within the framework of Mirrlees' optimal labour income tax model. Their paper focuses on the French redistribution system and finds that, under several plausible assumptions regarding the labour supply elasticity, the government appears to be non-Paretian, which indicates that they are giving negative marginal social welfare weights to the richest class of tax payers. When taking the participation decisions into account, the results confirm that high marginal tax rates are compatible with the maximization of a Paretian social welfare function at low labour supply elasticity. Furthermore, the method in this paper makes it possible to characterize the change in social preferences when tax reforms have taken place by comparing social welfare weights before and after the reforms.

Bargain and Keane (2010) use the inverted optimal tax model of Saez (2002) to investigate the redistributive preferences in Ireland over the time period of 1987-2005. They also retrieve the labour supply elasticities using a discrete choice model, where they specify consumption-leisure preferences to estimate labour supply behaviour and predict elasticities for different periods of time and income groups in Ireland. In this model, coefficients on consumption and worked hours vary linearly with several taste-shifters (e.g. gender, polynomial form of age, region). In contrast to other studies, this study retrieves the labour supply elasticities consistent with the data at use, while other studies postulate reasonable values for elasticities (Saez, 2002, Bourguignon and Spadaro, 2012, Immervoll et al., 2007). Bargain and Keane aim to answer the question whether the marginal social welfare function revealed by a study over a certain period is consistent over time. They find that redistributive preferences for the Irish government are very stable over time, while the economic circumstances are rapidly changing and radical fiscal reforms have taken place. They provide similar characterizations of redistributive preferences for the UK. However, the findings for the UK are contrary to the findings for Ireland. Their study captures the development in

social preferences of the Irish government over time. The findings for the UK can be explained by the social preferences of the political parties that were in power.

Bargain, Dolls, Neumann, Peichl & Sieglöcher (2013) have analysed the extent to which social inequality aversion differs across nations when controlling for actual differences in labour supply responses. They estimate labour supply elasticities at the extensive and the intensive margin for 17 European countries and the US. They focus on singles without children and use the inverted model proposed by Bourguignon and Spadaro (2012). Their results show that labour supply elasticities have relatively small differences across these countries. Social inequality aversion is the highest in Nordic and some Continental European countries, which reflects Rawlsian preferences. The high inequality aversion in these countries can be explained by the responses of the extensive margin that have been taken into account. Furthermore, Southern Europe and the US show a low inequality aversion, which reflects Utilitarian preferences. Moreover, when they impose zero labour supply responses, redistributive tastes become less pronounced and much more similar across countries. Therefore, when assessing social inequality aversion it is of great importance to take the efficiency constraints into account.

Hendren (2014) introduces the inequality deflator whereby social welfare weights can be used to resolve interpersonal comparisons without a social welfare function. According to the earlier study of Saez et al. (2012) transfers from the rich to the poor are roughly twice as costly as transfers from the poor to the rich, due to distortions in the tax system. Therefore, the inequality deflator values social welfare weights redistributed to the poor more than to the rich to account for the cost of spreading these benefits equally across the income distribution. Hendren concludes that there will always be a disagreement regarding how the government should redistribute. However, the inequality deflator might be helpful to decide whether policies are desirable where resolution of interpersonal comparisons is required.

Lorenz and Sachs (2016) derive a sufficient statistics test where the non-linear tax transfers system is beyond the Laffer bound, which reflects inefficiency in the tax transfers system. They apply this test to the German tax transfer system, which is characterized by rapidly falling effective marginal tax rates at the income threshold where transfers are phased out. They suggest that if the effective marginal tax rates are falling quickly in income, then the tax transfer system is probably inefficient. Their results show that Germany's structure of

marginal tax rates is inefficient and Pareto improvements can be made. Furthermore, they believe that the results for Germany also apply to other countries since rapidly falling effective marginal tax rates appear in many other countries as well.

Zoutman, Jacobs & Jongen (2016) measure the redistributive preferences of political parties in the Netherlands by exploiting data on the tax-benefit proposals of political parties in their election programs. They use the inverted optimal tax method developed by Bourguignon and Spadaro (2012) and follow the calculations of Jacquet et al. (2013) to reveal the social preferences for income redistribution for different political parties. By exploiting the detailed information on the proposed tax-benefit systems and assuming that political parties optimize the tax-benefit system according to their preferences, they have been able to calculate the social welfare weights of Dutch political parties for all income groups and the unemployed individuals. Their findings show that all parties roughly give a higher social welfare weight to the poor than to the rich. Moreover, they discover two anomalies: social welfare weights are found to be increasing from the working poor to the middle class and the social welfare weights of the rich are slightly negative. The negative social welfare weight of the rich implies that the Dutch government taxes the rich too much. By lowering the tax rates of the rich, Pareto improvements can be generated. However, the second anomaly is sensitive to the elasticity of taxable income for top-income earners and would disappear if the elasticity would be lower. Furthermore, they find a strong status-quo bias in redistributive politics in the Netherlands. This implies that the differences are very small in the election programs between the political parties and show comparable social welfare weights in the pre-existing tax benefit system. The findings in their study suggest that the Dutch democracy can be characterized as the “tyranny” of the middle class. The Dutch redistributive politics favour the middle class at the expense of both the poor and the rich income groups.

### **3. The Dutch tax system regarding child support for single parents**

In 2015 the Dutch government has reformed the tax system regarding child support regulations in the Netherlands. The reform in 2015 affected the income of single parents dramatically and had a significant impact on the labour participation. This chapter provides a historical overview of the social assistance- and child support regulations in the Netherlands for single parents. Furthermore, I present the main reasons for and the aims of the tax reform in 2015. Moreover, I describe the regulations before and after the tax reform that affect the income of single parents. Finally, I introduce the tax benefit calculator (Microtax) in order to show the actual tax rates in 2014 and 2015 in the Netherlands. This chapter forms the foundation of this thesis and is of great importance for further reading.

#### **3.1 Social assistance for single parents in the Netherlands**

The General Social Assistance Act (de Algemene Bijstandswet) of 1963 was the first legislation in the Netherlands that takes the personal circumstances of single parents into account. This legislation was introduced by Marga Klompé, who was the first feminine minister of the Netherlands (Van der Lans, 2006). The aim of this legislation was to provide financial support to the poorest individuals in the society. Homeless individuals and psychiatric patients were also included target groups for this legislation. Furthermore, this legislation made it easier for women with children to divorce, because the contribution of this legislation made them financially independent from their partner. Since the introduction of this law, the number of single parents in the Netherlands increased from 60,000 in 1963 to 308,000 in 2001 (Den Uyl, 2004).

Until the 1980's, single parents in various Dutch municipalities had an exemption from the job application obligation (sollicitatieplicht) until the youngest child reached the age of 18. In 1996, the government lowered the age of the youngest child to 5 years for this exemption. After 1996, the General Social Assistance act changed frequently. In 2004, the General Social Assistance act was replaced by the Work and Social Assistance Act (Wet Werken en Bijstand) (Den Uyl, 2004). This legislation aimed to stimulate individuals in

assistance to participate in the labour market. In 2015, the name of this legislation was changed to the Participation Act (Participatiewet).

In addition to the Participation Act, the child support regulations in the Netherlands represent a major share of the income of single parents. In the next section, the history regarding child support regulations will be described.

### **3.2 History of the child support regulations in the Netherlands**

The child support regulations in the Netherlands have a long history. The first legislation regarding child support in the Netherlands was the Child Benefit Act (Kinderbijslagwet), which was introduced in 1941 (Van Daalen, 2002). The introduction of the Child Benefit Act in the Netherlands was strongly related to the financial conditions of the wage earner of the household. The father in the household was generally the wage earner. However, children from households with low incomes also had to participate in the labour market to supplement the household income. Due to the introduction of the Child Labour Act (Kinderarbeidswet) in 1874 and the legislation on compulsory education (Leerplicht) in 1901 in the Netherlands, the labour participation of children strongly decreased. The decrease in the labour participation of children had an enormous impact on households with low incomes and on specific social classes in the society.

For example, households with many children did not have enough income to maintain the whole family. This led to thinking about the size of a household. These thoughts and the upcoming preventatives resulted in decreasing birth rates in the Netherlands. However, the decreasing birth rates varied among the social classes and the religions. In specific religions, such as the Catholic religion, it was forbidden to use preventatives. Therefore, the size of most Catholic households had not been reduced (Heek, 1954). On top of that, the wage levels in the society were adjusted to this development in the Netherlands. Hence, it was more difficult for wage earners of a large household to maintain the whole family compared to small households.

This development was regarded as a social inequality in the twentieth century and the Dutch government believed that the number of children that parents want to have was their



own responsibility. The decision to have children was not to be limited by the government and the labour income. Therefore, the government introduced the Child Benefit Act in 1941 to provide financial support for wage earners to maintain their household. The Child Benefit Act in the Netherlands was a typical employment insurance. The child benefits were a part of the wages. The right to receive the benefits was determined by the employment status of the father and the income of previous employment (Van Daalen, 2002).

The Child Benefit Act was changed repeatedly after the Second World War, which resulted in difficult regulations regarding child benefits. In 1963, a reform of the Child Benefit Act took place (Sociale Verzekeringsbank, 2016), with the aim to unify the regulations and to remove the discrimination regarding the employment status of the father. The name of the Child Benefit Act was changed to the General Child Benefit Act (Algemene Kinderbijslagwet) in 1963 and took the form of a national insurance contribution (volksverzekering). This reform extended the Child Benefit Act to every individual who had three or more children. However, the General Child Benefit Act still contains several specific regulations. For example, the regulations for employed individuals (Kinderbijslagwet Loontrekkenden) and self-employed individuals (Kinderbijslagwet Kleine zelfstandigen). Child benefits were provided to single parents in these groups for the first and second child. These regulations were merged in the General Child Benefit Act in 1980 (Sociale Verzekeringsbank, 2016).

In 1989, the government took over the whole financing of the General Child Benefit Act from the Social Insurance bank (Sociale Verzekeringsbank en de Raden van Arbeid). Since 1990, the General Child Benefit Act is not confronted with radical changes. The Dutch tax system has added a large number of regulations regarding child support over the years (Sociale Verzekeringsbank, 2016). The next section gives an overview of the regulations regarding child support in 2014.

### 3.3 Child support regulations in 2014

There were 11 regulations regarding child support in the Netherlands (Asscher, Bussemaker, & Weekers, 2013). These regulations were related to different legislations in the Dutch Income Tax Act (Wet op de Inkomstenbelasting, 2001). The 11 regulations in 2014 regarding child support were the following:

- 1) *The Child Benefit* (Kinderbijslag), which is mentioned earlier in section 3.2, is the first child benefit regulation in the Netherlands. The aim of the Child Benefit is to provide financial support to parents with children. This regulation is applied to every parent with a child under the age of 18, who does not receive a student grant. Parents do not qualify for the Child Benefit when their children of 16 or 17 years have an income more than 1,266 euros per quarter in 2014. For children who are not living with their parents, regardless of their age, the income threshold always applies. The amount of this benefit depends on the number of children and their respective ages. Parents receive this benefit quarterly, aside from their taxable income. Furthermore, the level of the Child Benefit will be corrected for price indexes every year. Due to budgetary reasons, this has not been corrected in 2014. Moreover, the level of the Child Benefit is based on the percentage of the basic child benefits, which can be found on the website of the tax authorities.
- 2) *The Income Dependent Child Benefit* (Kindgebonden budget) is introduced in 2009 in the General Earned Income regulations (Algemene wet inkomensafhankelijke regelingen). This is a financial support in addition to the Child Benefit and has the purpose of compensating families with low incomes. The amount of the Income Dependent Child Benefit depends on the number of children and the level of income of a household. The Income Dependent Child Benefit decreases with 7,6 % from an income of 26,147 euros and the amount of the benefit drops for each additional child. The amount for four or more children will remain constant and does not depend on income. Parents receive this subsidy next to their taxable income. Furthermore, by reaching the age of 12 and 16 years an increase in the Income Dependent Child Benefit will be provided to the parents (Rijksoverheid, 2008).

- 3) *The Childcare Subsidy (Kinderopvangtoeslag)* is introduced in 2005 and stems from the legislation *Besluit registers kinderopvang en peuterspeelzaalwerk*. The aims of this subsidy are to stimulate labour participation and to provide a qualitative childcare that unites the wishes of the parents for childcare (Kamp, 2012). This subsidy is only provided to parents who are participating in the labour market. The level of this subsidy depends on the cost of childcare, the income of the parents and the hours of childcare. The percentages of compensation by the government can be found on the website of the tax authorities.
- 4) *The Supplementary Social Assistance for Single Parents with a Minimum Income (Aanvulling op sociaal minimumuitkeringen voor alleenstaande ouders)* was a part of the Social Security Supplements Act (Toeslagenwet) that was introduced in 1987 in the Netherlands. This regulation provided a minimum income for the unemployed individuals (Kluwer, 2008). This regulation defined that every individual in the Netherlands received a minimum social assistance when they became unemployed. Singles received 70% of the minimum wage and couples 100% of the minimum wage. Single parents received 90% of this assistance in 2014, which was 20% higher than the singles. Single parents with at least one child under the age of 18 years received 3,200 euros per year more than singles (Asscher, Bussemaker, & Weekers, 2013).
- 5) The Dutch government provided *free textbooks* for children attending high school since August 2008. This regulation was a part of the Act on Education Contributions (*Wet tegemoetkoming onderwijsbijdrage en schoolkosten*). The aim of this regulation was to decrease the cost of education for parents and to improve the competitiveness of the textbook market. Due to this regulation, schools tended to re-use the textbooks, which resulted in a lower demand for textbooks and led to lower retail prices (Van Bijsterveldt-Vloegenthart, 2011).
- 6) *The Allowance for Education Cost for Children under the age of 21 (tegemoetkoming onderwijs- en schoolkosten)* was introduced in 2001 and was a part of the act for education contributions (*Wet tegemoetkoming onderwijsbijdrage en schoolkosten*). This allowance had the aim to make education financially accessible to everyone in the Netherlands (Ministerie van Onderwijs, Cultuur en Wetenschap, 2008). The

amount of this allowance depended on the education level of the child and decreased from an income level of 33.650 euros in 2014.

- 7) *The Regulation Governing the Contribution to Parents of Disabled Children Living at Home* (tegemoetkoming ouders thuiswonende gehandicapte kinderen) was introduced in 2000. This was an allowance in the Dutch Income Tax Act (Wet op inkomstenbelasting, 1964). The aim of this allowance was to provide financial support for parents with a disabled child who needs additional caretaking (Donner & Rouvoet, 2009). The amount in 2014 was 860 euros for two-earner households. Single earners received an additional amount of 1,460 euros per year.
- 8) *The Supplementary Single Parent Credit* (aanvullende alleenstaande ouderkorting) was a tax credit in the Dutch Income Tax Act (Wet op inkomstenbelasting, 2001) that single parents received for children below the age of 18. This regulation was introduced in 1990 and provided financial support for single parents (Asscher, Bussemaker, & Weekers, 2013). The condition to qualify for this credit was to be a single parent, who had been taking care of a child that is younger than 18 years, for at least 6 months. This regulation consisted of two parts: the first part was a fixed amount of 947 euros in 2014. The second part was income dependable and could be up to a maximum of 1,319 euros. The income dependable part could only be received by parents with children younger than the age of 16.
- 9) *The Income Dependent Combination Credit* (Inkomensafhankelijke Combinatiekorting) is provided to working parents with children younger than the age of 13. This regulation is introduced in 2009 and has the aim to stimulate labour participation (Asscher, Bussemaker, & Weekers, 2013). The amount of this tax credit depends on the level of income. Parents with an income of 32,539 euros or higher per year receive 2,133 euros as tax credit. This regulation is a tax credit in the Dutch Income Tax Act (Wet op de inkomstenbelasting, 2001).
- 10) *The Tax Credit for the Cost of Living of Children* (Aftrek levensonderhoud kinderen) was provided to parents who do not receive the Child Benefit and the student grant. This tax credit was introduced in 1980 and had the aim to provide a flat rate credit (forfaitaire aftrek) on the income of parents who were obliged to take care of the child.

This was a tax credit in the Dutch Income Tax Act (Wet op de inkomstenbelasting, 2001).

11) *The Parental Leave Tax Credit* (Ouderschapsverlofkorting) was introduced in 2009 and had the aim to provide a financial contribution to parents if they had to take extra holidays for the caretaking of their children (De Meester & Keuzenkamp, 2011). The amount of this credit was approximately 50% of the hourly minimum wage in the Netherlands. The credit could not be higher than the decrease in income in the previous year, as a consequence of the extra holidays that were taken. This regulation was a tax credit in the Dutch Income Tax Act (Wet op de inkomstenbelasting, 2001).

### **3.4 Child support regulations in 2015**

This section describes the main reasons for and the aims of the tax reform in 2015. Furthermore, I present the regulations regarding child support in 2015 after the reform and show the changes of regulations in the Dutch Income Tax Act in 2015 that affect the income of single parents.

#### **3.4.1 The tax reform and the child support regulations in 2015**

The large number of regulations makes understanding child support for single parents very complicated in the Netherlands. Moreover, the government's expenses on child support have increased by 3 billion euros in the period of 2005-2010. The total amount of the government's expenses on child support is 10 billion euros in 2014. The complicated regulations and the rising government expenses on child support are the reasons for the Dutch government to present a proposal to reform the child support regulations in 2012 (Rutte & Samsom, 2012). This proposal has resulted in the tax reform of 2015 (Wet hervorming kindregelingen, 2015). The government wants to reduce the government's expenses on child support with 0,5 billion euros. Furthermore, the government wants to achieve the following aims with the tax reform regarding child support regulations:

1) to simplify the tax system for (single) parents by reducing the numbers of regulations,

2) to stimulate (single) parents to participate in the labour market with the aim to increase the labour participation with 100,000 jobs, which is an increase of 1,4 % in respect to 2014 (Jongen et al., 2015),

3) to maintain income support for the ones who need it the most.

In the pre-reformed tax system, each regulation on child support has their own form and contains their own sub goal. Therefore, these regulations could partially overlap and counteract each other in their aim (Asscher et al., 2013). According to the Dutch government, the tax reform will lead to a simplification of the tax system and make the tax system more equitable in 2015. The tax reform has reduced the child support regulations from 11 to 4 in 2015. The following regulations have been abolished in 2015:

- *The Supplementary Social Assistance for Single Parents with a Minimum Income* (aanvulling op sociaal minimumuitkeringen voor alleenstaande ouders) and *the Supplementary Single Parent Credit* (aanvullende alleenstaande ouderkorting) were regulations that focused specifically on single parents. These two regulations were not effective and made the tax system unnecessarily complicated. Therefore, they were abolished in 2015. These two regulations have been replaced by *the Single Parent Credit* (alleenstaande-ouderkop) in the Income Dependent Child Benefit (Kindgebonden Budget). This additional credit decreases when income increases and the amount of this credit is independent of the number of children. Single parents who are participating in the labour market receive 2,580 euros more per year in 2015 compared to 2014, because the participation in the labour market results in a higher level of the Earned-Income Tax Credit (Arbeidskorting). The Single Parent Credit will take away the financial barriers for single parents to participate in the labour market and make working more financially attractive. The income loss of single parents due to the two abolished regulations is compensated by the introduction of the Single Parent Credit in 2015.
- *Free books* and *the Allowance for Education Cost for Children under the age of 21* were abolished in 2015 to simplify the tax system. The income loss due to these two

abolished regulations is compensated by a higher amount of the Income Dependent Child Benefit in 2015.

- Parents received *the Parental Leave Credit* from the government as a compensation to take extra days off for their children. Results of a study (De Meester & Keuzenkamp, 2011) show that this credit did not affect the behaviour of parents and created a high administrative burden for the employee and the employer. Therefore, this regulation was abolished in 2015.
- *The Tax Credit for the Cost of Living of Children* was abolished because of budgetary reasons.
- *The Regulation Governing the Contribution to Parents of Disabled Children Living at Home* is integrated in the Child Benefit. Parents with disabled children receive twice the amount of the Child Benefit in 2015.

### **3.4.2 The child support regulations in 2015**

The following regulations are left in 2015:

1. The Child Benefit (Kinderbijslag),
2. The Income Dependent Child Benefit (Kindgebonden budget),
3. The Childcare Subsidy (Kinderopvangtoeslag),
4. The Income Dependent Combination Credit (Inkomensafhankelijke combinatiekorting).

#### **1) The Child Benefit**

The Child Benefit regulation has changed slightly in 2015 compared to 2014. The level of the Child Benefit is not corrected for the price index in 2015, due to budgetary reasons. Furthermore, *the Regulation Governing the Contribution to Parents of Disabled Children Living at Home* has merged in the Child Benefit in 2015. Parents with a disabled child receive twice the amount of the Child Benefit. Moreover, parents with children of three years or older who need intensive caretaking also receive twice the amount of the Child

Benefit. On top of that, the income threshold for children from 16 years, who are not living with their parents, has been removed since 2015.

## **2) The Income Dependent Child Benefit**

The Income Dependent Child Benefit has changed in 2015. The amount of the Income Dependent Child Benefit has increased in 2015 because of the abolition of *the Supplementary Social Assistance for Single Parents with a Minimum Income* and *the Supplementary Single Parent Credit* in 2015. The Single Parent Credit (alleenstaande-ouderkop) replaces these two abolished regulations in 2015. Furthermore, the amount of the Income Dependent Child Benefit for children of 16 and 17 years and the amount for the first and second child have increased in 2015. To reduce the disparity in the Income Dependent Child Benefit for parents with low and high incomes, the amount of the Income Dependent Child Benefit declines at a lower income in 2015 compared to 2014. In 2014 the amount of the Income Dependent Child Benefit declines at the income level from 26,000 euros and in 2015 from 19,767 euros, which is the minimum wage in 2015. Single parents with a minimum wage might receive 2,100 euros more in 2015. Moreover, the definition of “single parent” in the Income Dependent Child Benefit is equalised for the fiscal legislation and the general act of tax credit regulations (Algemene wet inkomensafhankelijke regelingen, 2015) in 2015. Due to this adjustment, it is easier for single parents to qualify for the Income Dependent Child Benefit and the administrative burdens for the government are also reduced.

## **3) The Childcare Subsidy**

This subsidy has not changed in 2015. The amount of this subsidy can be found on the website of the Dutch tax authorities.

## **4) The Income Dependent Combination Credit**

This credit has not changed in 2015. The income thresholds of this credit can be found on the website of the Dutch tax authorities.

### **3.4.3 General tax regulations that affect the income of single parents**



The Dutch government has also made changes in other tax regulations in 2015 that might incentivise single parents to participate in the labour market. These tax regulations vary with taxable income and are applied to every individual in the Netherlands who has a taxable income. These regulations are: The General Tax Credit (Inkomensafhankelijke algemene heffingskorting) and The Earned-Income Credit (Arbeidskorting) (Belastingdienst, 2015).

### **The General Tax Credit**

The General Tax Credit (Inkomensafhankelijke algemene heffingskorting) is a credit in the Dutch Income Tax Act (Wet op de inkomstenbelasting, 2001) that every individual in the Netherlands receives. The amount of this credit depends on the age, the income level and the duration of residency in a year in the Netherlands of an individual. This credit depends more on income in 2015 compared to 2014. The amount of the General Tax Credit is higher for incomes up to € 56,935 and lower for incomes above € 56,935 (Belastingdienst, 2016).

### **The Earned-Income Credit**

Another important tax credit that is changed in 2015 that affects the labour participation is the Earned-Income Credit (Arbeidskorting). This credit is applied to every individual who is participating in the labour market and has a taxable income. The amount of this credit depends on the age and the level of income. In the reformed tax system the income threshold of the Earned-Income Credit has increased from 40,721 euros in 2014 to 49,770 euros per year in 2015 (Belastingdienst, 2015). The increase in the income threshold in combination with *the Single Parent Credit* (alleenstaande-ouderkop) results in a maximum income increase of 2,580 euros per year in 2015 for single parents who are participating in the labour market.

### 3.5 Microtax

After an overview of the Dutch regulations regarding child support, I want to show the actual tax schedules before and after the tax reform. In order to do this, I have to introduce a tax benefit calculator, which calculates the net incomes and net taxes for single parents in the Netherlands. The “CPB Netherlands Bureau for Economic Policy Analysis (CPB, 2015) has developed Microtax, a tax benefit calculator for the Netherlands. This calculator contains Dutch tax regulations until 2013 for the Netherlands. To analyse the changes before and after the reform, I update Microtax with the data of 2014 and 2015 including changes in tariffs and tax bases. Table 1 of the Appendix presents this data. The performed updates only apply to the elements in Microtax that affect the income of single parents.

Microtax contains most tax regulations of the Dutch tax system and takes the following assumptions into account:

- single parents are all under the pension age,
- single parents who reach the pension age do not have children that qualify for the criteria of the child regulations,
- the childcare subsidy has not been implemented in Microtax.

Single parents only receive the Childcare Subsidy if they work. This subsidy depends on the income of the single parent and the hours of childcare the single parent needs. The level of this subsidy is difficult to determine and requires personal data. Since this data is not available, this subsidy will not be taken into account for the calculations and simulations of the tax rates of single parents. Moreover, the tax reform of 2015 has not changed the structure of this regulation. The current level of this subsidy can be found on the website of the Dutch tax authorities.

On top of that, I make the following additional assumptions in this thesis:

- the amount of net income is for two children with the age of seven.
- the second-earner effect is not taken into account.

Microtax calculates the net incomes and net taxes of a specified income group in the Netherlands given the gross earnings, personal specified information about the married state, the number of working hours, the number of children and the age of the children. Moreover,

Income groups	Gross earnings	Net tax '14	Net income '14	Net tax '15	Net income '15	% change in net tax	% change in net income
0	0	-338	338	-344	344	2	2
1	234	-168	402	-239	473	42	18
2	383	-32	415	-98	481	206	16
3	498	27	471	5	493	-80	5
4	648	112	535	54	593	-52	11
5	1058	334	724	276	782	-17	8

Microtax calculates the net taxes by subtracting the nominal disposable income (nominaal besteedbaar inkomen) from the gross income (bruto inkomen).

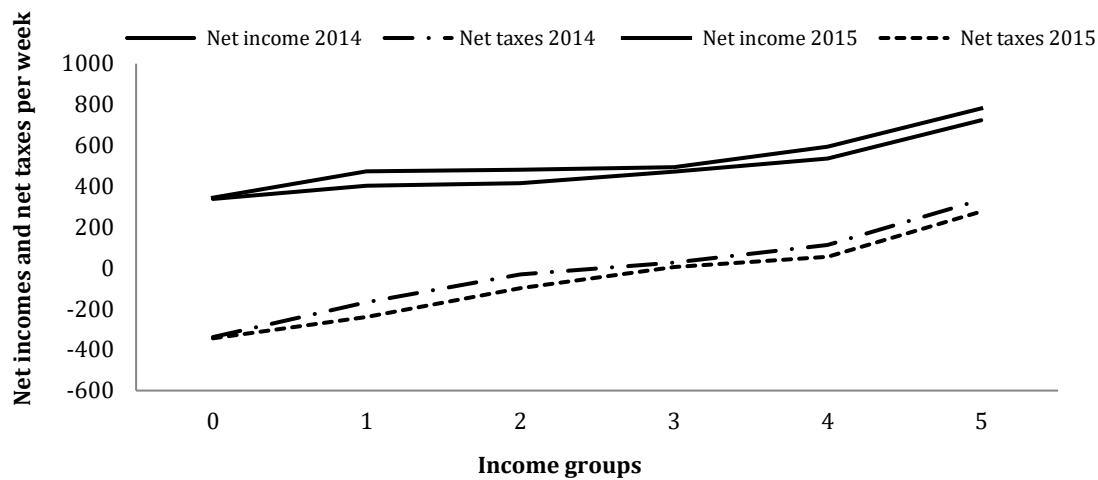
### 3.6 The actual tax schedule of the Netherlands in 2014 and 2015

Figure 1 and Table 1 present the actual tax schedule of the Netherlands in 2014 and 2015. In order to find the actual net taxes and net incomes, I need the income distribution of the Netherlands as input in Microtax. The income distribution is provided by the “CPB Netherlands Bureau for Economic Policy Analysis (CPB, 2015). I define the gross earnings in euros per week for single parents with two children, both at the age of seven. Furthermore, I divide the single parents into six income groups, in which income group 0 represents the group of single parents who are unemployed. The remaining income groups are the working groups. The net taxes and the net incomes are calculated with Microtax and are presented in weekly earnings. Moreover, in the last two columns of Table 1, I show the percentage change of the net taxes and net incomes from 2014 to 2015. Negative net taxes imply that the single parents receive a transfer from the government.

**Table 1. Actual tax schedules of the Netherlands in 2014 and 2015.**

*Source:* CPB (2015). *Note:* single parents are divided into 6 income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The gross earnings reflect the income distribution of the Netherlands. Negative net taxes imply a transfer from the government. The net income is calculated by subtracting the net taxes from the gross earnings. The last two columns show the percentage change in net taxes and net incomes from 2014 to 2015, respectively. The positive change in net

taxes implies a reduction in net taxes and the negative change implies an increase in net taxes. All incomes are presented in euros per week and are based on the family type of a single parent with two children.



**Figure 1. Actual net taxes and net incomes of the Netherlands in 2014 and 2015.**

*Note:* the x-axis shows the income groups of single parents divided into 6 groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The y-axis shows the net incomes and net taxes in euros per week.

Table 1 shows that the net taxes and net incomes in 2014 and 2015 increase when gross earnings increase. The net taxes in 2014 are higher than the net taxes in 2015. This is indicative of a higher amount of transfers from the government to single parents in 2015. The smallest change in net incomes and net taxes is shown in income group 0 by a change of 2%. Income group 0 does not show income losses in 2015, the increase in net taxes is compensated by the increase in net incomes, because they do not pay taxes. The biggest changes in net taxes and net incomes are shown for the income groups 1 and 2. These two groups receive more net transfers from the government, which results in higher net incomes. Income groups 1 and 2 have the lowest income when participating in the labour market. Due to the tax reform, the incomes of these two income groups have risen significantly in respect to income group 0 in 2015. This indicates that participating in the labour market is more financially rewarding in 2015 for income groups 1 and 2, which is in accordance with the second and the third aim of the tax reform.

### **3.7 Summary**

This chapter gave an overview of the history of the social assistance for single parents and the child support regulations. Furthermore, I shown the Dutch child support regulations before and after the tax reform. The aims of the reform are: 1) to simplify the tax system for single parents, 2) to stimulate single parents to participate in the labour market and 3) to maintain income support for the ones who need it the most. Moreover, I have introduced Microtax in order to find the actual tax schedule of the Netherlands in 2014 and 2015.

The government has achieved the first aim of the tax reform by reducing the regulations from 11 to 4. According to the findings in Table 1 and Figure 1, the reformed tax system has increased the income of income groups 1 and 2. Participating in the labour market is more financially rewarding in 2015 for income groups 1 and 2. This finding is in accordance with the second and third aim of the tax reform. For the following chapters, I will keep the aims of the tax reform in mind to discuss the optimality of the Dutch tax schedule before and after the reform. In the next chapter, I will introduce the optimal taxation model of Saez (2002) and the simulation model Singletax in order to find the optimal tax rates of the Netherlands.

## **4. The optimal taxation model of Saez**

This chapter introduces the optimal taxation problem and describes the optimal taxation model of Saez (2002). Furthermore, I present the simulation model in Singletax, which is provided by the “CPB Netherlands Bureau for Economic Policy Analysis”. The inputs for Singletax are country specified data, which includes the income distribution, elasticities and shares of single parents in the population of the Netherlands. These parameters and elasticities are taken from the MIMOSI and MICSIM model (CPB, 2015), respectively. The last section briefly describes and explains the MIMOSI and MICSIM model and discusses the shortcomings of these models.

### **4.1 Optimal taxation models**

The optimal income taxation problem can be described as follows: the government maximises a social welfare function given its budget constraint. The social welfare function is a function of the society’s individual utilities, which depends on the net household income (equivalent to consumption in a static framework) and leisure. The form of this function is based on normative assumptions. This can have the extreme form of a Rawlsian preference, where the government only cares about the worst individuals in the society, or a Utilitarian preference, where the government wants to maximise the utility of the whole society. However, it is not possible for the government to observe the actual productivities. Therefore, the government can only rely on the second-best taxation on incomes. Recent studies (Revesz, 1998; Piketty, 1997; Diamond, 1998; Saez, 2001) have shown that it is possible to observe and estimate elasticities empirically. Since it is possible to observe gross earnings and elasticities, the optimal tax model of Saez (2002) has provided a great contribution to the optimal income tax theory.

Saez (2002) has introduced a model for the optimal marginal tax rates at every income level in terms of the relevant elasticities of taxable income and the properties of the wage distribution. In the Saez model (2002) individuals can choose whether or not to work (extensive margin) and if they do choose to work, how many hours they want to work

(intensive margin). However, income support from the government affects the labour supply incentives. The study of Saez (2002) has shown that when labour supply responses are concentrated along the intensive margin, a NIT program (Negative Income Tax program, where the largest transfers are provided to the lowest income earners who needed it the most) with a substantial guaranteed income level and high phasing-out rates are optimal. Many European countries use these kinds of NIT programs to redistribute towards unemployed or low income individuals. However, NIT programs affect the labour supply along the extensive margin and lead to low working rates (Murray, 1984).

Therefore, governments have advocated the EICT (Earned Income Tax Credit) programs to reduce the low working rates. These kinds of programs make work more financially attractive, because the amount of the credit increases with the earning level. Also, the EICT will be tax away at some point in the income distribution and lead to disincentives of labour supply. When labour supply responses are concentrated along the extensive margin, then the optimal transfer is similar to an EICT with negative marginal tax rates at the bottom. Nevertheless, the level of these transfer programs is a trade-off between equity and efficiency and depends on the government's preferences for redistribution.

## 4.2 The theoretical model of Saez (2002)

In this section, I present the theoretical framework of Saez (2002). The model assumes that potential workers can be aggregated into  $I + 1$  discrete groups in the labour market:  $I$  groups of individuals who do work, plus one group who does not work  $i = 0$ . The productivity levels of the framework are ranked in the way that  $Y_i$  increases in  $i$ . Each level of income  $Y_i$  corresponds with a level of consumption (disposable income)  $C_i = Y_i + T_i$ . The described framework presents the following optimal tax formula:

$$\frac{T_i - T_{i-1}}{C_i - C_{i-1}} = \frac{1}{\zeta_i h_i} \sum_{j \geq i}^I h_j \left[ 1 - g_j - \eta_j \frac{T_j - T_0}{C_j - C_0} \right] \quad (1)$$

where

- $T_i$  is the net tax paid by group  $i$ ,
- $C_i$  is the net income of group  $i$ ,

- $\zeta_i$  is the intensive elasticity of labour supply at  $i$ :  $\zeta_i = \frac{C_i - C_{i-1}}{h_i} \frac{dh_i}{d(C_i - C_{i-1})}$
- $h_i$  is the share of individuals of group  $i$  in the population
- $\eta_j$  is the extensive elasticity of group  $j$ :  $\eta_j = \frac{C_j - C_0}{h_j} \frac{dh_j}{d(C_j - C_0)}$
- $g_j$  is the set of marginal social welfare weights the government assigns to group  $0, \dots, I$ .

To find the optimal tax rates, expression (1) needs to be solved. This implies that the left side and the right side of the equation should be equal. The left side of the equation states the extra tax paid when moving from group  $i-1$  to  $i$  divided by the gain in net income. Unemployed individuals receive benefits  $-T_0$ , which is by definition identical to  $C_0$ . The gross earnings within group  $i$  are supposed to be fixed and equal to  $C_i + T_i$ .

The right side of the equation takes the following factors into account:  $h_i$  measures the shares of group  $i$  in the population and the social welfare function is summarised by  $g_j$ , the set of social welfare weights the government assigns to group  $0, \dots, I$ . Saez (2002) has argued that “the  $g_j$  represents the marginal social welfare of transferring one euro to an individual in group  $i$ , expressed in terms of public funds”. Given this definition, the model of Saez does not require the specification of utility functions, since the marginal utility of income is incorporated in  $g_j$ .

The intensive elasticity  $\zeta_i$  (Saez, 2002) is defined as:

$$\zeta_i = \frac{C_i - C_{i-1}}{h_i} \frac{dh_i}{d(C_i - C_{i-1})}$$

The intensive elasticity  $\zeta_i$  indicates the percentage increase in labour supply of group  $i$  when  $C_i - C_{i-1}$  is increased by 1%. The higher the intensive elasticity, the stronger a person reacts to the change in net wage.

The extensive elasticity  $\eta_j$  (Saez, 2002) is defined as:

$$\eta_j = \frac{C_j - C_0}{h_j} \frac{dh_j}{d(C_j - C_0)}$$



The extensive elasticity  $\eta_j$  indicates the percentage of individuals in group  $i$  who stop working when the difference between the net income gained from work and at earnings point  $i$  is reduced by 1%.

Saez has ignored income effects in his theoretical model of income taxation (often based on quasi-linear preferences). When this effect is ruled out, an additional constraint has to be added in the Saez model (2002) that normalizes social welfare weights as follows:

$$\sum_{i=0}^I h_i g_i = 1 \quad (2)$$

Expression (2) indicates that the weighted sum of the social welfare weights must equal one. With no income effects, a marginal euro of public funds is valued as much as an additional euro redistributed to all groups (Saez, 2002). Recent studies have shown that the income effect is empirically negligible (Blundell & MaCurdy, 1999). Including income effects make the analysis substantially complicated. Furthermore, income effects along the intensive margin of response are found to be small in the empirical literature (Blundell and MaCurdy, 1999). Therefore, income effects will not be taken into account for the analysis in this thesis.

Expression (3) gives the budget constraint of the government:

$$\sum_{i=0}^I h_i T_i = H, \quad (3)$$

where  $H$  is the net revenue of taxes that the government receives. This can also be negative, which points to net transfers that the government pays to single parents. The net tax revenue  $H$  of the government has to be kept fixed in the simulations to find the optimal tax rates. This is another additional constraint that is required to find the optimal tax rates and the social welfare weights. It defines that the sum of the optimal net taxes must be equal to the sum of the actual amount of net taxes received from the society. Moreover, for the most developed countries this amount will be negative, because on average single parents receive a positive net transfer financed by the government (Blundell et al., 2009).

Expression (4) describes the marginal social welfare weight  $g_j$  for a specific income group:

$$g_j = \frac{1}{(pC_i)^\nu}, \quad (4)$$

where  $p$  is the scaling parameter. Parameter  $p$  has to be chosen so that it satisfies expression (2).  $C$  stands for the net income and  $\nu$  measures the strength of the preference for redistribution. The larger the  $\nu$ , the more the government desires to redistribute to the poor. I follow the paper of Blundell et al., (2009), which has presented three scenarios ( $\nu = 0.25$ ;  $\nu = 1$ ;  $\nu = 2$ ) of the government's preferences for redistribution.  $\nu = 0.25$  indicates a relatively small preference for redistribution and is indicative of a Utilitarian preference. According to Saez (2002), the scenario  $\nu = 1$  implies a relatively high taste for redistribution.  $\nu = 2$  indicates an extremely high preference for redistribution and is indicative of a Rawlsian preference. In this thesis, I will show the results of the simulation of these three scenarios to discuss the government's preferences for redistribution.

The system of expressions (1) - (4) give the solution to the optimal tax system given the redistributive preferences  $\nu$ , the elasticity parameters  $\eta_j$ ,  $\zeta_i$ , and the share of individuals  $h_i$  in each subgroup.

Expression (5) assumes the shares of the subgroups (1) – (5) in the population and it shows that individuals make a specific choice in labour and income:

$$h_i = h_i^0 \cdot \left( \frac{C_i - C_0}{C_i^0 - C_0^0} \right)^{\eta_i}. \quad (5)$$

Variables with a superscript zero indicate levels in the current tax system. The shares of individuals  $h_i$  are endogenous to the tax system, because the distribution of earnings and the unemployment levels are affected by taxes. Hence, when solving an optimal tax system that is different from the current tax system it has to be taken into account that the share of individuals in each option will change. The tax reform in 2015 has changed the budget constraint of the government. This affects the level of net incomes in each income group and the shares of the population. Given the shares of 2014 and the actual tax schedules of 2014 and 2015, it is possible to find the new shares of 2015 with expression (5). According to Saez (2002), it is impossible to find functions that satisfy the intensive and the extensive margin

for all possible values of  $c_0$  and  $c_i$ . Therefore, the intensive margin has not been taken into account in this expression.

### 4.3 Singletax

The expressions I have mentioned in the previous section are pre-programmed in Singletax, a simulation model that is provided by the “CPB Netherlands Bureau for Economic Policy Analysis” (CPB, 2015). In Singletax single parents are divided into six income groups. Individuals who are unemployed are represented by  $i = 0$ . The remaining groups are represented by  $i = 1, 2 \dots 5$ , whereby  $I = 5$  represents individuals with the highest income. Singletax presents the gross earnings, net incomes and taxes in weekly earnings. Negative net taxes in Singletax indicate a transfer from the government to that income group. Furthermore, Singletax contains the three scenarios ( $\nu = 0.25$ ;  $\nu = 1$ ;  $\nu = 2$ ) of the government’s preferences. By varying the parameter  $p$  (the scaling parameter) and the net tax of income group 0, I am able to find the optimal tax rates for the three scenarios by using the solver function of Excel.

Net incomes are increasing in gross earnings and transfers from the government cannot result in lower net incomes in respect to a lower income group (e.g. income group 1 has to have a higher net income than income group 0). When this occurs, the government’s tax policy on transfer programs presumably does not maximize welfare (Bourguignon and Spadaro, 2012, Ahamad and Stern, 1984). Moreover, the “CPB Netherlands Bureau for Economic Policy Analysis” also provides the income distribution, the intensive elasticities, the extensive elasticities and the shares of the population for 2014 of the Netherlands. Parameters and elasticities are taken from the MIMOSI and MICSIM model, respectively (CPB, 2015). These two models will be described briefly in the next section.

#### 4.4 MIMOSI and MICSIM

The income distribution of 2014 has been calculated with MIMOSI, which is a highly advance tax-benefit model that has been used by the CPB to determine the redistribution and budgetary effects of reform proposals for the tax-benefit system in the Netherlands (Jongen et al., 2014). MIMOSI calculates the budget constraint of the government very accurately, because of the specific data the model takes into account concerning the personal income levels, subsidies and tax credits. However, for this thesis I assume the before tax income distribution in 2015 has not changed, in order to investigate the effects of the tax reform on the net incomes of single parents. Therefore, I apply the before tax income distribution and the elasticities of 2014 to the tax system in 2015.

The intensive elasticities, extensive elasticities and shares of 2014 for the Netherlands are taken from the MICSIM model. This is a behavioural microsimulation model for the analysis of the Dutch tax-benefit system (Jongen et al., 2014), which is used as a structural discrete choice model for labour supply. Jongen et al., (2014) have collected a large dataset for various types of Dutch households to estimate preferences over income, leisure, formal childcare and the corresponding labour supply elasticities. Their most important findings regarding the empirical estimates are: men in couples have much smaller labour supply elasticities than women in couples. This labour supply elasticity is even bigger when women have young children. The cross-elasticities of women in couples are significantly larger than for men. Furthermore, the labour supply elasticity is relatively high for single parents with young children compared to single parents with older children. Moreover, they find that the intensive margin response is smaller than the extensive margin response.

Their findings on the labour supply elasticities are in line with the results that have been found by Bargain et al. (2014), who have estimated labour supply elasticities for a large number of countries and several subgroups in these countries. Furthermore, Jongen et al. (2014) have presented reality checks on the behaviour responses of the structural model to international studies (Bettendorf et al., 2014, Bosch and Jongen., 2013) and related studies for the Netherlands (Blau and Kahn, 2007; Heim, 2007; Bargain and Peichl, 2013; Bargain et al., 2014). Their results are in line with these studies. However, various mechanisms are not presented in the MICSIM model, which are relevant for the results of the tax-benefit reform

such as the decision of involuntary unemployment. Furthermore, the MICSIM model ignores the general equilibrium effect on prices and wages and the lifecycle. Although this model has its shortcomings, the results of MICSIM show the most recent data on labour supply elasticities for single parents in the Netherlands. Moreover, these findings are in line with the related literature for the Netherlands. Therefore, I consider this data as reliable and applicable to the tax system of 2014 and 2015.

## **4.5 Summary**

In this chapter, I have described the optimal taxation problem, where the government maximises a social welfare function given its budget constraint. However, it is not possible to observe the actual productivities of individuals. Therefore, the government can only rely on the second-best taxation of observed income. Furthermore, I have introduced the Saez model (2002) with the optimal tax formula and the simulation model Singletax, in which the Saez model is pre-programmed. Finally, I have described the MIMOSI and MICSIM model and the related findings in the paper of Jongen et al. (2014). These findings are in line with the studies on labour supply for the Netherlands. I will present the results of the simulations in the next chapter.

## 5. Optimal tax rates

This chapter presents the findings and discusses the results of optimal tax rates for the Netherlands and the UK. Furthermore, I introduce the OECD tax benefit calculator (OECD, 2016) in order to find the actual tax rates of the UK. This tax benefit calculator calculates the average net incomes and taxes of all OECD countries by taking the tax regulations of each country into account. Moreover, I conduct robustness analyses on the Dutch tax system to discuss the impact of different parameters on the optimal tax rates of both countries.

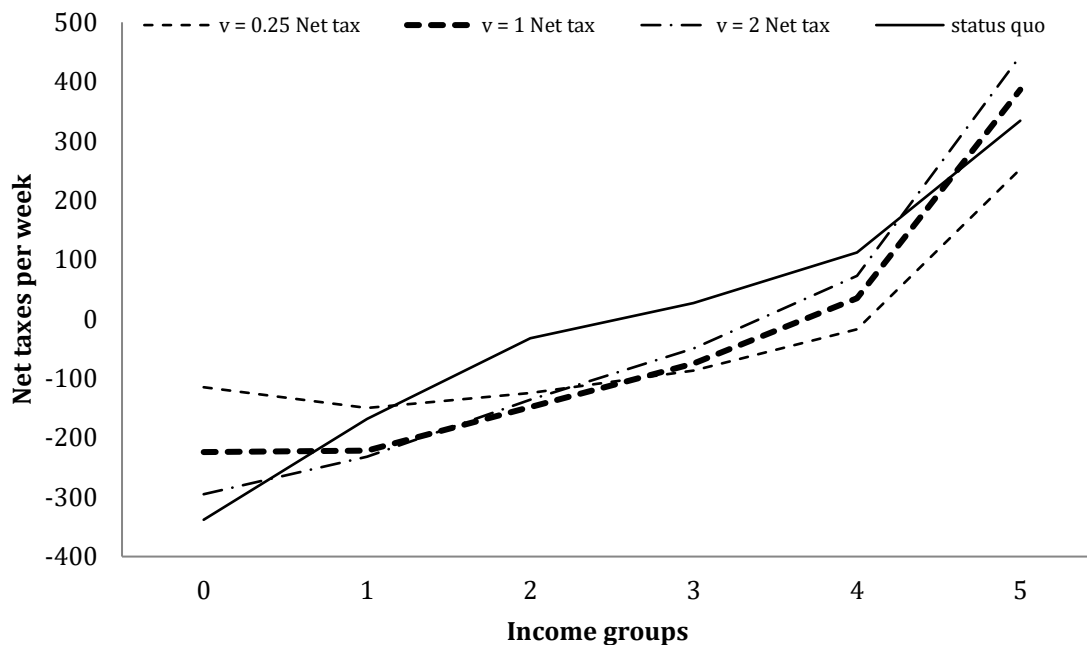
### 5.1 The optimal tax rates for the Netherlands in 2014 and 2015

Table 2 presents the actual tax schedule and the optimal tax rates for the Netherlands in 2014 and 2015 with the three scenarios  $\nu = 0.25$ ,  $\nu = 1$  and  $\nu = 2$ . The scenarios present the government's preference for redistribution, where  $\nu = 0.25$  is indicative of Rawlsian preferences and  $\nu = 2$  of Utilitarian preferences. The single parents are divided into six income groups. Income group 0 reflects the unemployed single parents who receive a welfare benefit. The remaining income groups are the working single parents. The gross earnings, intensive elasticities, extensive elasticities and the shares of the population for 2014 are provided by the "CPB Netherlands Bureau for Economic Policy Analysis". These parameters and elasticities are taken from MIMOSI and the MICSIM model (CPB, 2015), respectively. The shares of the population in 2015 are calculated with expression (5) of the Saez model (2002) as mentioned in chapter 4. Furthermore, the net taxes and the net incomes in Table 2 are calculated with Microtax. The last column of Table 2 shows the average net tax the government receives from single parents. The average net tax stands for the government's budget constraint. Since the average net tax is negative, it reflects transfers the government pays to single parents. All incomes are presented in euros per week. Figure 2 and Figure 3 illustrate Table 2 graphically.

**Table 2. Optimal tax rates for the Netherlands in 2014 and 2015.**

2014							Status quo			$v = 0.25$			$v = 1$			$v = 2$			
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax			
0	0			0.25	-338	338	0.01	-115	115	0.07	-224	224	0.13	-295	295	-42			
1	234	0.26	0.26	0.15	-168	402	0.22	-150	384	0.21	-221	455	0.19	-232	466				
2	383	0.11	0.26	0.15	-32	415	0.23	-125	507	0.22	-148	531	0.20	-136	518				
3	498	0.08	0.21	0.15	27	471	0.20	-87	585	0.18	-75	573	0.17	-50	548				
4	648	0.04	0.18	0.15	112	535	0.18	-17	665	0.17	35	612	0.16	73	575				
5	1058	0.01	0.14	0.15	334	723	0.16	253	805	0.15	387	671	0.15	443	614				
2015							Status quo			$v = 0.25$			$v = 1$			$v = 2$			
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax			
0	0			0.18	-344	344	0.01	-142	142	0.06	-244	244	0.12	-318	318	-71			
1	234	0.26	0.26	0.18	-239	473	0.22	-176	410	0.21	-249	483	0.20	-262	496				
2	383	0.11	0.26	0.17	-98	481	0.23	-153	535	0.22	-178	561	0.20	-167	550				
3	498	0.08	0.21	0.15	5	493	0.20	-116	615	0.19	-107	605	0.17	-82	580				
4	648	0.04	0.18	0.16	54	593	0.18	-48	696	0.17	2	645	0.16	40	608				
5	1058	0.01	0.14	0.15	276	781	0.16	218	840	0.15	352	706	0.15	409	648				

*Source:* MIMOSI and MICSIM model. *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1 - 5 are the working single parents. The shares show the distribution of single parents in the population. The status quo presents the actual tax schedule of the Netherlands and  $v = 0.25$ ,  $v = 1$  and  $v = 2$  are the scenarios of the government's preferences for redistribution. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.



**Figure 2. Optimal tax rates and the status quo for the Netherlands in 2014.**

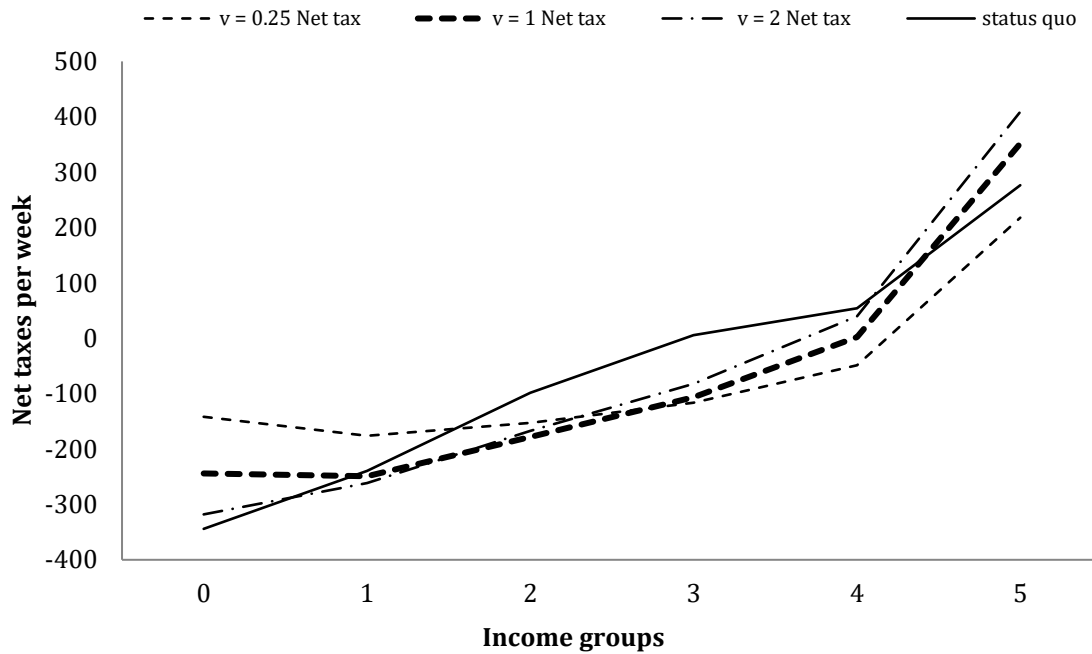
*Notes:* the x-axis shows the income groups of single parents divided into six groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The y-axis shows the net incomes and net taxes in euros per week in 2014. The status quo illustrates the actual net taxes and  $\nu = 0.25$ ,  $\nu = 1$  and  $\nu = 2$  present the scenarios of the government's preferences for redistribution.

### 5.1.1 The optimal tax rates in 2014

When I compare the status quo of 2014 to the optimal tax rates in 2014, the findings show that the status quo of the Netherlands is not in accordance with all scenarios of the optimal tax rates, as it differs at every income level. Income group 0 of the status quo is most in line with  $\nu = 2$ , which reflects a high desire for redistribution. Income group 1 is equal to  $\nu = 0.25$ , which indicates a low preference for redistribution to this income group. Furthermore, income groups 2 and 3 of the status quo are not in accordance with any optimal tax scenario and refer to an extremely low preference for redistribution. Income group 4 is very close to  $\nu = 2$  and income group 5 is the closest to  $\nu = 1$ , which reflects a relatively high preference for redistribution. The actual tax schedule of 2014 shows that there is a relatively high preference



for redistribution on the bottom and top of the income distribution at the expense of the middle incomes in the Netherlands.



**Figure 3. Optimal tax rates and the status quo for the Netherlands in 2015.**

*Notes:* the x-axis shows the income groups of single parents divided into six groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The y-axis shows the net incomes and net taxes in euros per week in 2015. The status quo illustrates the actual net taxes and  $v = 0.25$ ,  $v = 1$  and  $v = 2$  present the scenarios of the government's preferences for redistribution.

### 5.1.2 The optimal tax rates in 2015

The optimal tax rates in 2015 show a similar trend compared to 2014. Income group 0 is close to  $v = 2$  and indicates a high preference for redistribution. Income group 1 is in line with  $v = 1$ , which indicates a relatively high preference for redistribution. However, the preference for redistribution in income group 1 is still smaller than income group 0. Income group 2 and 3 show low preferences for redistribution, which is in line with the actual net taxes of 2014. Income group 4 is close to  $v = 2$  and income group 5 lies between  $v = 0.25$  and  $v = 1$ . These findings show that the Dutch government has slightly changed the preferences for redistribution in 2015 compared to 2014. The actual net taxes in 2015 also show high preferences at the bottom of the income distribution and relatively high preferences at the top

of the income distribution. The government has the lowest preferences for redistribution for the middle income groups. The next section presents the differences between the optimal tax rates in 2014 and 2015.

### **5.1.3 The optimal tax rates in 2014 compared to 2015**

The status quo of 2015 shows a slightly different desire for redistribution in income groups 1 and 2 compared to 2014. Income group 1 of the status quo is equal to scenario  $\nu = 1$  in 2015 and is equal to  $\nu = 0.25$  in 2014 (see Figure 2). This indicates that the desire for redistribution of the government has increased in 2015 for income group 1. For income group 2 the status quo in 2015 is more comparable to the scenario  $\nu = 0.25$  than in 2014, which indicates that the government has slightly increased the desire for redistribution for this income group compared to 2014. The desire for redistribution in income group 5 has decreased slightly. The remaining income groups do not show any significant changes.

According to these findings, I can conclude that the tax reform in 2015 has made the tax system more in accordance to the aims the government wants to achieve. The government's desire for redistribution for income groups 1 and 2 has increased, which will stimulate unemployed single parents to participate in the labour market. This has resulted in a lower share of single parents in income group 0 in 2015. However, the budget constraint has been changed in 2015. The average net taxes (in this case the average net transfers) in 2014 are higher than in 2015. In exchange for the higher labour participation for income group 1 and 2, the government's revenue through net taxes has been reduced in 2015.

## **5.2 The UK tax schedule**

In the previous section, I have presented the optimal tax rates in the Netherlands in 2014 and 2015. This section will present the actual and optimal tax rates of the UK in order to compare the tax systems of these two countries. To find the optimal tax rates of the UK, I need the actual tax schedule and the same country specified data as in the simulations that I have carried out for the Netherlands. I have derived this data from the study of Blundell et al.

(2009). This study analyses the design of personal income tax and discusses the welfare benefits empirically for single mothers in the UK and Germany in 2002. The UK data in the study of Blundell et al. (2009) is taken from the microsimulation model TAXBEN<sup>1</sup>, which is a tax benefit calculator of the UK. For this thesis, I assume that the country specified data on income distribution, elasticities and the shares of the population from the paper of Blundell et al. (2009) are applicable to the tax schedule of single parents in 2014 for the UK. However, the net incomes and net taxes that are presented in the paper of Blundell et al. (2009) are from 2002. This data has to be updated to the current tax schedule of the UK. In order to do this, I use the OECD tax benefit calculator. This tax benefit calculator is comparable to Microtax for the Netherlands and computes the actual net incomes and taxes for all OECD countries until 2014. I will describe the OECD tax benefit calculator in the next section.

### **5.2.1 OECD tax benefit calculator**

The OECD tax benefit calculator can be used to calculate the net taxes and net incomes for the UK. This calculator takes the taxes and social security contributions due to earnings and benefits into account. Benefits such as unemployment benefits, social assistance, family benefits, housing benefits and in-work benefits are included in the calculations. However, this calculator presents the average wage levels of the countries and does not take the childcare subsidy into account, because the level of this subsidy depends on personal circumstances and cannot be estimated with this tax benefit calculator.

The inputs for the OECD tax benefit calculator are the gross earnings levels and the family type. For each country, I can choose from a selection of different gross earnings levels and family types. The range of the gross earnings levels start from 0% up to 200% and are based on the average gross earnings levels per year of the chosen country. Moreover, the gross earnings levels from the range of 0% up to 50% are specified in steps of ten percent. Gross earnings levels from 50% up to 200% are presented more specifically in steps of 1%.

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<sup>1</sup> TAXBEN operates on data taken from the Family Expenditure Survey (FES), a yearly representative sample of 7,000 UK households. It was substantially revised in 1990 (Johnson, Stark, & Webb, 1990).

I will use the income distribution from the study of Blundell et al. (2009) as a base to derive the actual net incomes and taxes in the OECD tax benefit calculator for the UK in 2014. Since it is not possible to insert the gross earnings levels manually, I have to choose the nearest gross earnings levels in the OECD tax benefit calculator that matches the gross earnings levels in the study of Blundell et al. (2009). Therefore, the OECD gross earnings levels will show a small deviation from the data of Blundell et al. (2009). Table 3 presents these results.

### **5.2.2 Actual tax rates of the UK**

Table 3 shows the gross earnings, net taxes and net incomes derived from the paper of Blundell et al. (2009) of the year 2002 and the actual net taxes and net incomes derived from the OECD tax benefit calculator of the year 2014. The gross earnings of the OECD are the inputs for the OECD tax benefit calculator. The net taxes and net incomes are the outputs from the OECD tax benefit calculator for the year 2014 by the given inputs. Single parents are divided into six income groups. Income group 0 represents the unemployed single parents with welfare benefits and the remaining income groups represent the working single parents. The incomes are presented in euros per week and the calculations are based on the family type of a single parent with two children. The difference in net taxes and net incomes can be explained by the different time periods when the data is obtained. The data from the study of Blundell et al. (2009) are from 2002 and the data collected from the OECD are from 2014. For the rest of this thesis, I will use the gross earnings levels and net taxes and net incomes from the OECD tax benefit calculator that are shown in Table 3.

**Table 3. The UK tax schedule from the study of Blundell et al. (2009) and the OECD.**

Income groups	Blundell			OECD <sup>2</sup>		
	Gross earnings	Net tax	Net income	Gross earnings	Net tax	Net income
0	0	-304	304	0	-437	437
1	101	-226	327	123	-424	547
2	166	-197	363	165	-396	561
3	237	-163	400	248	-327	575
4	327	-102	430	330	-252	582
5	501	15	489	504	-95	599

*Source:* Blundell et al. (2009) and the OECD tax benefit calculator (OECD, 2016). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

### 5.2.3 The optimal tax rates of the UK

After finding the actual net taxes and incomes of the UK, I have used Singletax to simulate the optimal tax rates for the UK. Table 4 and Figure 4 show the actual tax schedule (status quo) and the optimal tax rates of the UK. Single parents are divided into six income groups, whereby income group 0 represents the unemployed single parents with welfare benefits. The remaining income groups are the working single parents. The gross earnings, the actual net taxes and incomes stated as the status quo are taken from the OECD tax benefit calculator that has been presented in Table 3. The intensive elasticities, extensive elasticities and the shares of the population are derived from the study of Blundell et al. (2009). Furthermore, the table presents the three scenarios ( $\nu = 0.25$ ,  $\nu = 1$ ,  $\nu = 2$ ) of the government's preference for redistribution. These are the outputs of the simulation model Singletax.  $\nu = 0.25$  indicates Rawlsian preferences,  $\nu = 1$  reflects to relatively high preferences for desire and  $\nu = 2$  Utilitarian preferences. The last column of Table 4 shows the average net taxes that

<sup>2</sup> The OECD tax benefit calculator defines the income levels in the national currency. Therefore, I have used the average exchange rates of 2014 to convert the national currency of the UK from pounds into euros in order to compare the net incomes and net taxes with the Netherlands. Exchange rate of 1/1/14: 1 GBP = 1.19033448 EUR and 31/12/14: 1 GBP = 1.25054711 EUR. The average exchange rate is:  $(1.19033448 + 1.25054711) / 2 = 1.220440795$  (Belastingdienst, 2014).

the government receives from the tax system. The negative average net tax indicates transfers from the government to the single parents.

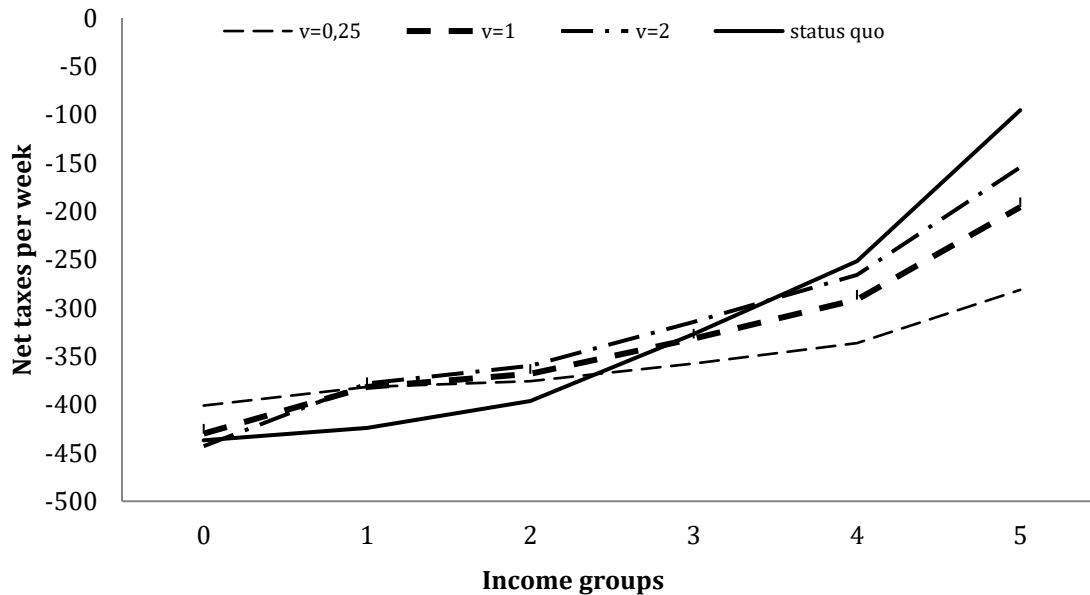
The findings in Table 4 and Figure 4 show that for all income levels the net taxes are negative, which indicates that all single parents receive transfers from the government. Income group 0 of the status quo lies between the scenarios  $\nu = 1$  and  $\nu = 2$ . This indicates a relatively high preference for redistribution. Income group 1 does not match any scenario of the optimal tax rates. The government's preference for redistribution in the actual tax system is extremely high for this income group. The preference for redistribution for income group 2 is also high, but is slightly smaller than for income group 1. Income groups 3 and 4 are most in line with the scenario  $\nu = 2$ . Income group 5 shows an extremely low preference for redistribution.

The largest group of single parents are located in income group 0 for all scenarios and the status quo in Table 4. According to these findings, I can conclude that the government of the UK has a high preference for redistribution for income groups 1 to 4 and a relatively low preference for redistribution for income groups 0 and 5. This tax system is stimulating the labour participation in the UK. However, the single parents in income group 0 do not seem to be affected by financial incentives of the tax system, since the share of this income group is extremely large.

**Table 4. Actual tax schedule and the optimal tax rates of the UK.**

Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Status quo			$\nu = 0,25$			$\nu = 1$			$\nu = 2$			Average net tax
				Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	Shares	Net tax	Net income	
0	0			0.53	-437	437	0.47	-401	401	0.51	-430	430	0.53	-443	443	-371
1	123	0.08	0.08	0.09	-424	547	0.09	-382	505	0.09	-382	505	0.09	-378	501	
2	165	0.17	0.15	0.09	-396	561	0.10	-376	541	0.09	-368	533	0.09	-360	525	
3	248	0.12	0.20	0.09	-327	575	0.10	-358	605	0.10	-332	579	0.09	-314	562	
4	330	0.08	0.25	0.09	-252	582	0.11	-336	667	0.10	-291	622	0.10	-266	596	
5	504	0.04	0.28	0.09	-95	599	0.12	-281	785	0.11	-196	699	0.10	-154	658	

*Source:* MIMOSI and MICSIM model. *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The shares show the distribution of single parents in the population. The status quo presents the actual tax schedule of the UK and  $\nu = 0,25$ ,  $\nu = 1$  and  $\nu = 2$  are the scenarios of the government's preferences for redistribution. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.



**Figure 4. Optimal tax rates and the actual net taxes for the UK in 2014.**

*Notes:* the x-axis shows the income groups of single parents divided into six groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The y-axis shows the net incomes and net taxes in euros per week. The status quo illustrates the actual net taxes of the UK and  $\nu = 0.25$ ,  $\nu = 1$  and  $\nu = 2$  present the scenarios of the government's preferences for redistribution.

### 5.3 Comparing the Netherlands and the UK

In this section, I compare the actual net taxes and the optimal net taxes of the Netherlands in 2015 to the UK for scenario  $\nu = 1$ . Table 5 and Figure 5 present these findings. Single parents are divided into six income groups, whereby income group 0 represents the unemployed single parents with welfare benefits. The remaining income groups are the working single parents. The gross earnings, intensive elasticities, extensive elasticities and the shares of the population are the country specific data. Furthermore, the last column of Table 5 presents the average net taxes, which indicates net transfers paid by the government to the single parents.

When I compare the gross earnings levels of the UK to the Netherlands, I find that the gross earnings levels of the Netherlands are more than two times the gross earnings levels in



the UK. This indicates that the income levels of single parents in the UK are significantly lower than those of the single parents in the Netherlands. The lower gross earnings levels might be explained by the different time period when the data was obtained. Another explanation for the difference is the target group of the study of Blundell et al. (2009). The data from the study of Blundell et al. (2009) is specified to single mothers in the UK. The Dutch data from the CPB (2015) is for all single parents in the Netherlands. By including the gross earnings levels of single fathers, the distribution between the income groups and the general distribution of gross earnings can be affected. Studies (Blundell & MaCurdy, 1999; Bargain et al., 2011) have shown that single fathers have lower labour supply elasticities and higher income levels compared to single mothers. This might explain the difference in the distribution of gross earnings levels between the UK and the Netherlands.

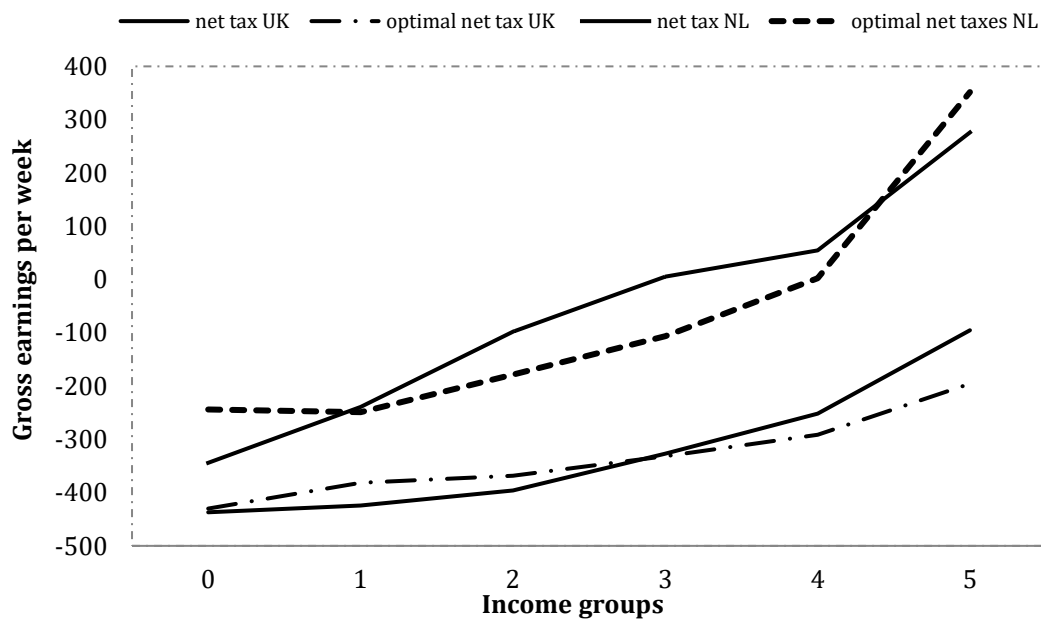
Due to the difference in income distribution between the UK and the Netherlands, it is difficult to make a good comparison between the tax schedules of the two countries. However, the incomes in income group 0 are similar for the two countries. This is the only income group in which the net taxes and net incomes are independent of the gross earnings levels. The level of income of income group 0 depends on the amount of social assistance the government provides. Therefore, I can compare income group 0 of the two countries.

Table 5 shows that income group 0 in the UK receives more transfers from the government than the Netherlands. The level of transfers to single parents reflects the trade-off between equity and efficiency, the government's preferences for redistribution and gives an indication of the welfare of a country. The gross earnings levels for single parents are higher in the Netherlands than the UK. However, the UK government pays more transfers to single parents than the Dutch government. This indicates that the UK government is more willing to provide a certain level of social security to the poor compared to the Dutch government. These findings are in accordance to the studies of the OECD, (2015a) and OECD, (2015b), whereby the general gross earnings levels are higher in the Netherlands than the UK. Moreover, the social benefits to households have a bigger share in the UK GDP (gross domestic product) than in the Netherlands.

Due to the high level of transfers in the UK, the share of the unemployed single parents in the population is extremely high compared to the Netherlands. The labour supply elasticity for income group 1 is relatively low compared to other income groups in the UK.

This indicates that financial incentives have less impact on the labour participation decision of single parents in income group 1 in the UK.

The optimal tax rates of the UK and the Netherlands also show a large difference. This is a logical result when the country specific data and the budget constraints of these two countries differ. Earlier studies (Saez, 2002; Mastrogiacomo et al., 2011) have shown that the intensive elasticities are less important compared to the extensive elasticities in optimal taxation models. However, these studies do not show the impact of these parameters on the optimal tax rates. In order to investigate how these parameters affect the optimal taxes rates of a country, I will carry out robustness analyses in the next section to discuss these effects.



**Figure 5. Net taxes and net incomes of Netherlands 2015 and the UK.**

*Notes:* the x-axis shows the income groups of single parents divided into six groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The y-axis shows the net incomes and net taxes in euros per week. The net taxes of the UK and NL are the actual net taxes in 2014 and 2015, respectively. The optimal net taxes of the UK and NL are the scenario  $\nu = 1$  of the government's preference for redistribution in 2014 and 2015, respectively.

**Table 5. Actual tax schedules and the optimal tax rates  $\nu = 1$  for the Netherlands and the UK.**

NL 2015				Status quo			$\nu = 1$			Average net tax
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	
0	0			0.18	-344	344	0.06	-244	244	-71
1	234	0.26	0.26	0.18	-239	473	0.21	-249	483	
2	383	0.11	0.26	0.17	-98	481	0.22	-178	561	
3	498	0.08	0.21	0.15	5	493	0.19	-107	605	
4	648	0.04	0.18	0.16	54	593	0.17	2	645	
5	1058	0.01	0.14	0.15	276	781	0.15	352	706	
UK				Status quo			$\nu = 1$			Average net tax
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	
0	0			0.53	-437	437	0.51	-430	430	-374
1	123	0.08	0.08	0.09	-424	547	0.09	-382	505	
2	165	0.17	0.15	0.09	-396	561	0.09	-368	533	
3	248	0.12	0.20	0.09	-327	575	0.10	-332	579	
4	330	0.08	0.25	0.09	-252	582	0.10	-291	622	
5	504	0.04	0.28	0.09	-95	599	0.11	-196	699	

*Source:* MIMOSI and MICSIM model for the Netherlands and Blundell et al. (2009) and the OECD tax benefit calculator for the UK (OECD, 2016). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The shares show the distribution of single parents in the population. The status quo illustrates the actual tax rates of the UK and the Netherlands.  $\nu = 1$  presents the government's preferences for redistribution. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

## 5.4 Robustness analyses

The previous section has explained the difference in the distribution in gross earnings levels in the UK and the Netherlands. However, the impact of the country specific data and the budget constraint on the optimal tax rates of the UK and the Netherlands have not been declared yet. Furthermore, it is also not clear which parameter affects the optimal tax rates the most. Therefore, I have conducted robustness analyses for the scenario  $\nu = 1$  on the Dutch data in order to investigate how the country specific data and the budget constraint affect the optimal tax rates of the UK and the Netherlands.

To do this, I carry out four robustness analyses by changing each time one parameter of the country specified data of the Netherlands, while keeping the income distribution of the Netherlands constant. The results are presented in Table 6a, 6b and Figure 6. The replaced parameters are stated in bold. The affected parameters are stated in italic.

In the first robustness analysis I have lowered the net taxes of the Netherlands in each income group with 300 euros while keeping the gross earnings levels constant. The average net tax decreases from -71 to -371 euros in the Netherlands, which is now similar to the UK. The average net taxes represent the government's budget constraint. As a result of the change, the optimal tax rates of the Netherlands have moved to the same level as the UK. The change in net taxes affect the shares of the single parents in income group 1 dramatically, because the transfers of income group 0 have dropped significantly compared to the status quo.

In the second robustness analysis, I have replaced the intensive elasticities of the Netherlands with the intensive elasticities of the UK. The intensive elasticities of the UK are smaller than the intensive elasticities of the Netherlands, which indicates that financial incentives have a smaller effect on the amount of working hours of single parents. Table 6a and Figure 6 show that the change of the intensive elasticities has almost no impact on the optimal tax rates. This is in line with the literature (Saez, 2002; Sorensen 2010; Mastrogiacomo et al., 2011; Jongen et al., 2014) on optimal taxation.

**Table 6a. Robustness analyses on the scenario ( $\nu = 1$ ) of the Netherlands and the UK.**

Net taxes				Status quo			$\nu = 1$			
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax
0	0			0.18	<b>-644</b>	<b>644</b>	<i>0.02</i>	<i>-480</i>	<i>480</i>	-371
1	234	0.26	0.26	0.18	<b>-539</b>	<b>773</b>	<i>0.22</i>	<i>-527</i>	<i>761</i>	
2	383	0.11	0.26	0.17	<b>-398</b>	<b>781</b>	<i>0.23</i>	<i>-477</i>	<i>859</i>	
3	498	0.08	0.21	0.15	<b>-295</b>	<b>793</b>	<i>0.19</i>	<i>-417</i>	<i>915</i>	
4	648	0.04	0.18	0.16	<b>-246</b>	<b>893</b>	<i>0.18</i>	<i>-319</i>	<i>966</i>	
5	1058	0.01	0.14	0.15	<b>-24</b>	<b>1081</b>	<i>0.16</i>	<i>13</i>	<i>1044</i>	
Intensive elasticity				Status quo			$\nu = 1$			
Income groups	Gross earnings	<b>Intensive elasticity</b>	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax
0	0			0.18	-344	344	<i>0.06</i>	<i>-243</i>	<i>243</i>	-71
1	234	<b>0.08</b>	0.26	0.18	-239	473	<i>0.21</i>	<i>-238</i>	<i>472</i>	
2	383	<b>0.17</b>	0.26	0.17	-98	481	<i>0.22</i>	<i>-171</i>	<i>554</i>	
3	498	<b>0.12</b>	0.21	0.15	5	493	<i>0.19</i>	<i>-101</i>	<i>599</i>	
4	648	<b>0.08</b>	0.18	0.16	54	593	<i>0.17</i>	<i>2</i>	<i>646</i>	
5	1058	<b>0.04</b>	0.14	0.15	276	781	<i>0.16</i>	<i>314</i>	<i>744</i>	

*Source:* MIMOSI and MICSIM model for the Netherlands and Blundell et al. (2009). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The shares show the distribution of single parents in the population. The status quo illustrates the actual tax schedule of the Netherlands.  $\nu = 1$  presents the government's preferences for redistribution. The replaced parameters for the robustness analyses are stated in bold. The affected parameters are stated in italic. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

**Table 6b. Robustness analyses on the scenario ( $\nu = 1$ ) of the Netherlands and the UK.**

Extensive elasticity				Status quo			$\nu = 1$			
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax
0	0			0.18	385	344	<i>0.10</i>	<i>-249</i>	<i>249</i>	-71
1	234	0.26	<b>0.08</b>	0.18	-239	473	<i>0.19</i>	<i>-238</i>	<i>471</i>	
2	383	0.11	<b>0.15</b>	0.17	-98	481	<i>0.20</i>	<i>-163</i>	<i>546</i>	
3	498	0.08	<b>0.20</b>	0.15	5	493	<i>0.18</i>	<i>-96</i>	<i>595</i>	
4	648	0.04	<b>0.25</b>	0.16	54	593	<i>0.18</i>	<i>-1</i>	<i>649</i>	
5	1058	0.01	<b>0.28</b>	0.15	276	781	<i>0.16</i>	<i>295</i>	<i>763</i>	
Combination				Status quo			$\nu = 1$			
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Shares	Net tax	Net income	Shares	Net tax	Net income	Average net tax
0	0			0.18	<i>-644</i>	<i>644</i>	<i>0.06</i>	<i>-472</i>	<i>472</i>	-371
1	234	<b>0.08</b>	<b>0.08</b>	0.18	<i>-539</i>	<i>773</i>	<i>0.19</i>	<i>-521</i>	<i>755</i>	
2	383	<b>0.17</b>	<b>0.15</b>	0.17	<i>-398</i>	<i>781</i>	<i>0.20</i>	<i>-465</i>	<i>848</i>	
3	498	<b>0.12</b>	<b>0.20</b>	0.15	<i>-295</i>	<i>793</i>	<i>0.19</i>	<i>-407</i>	<i>905</i>	
4	648	<b>0.08</b>	<b>0.25</b>	0.16	<i>-246</i>	<i>893</i>	<i>0.19</i>	<i>-323</i>	<i>971</i>	
5	1058	<b>0.04</b>	<b>0.28</b>	0.15	<i>-24</i>	<i>1081</i>	<i>0.17</i>	<i>-68</i>	<i>1126</i>	

*Source:* MIMOSI and MICSIM model for the Netherlands and Blundell et al. (2009). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The shares show the distribution of single parents in the population. The status quo illustrates the actual tax schedule of the Netherlands.  $\nu = 1$  presents the government's preferences for redistribution. The replaced parameters for the robustness analyses are stated in bold. The affected parameters are stated in italic. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

The third robustness analysis in Table 6b replaces the extensive elasticities of the Netherlands with the extensive elasticities of the UK. The extensive elasticities of the UK are smaller than the extensive elasticities of the Netherlands, which indicates that the choice whether or not to participate in the labour market is less responsive to financial incentives for single parents in the Netherlands. The results show that this parameter also has a small impact on the optimal tax rates in the Netherlands. However, the impact of the extensive elasticities on the optimal tax rates is larger than the impact of the intensive elasticities. This is in accordance with the optimal taxation literature (Saez, 2002; Sorensen 2010; Mastrogiacomo et al., 2011; Jongen et al., 2014).

The fourth analysis in Table 6b replaces the net taxes, the intensive elasticities and the extensive elasticities of the Netherlands for those of the UK. The results in Figure 6 illustrate that the optimal tax rates of the Netherlands have moved closer to the optimal tax rates of the UK but still show a significant deviation. The remaining deviation can be explained by the difference in the income distribution, because this is the only parameter that has not been changed in the robustness analyses. These findings show that the government's budget constraint and the income distributions are very important when determining the optimal tax rates of a country.

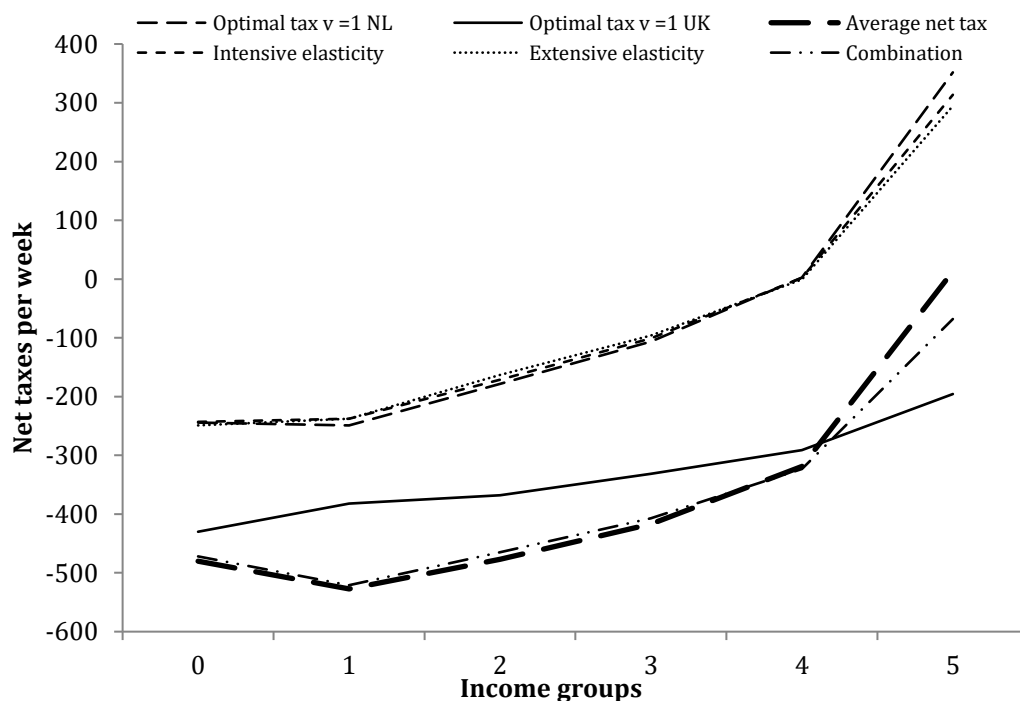


Figure. 6 Robustness analyses of the optimal tax rates in Netherlands and the UK

*Notes:* the x-axis shows the income groups of single parents divided into six groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The optimal tax  $\nu = 1$  of the Netherlands and the UK show the optimal tax rates in each income group of the scenario  $\nu = 1$ . The average net tax line shows the optimal net taxes in each income group when the government's tax receivings are lowered by 300 euros per week in the Netherlands. The intensive elasticity and the extensive elasticity show the optimal net taxes of the Netherlands when replacing the Dutch elasticities with those of the UK. The combination line shows the net taxes of scenarios  $\nu = 1$  of the Netherlands when replacing the intensive elasticity, extensive elasticity and the lowered average net tax receiving of the Netherlands.. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

## 5.5 Summary

This chapter described the optimal tax rates of the UK and the Netherlands. To find the actual rates of the UK for 2014, I have introduced the OECD tax benefit calculator. Furthermore, I compared the actual tax schedules of the UK and the Netherlands and find that the income distributions of the two countries differ significantly from each other, except for income group 0. This is the only income group in which the net taxes and net incomes are independent of the gross earnings levels, but depend on the amount of social assistance the government provides. When comparing income group 0 of both countries, I find that the government of the UK provides more transfers to income group 0 than the government of the Netherlands. However, the gross earnings levels are higher in the Netherlands. This indicates that the UK government is more willing to provide a certain level of social security to the poor compared to the Dutch government.

The difference in actual tax rates results logically to differences in the optimal tax rates. Moreover, the optimal tax rates depend on the country specific data and the budget constraint of a country. The literature on optimal tax rates has shown that the intensive elasticities are less important compared to the extensive elasticities in optimal taxation models. However, these studies do not show the impact of these parameters on the optimal tax rates. Therefore, I carried out robustness analyses to discuss the impact of these parameters. The results of the robustness analyses are in line with the findings in the literature and show that the budget constraint and the income distribution affect the optimal tax rates the most. When governments structure a welfare program, it is of great importance to take the income distribution and the budget constraint into account.



## 6. Social welfare weights

The previous chapter presented the optimal tax rates of the Netherlands before and after the tax reform in 2015 using the optimal taxation model of Saez (2002). Furthermore, I have compared the optimal tax schedule of the Netherlands in 2015 to the UK and carried out robustness analyses to discuss how the parameters of the country specified data might affect the optimal tax rates. The income distribution and the budget constraint are the key parameters that affect the level of the optimal tax rates. However, the actual tax rates have only shown the actual tax schedule of a country and the optimal tax rates have shown what the tax rates should look like with a particular government's preference for redistribution. The question remains how much the government values a particular income group in the population and how these preferences relate between income groups and other countries. The government's value for a particular income group can be shown with the social welfare weights. By calculating the social welfare weights of a country, I can show the government's valuation of particular income groups and discuss the tax policy of a country. Furthermore, I can show whether the tax policy in a country is in accordance with the aims the government wants to pursue. Therefore, this chapter will focus on the calculations of the marginal social welfare weights for single parents.

In order to do this, I present the inverted optimal taxation model of Saez (2002), which is introduced by Bourguignon and Spadaro (2012). This model is pre-programmed in Singeltax and is provided by the CPB Netherlands Bureau for Economic Policy Analysis (CPB, 2015). Furthermore, I compare the marginal social welfare weights of the Netherlands to six European countries (Belgium, Germany, Denmark, France, Ireland and the UK) and discuss how the Dutch social welfare weights in 2014 and 2015 relate to the social welfare weights of these European Countries. The calculation of the social welfare weights requires country specified data of single parents in a country and the actual tax rates. These parameters are presented in the previous chapter for the UK and the Netherlands. Nevertheless, the country specific data is not available for every country that I take into account for this thesis. Therefore, I will introduce Gini-coefficients to overcome this lack of information. I will provide empirical evidence to support the presumption of Gini-indices. Moreover, the actual tax rates of the five other European countries will be collected from the OECD tax benefit calculator as I did for the UK in the previous chapter. Finally, I discuss the

results of the simulation on marginal social welfare weights related to the aims of the tax reform in 2015 of the Netherlands.

## 6.1 Inverted optimal taxation model

Social welfare weights reflect the valuation of a government of single parents in a certain income group. The social welfare weight that is assigned to a group depends on the government's preference for redistribution and the budget constraint. The higher the assigned weight to a group, the more the government values an extra euro redistributed to that group. Studies (Sorensen, 2010; Bourguignon and Spadaro, 2012) have shown that 1) marginal social welfare weights are decreasing with increasing incomes and 2) are positive. However, recent papers (Madden and Savage, 2014; Weinzierl, 2014; Saez and Stantcheva, 2016) have shown that these two assumptions are not always valid and do not reflect the government's actual valuation of particular income groups in the society. When the first assumption of decreasing marginal social welfare weights fails, it indicates that the government is not maximizing the social welfare function. When the second assumption on positive marginal social welfare weights fails, then the tax system can still make Pareto improvements.

In chapter 4, I have introduced the optimal taxation model of Saez (2002) in order to find the optimal tax rates, given the social welfare weights (expression 4) of the government. In this chapter I derive the social welfare weights by inverting the optimal taxation model of Saez (2002), which is introduced by Bourguignon and Spadaro (2012). The social welfare weights of the actual tax system can be calculated given the country specified data and the actual tax rates. The social welfare weights for a given tax benefit system must satisfy the equations that are presented below. For the working group with the highest income  $i=I$ , the social welfare weight  $g_I$  is defined as follows:

$$g_I = 1 - \zeta_I \frac{T_I - T_{I-1}}{C_I - C_{I-1}} - \eta_I \frac{T_I - T_0}{C_I - C_0}, \quad (6)$$

and for the remaining working income groups  $i$  is defined as:

$$g_I = 1 - \zeta_i \frac{T_i - T_{i-1}}{C_i - C_{i-1}} - \eta_i \frac{T_i - T_0}{C_i - C_0} + \frac{1}{h_i} \sum_{j=i+1}^J h_j \left[ 1 - g_j - \eta_j \frac{T_j - T_0}{C_j - C_0} \right], \quad (7)$$

where  $g_i$  is the social welfare weight of single parents of income group  $i$ ,  $C_i$  is the net income of income group  $i$ ,  $T_i$  stands for the net taxes paid by income group  $i$  and  $h_j$  is the share of individuals of group  $j$  in the population. The intensive elasticity  $\zeta_i$  (Saez, 2002) is defined as:

$$\zeta_i = \frac{C_i - C_{i-1}}{h_i} \frac{dh_i}{d(C_i - C_{i-1})}$$

The intensive elasticity  $\zeta_i$  indicates the percentage increase in labour supply of group  $i$  when  $C_i - C_{i-1}$  is increased by 1%. The higher the intensive elasticity, the stronger a person reacts to the change in net wage. The extensive elasticity  $\eta_i$  (Saez, 2002) is defined as:

$$\eta_i = \frac{C_i - C_0}{h_i} \frac{dh_i}{d(C_i - C_0)}$$

The extensive elasticity  $\eta_i$  indicates the percentage of individuals in group  $i$  who stop working when the difference between the net income gained from work and at earnings point  $i$  is reduced by 1%.

Furthermore, the expressions (2), (3) and (5) of the Saez model (2002) that is described in chapter 4 are also required for the inverted taxation model of Bourguignon and Spadaro (2012).

## 6.2 Singletax for social welfare weights

The inverted optimal taxation model of Bourguignon and Spadaro (2012) is pre-programmed in Singletax. The parameters and assumptions I have used for the calculation of the optimal tax rates in chapter 4 are also required for the simulation of the social welfare weights. In Singletax single parents are divided into six income groups. Individuals who are unemployed are represented by  $i = 0$ . The remaining groups are represented by  $i = 1 - 5$ , where  $I = 5$  represents individuals with the highest income. The ‘‘CPB Netherlands Bureau for Economic Policy Analysis’’ has provided the income distribution, the intensive elasticities, the extensive elasticities and the shares of the population for the Netherlands for 2014. Parameters and elasticities are taken from the MIMOSI and MICSIM model (CPB, 2015),

respectively. Singletax presents the gross earnings, net incomes and taxes in weekly earnings. Negative net taxes in Singletax indicate a transfer from the government to that income group.

To find the social welfare weights, the actual tax rates of a country are required. The actual tax system of the Netherlands is determined by using the tax benefit calculator Microtax and for the UK by using the OECD tax benefit calculator. For the actual tax rates of the five other European countries (Belgium, Denmark, France, Germany and Ireland), I will also use the OECD tax benefit calculator as mentioned in chapter 5. Given the country specified data on income distributions, elasticities, shares and the actual tax schedule, I am able to find the social welfare weights through equations (6) and (7). However, I only have the country specified income data of the Netherlands and the UK. This data is unavailable for the five other European countries. Therefore, I will introduce the Gini-indices in the next section to overcome this lack of information on the country specified data of the five other European countries.

The weighted sum of the social welfare weights of each country is equal to one for normalisation purposes, because income effects are ruled out in this model. This satisfies expression (2) of the Saez model (2002) in chapter 4. When including income effects in this model, the labour supply depends not only on  $C_i - C_0$ , but also on  $C_0$ . In this situation, the average welfare weights may no longer be equal to one (Saez, 2002). As mentioned in chapter 4, including income effects makes the analysis substantially more complicated and the response is found to be small along the intensive margin. Therefore, income effects are not taken into account for this thesis.

Furthermore, as mentioned earlier in chapter 4, net incomes are increasing in gross earnings. Transfers from the government can not result in lower net incomes compared to a lower income group (e.g. income group 1 has to have a higher net income than income group 0). If this occurs, it might result in increasing or negative marginal social welfare weights. If increasing marginal social welfare weights occur, the revealed social welfare function is non-Paretian (e.g. giving the negative marginal social weights to the richest class of tax payers). If negative marginal welfare weights occur, it is possible to make Pareto improvements in the current tax system (Bourguignon and Spadaro, 2012; Ahamad and Stern, 1984).

### 6.3 The Gini-indices

The Gini-index measures the degree of inequality in the distribution of family incomes in a country. A Gini-index of zero represents perfect equality, while an index of 100 implies perfect inequality (World Bank, 2016). Since the Gini-indices of the Netherlands and the UK differ from each other, I have divided the UK and the Netherlands into two groups in order to make the analysis as specific as possible. For this thesis, I make the following assumption: when the five other European countries have comparable Gini-indices to the Netherlands or the UK, the country specified data on income distributions, elasticities and shares of the Netherlands and the UK are applicable to these countries.

However, applying the country specified income data of the Netherlands and the UK to the five other European countries might affect the outcomes of the simulations. Therefore, the results of this thesis are not able to precisely represent the government's preferences for redistribution in the five other European countries. Nevertheless, the results do provide an indication of the government's valuation on single parents in each income group, because the actual net taxes and net incomes of these countries will be used for the simulations (this will be explained in the next section). Moreover, the findings on the Dutch tax reform can be used as reference for other governments to improve the labour participation of single parents in their own country.

Table 7 presents the Gini-indices of the seven European countries. Based on the Gini-indices, I divide the five other European countries into the group of the Netherlands or the UK. The first group has Gini-indices up to 31 and the second group has Gini-indices from 31 upwards. The last column of Table 7 presents the year when the data has been obtained. The Netherlands and the UK are located in group A and B, respectively. The Dutch country specified data will be applied to the countries in group A, while the UK country specified data will be applied to the countries in group B.

The group A countries can be characterized as West-European countries except Denmark, which is a Scandinavian country. The group B countries can be characterized as Anglo-Saxon countries with the exception of France, which is a West-European country. Although the classification of the countries are not in accordance with the geographical location of Denmark and France, the Gini-indices show that Denmark and France have

comparable degrees of inequality in the distribution of family incomes to the Netherlands and the UK, respectively. Therefore, the country specified data is assumed to be comparable to the Netherlands and the UK. Moreover, I find empirical evidence in recent studies (Bargain et al., 2013; Immervoll et al., 2007) to support the classification in Table 7.

Bargain et al. (2013) have studied the labour supply elasticities for 17 European countries and the US for singles. They have also applied the Saez model (2002) and the inverted Saez model in their study. Individuals are also divided into six income groups. Although they have investigated a different household type in their study, the results provide support for the classification of the countries in Table 7. The findings in the study of Bargain et al. (2013)<sup>3</sup> show a comparable pattern in the marginal social welfare weights for income groups 1 to 5. The main differences are stated in income group 0. The Netherlands, Germany, Belgium and Denmark (group A in this thesis) have relatively high social welfare weights in income group 0, of which Belgium and Denmark show extremely high marginal social welfare weights in income group 0. The UK, Ireland and France (group B in this thesis) show comparable marginal social welfare weights in income group 0. These findings in Bargain et al. (2013) support the classification in Table 7.

Immervoll et al. (2007) have shown that the percentages of social benefits in disposable incomes, effective marginal tax rates, earning equalities and participation elasticities for single parents<sup>4</sup> in the Netherlands, Germany and Belgium are comparable. These countries are represented as Continental European countries in their study. The results in their study also show similarities of these parameters for the UK and Ireland. Both countries are stated as Anglo-Saxon countries. However, Immervoll et al. (2007) have mentioned France as a Continental European country. The results of their study show that France sometimes has comparable parameters to the Continental European countries and sometimes to the Anglo-Saxon countries. This can be explained by the geographical location of France, which is influenced by Continental European countries as well as Anglo-Saxon countries. Denmark is stated as a Nordic European country in their study. The findings in their study for Denmark show significant differences compared to the Continental European countries.

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<sup>3</sup> see Figure 5 and Figure 8 of Bargain et al. (2013)

<sup>4</sup> see Table 1, Figure 1, Figure 3, Table 6, respectively of Immervoll et al. (2007)

These findings provide evidence for the classification of the countries in Table 7. However, the allocation of Denmark and France are questionable, due to different findings. Nevertheless, I will take these two countries into account in the analysis of the marginal social welfare weights in order to discuss the differences with the Netherlands.

**Table 7. Gini-indices**

Group A	Gini-indices $\leq 31$	Year
Belgium	27.6	2012
Netherlands	28.0	2012
Denmark	29.1	2012
Germany	30.1	2011
Group B	Gini-indices $> 31$	Year
Ireland	32.5	2012
United Kingdom	32.6	2012
France	33.1	2012

*Source:* World Bank (2016). *Notes:* European countries are divided into group A and group B countries based on the Gini-indices. The year column in Table 7 presents the year in which the Gini-indices are obtained.

## 6.4 OECD tax benefit calculator for countries in group A and B

In section 5.2.1, I have described the OECD tax benefit calculator for the UK. I will apply this tax benefit calculator in the same way to find the net taxes and the net incomes for the five other European countries in group A and B. The inputs for the OECD tax benefit calculator are the gross earnings levels and the household type. The outputs are the net taxes and net incomes. The gross earnings levels in the OECD tax benefit calculator are presented in percentages from 0% to 200%. These levels are based on the average wage level of the whole population in a country. As described in section 6.2, the income distributions (thus the gross earnings levels) of these five other European countries are not available. In order to apply the income distributions of the Netherlands and the UK to the five other European countries, I have to translate the gross earnings levels of the Netherlands and the UK into percentages of the OECD average wage levels.

I define the gross earnings levels of the Netherland and the UK in percentages of the OECD tax benefit calculator. The third column of Table 8 shows the 100% average wage

level per week of the OECD. I divide the gross earnings levels (the second column in Table 8) to the 100% average wage level (the third column in Table 8). The results are the gross earnings levels of the Netherlands and the UK (in percentages), these are presented in column four of Table 8. These numbers will be used as inputs for the OECD tax benefit calculator to find the actual tax rates and net taxes of the five other European countries. All gross earnings levels in Table 8 are defined in euros per week and are based on the household type of a single parent with two children. The gross earnings levels of the five other European countries are presented in Table 9 and 10.

**Table 8. Gross earnings in respect to OECD average wage levels.**

Income Groups	Gross Earnings NL	Average Wage Level OECD p/w	% in respect to OECD
0	0	945	0%
1	234		25%
2	383		40%
3	498		53%
4	648		69%
5	1058		112%

Income Groups	Gross Earnings UK	Average Wage Level OECD p/w	% in respect to OECD
0	0	826	0%
1	123		15%
2	165		20%
3	248		30%
4	330		40%
5	504		61%

*Source:* OECD (2016). *Notes:* single parents are divided into six income groups. Income group 0 are the unemployed single parents and income groups 1 to 5 are the working single parents. The second column shows the average wage level per week for the Netherlands and the UK as defined in the OECD tax benefit calculator. The average wage levels of the OECD are based on the average wage levels for the whole population in a country. The last column can be calculated by dividing the gross earnings levels by the average wage level in the second column.



## **6.5 Actual Social welfare weights**

Table 9 and 10 present the actual tax schedules with social welfare weights for the countries in group A and B, respectively. The first column of both tables shows the six income groups, where income group 0 stands for the unemployed single parents and income group 1 to 5 for the working single parents. The second column shows the gross earnings levels per week for each income group. Group A and group B countries use the intensive elasticity, the extensive elasticities and the shares of the population of the Netherlands in 2014 (since the data of the OECD tax benefit calculator for the countries is updated to 2014) and the UK, respectively. The net taxes and net incomes of the countries are outputs of the OECD tax benefit calculator and Microtax for the Netherlands. Negative net taxes indicate that single parents receive a transfer from the government.

The social welfare weights in both tables are the results of the simulations of Singletax. These social welfare weights reflect the government's valuation of a specific income group. Negative social welfare weights indicate that Pareto improvements can be made in the tax system (Ahmad and Stern, 1984). Apparently the government finds it more important to stimulate a particular income group in the society than maximizing welfare. Social welfare weights higher than one imply that the government wants to redistribute to this particular income group more than to other income groups.

The average net taxes show the net taxes received by the government or the transfers paid to the single parents. For all countries the average net taxes are negative because the government, on average, pays more transfers to single parents than they receive tax payments. The incomes and taxes are defined in weekly earnings.

### **6.5.1 The social welfare weights of the group A countries**

The social welfare weights of the Netherlands in 2014 show that the Dutch government has the largest preference for redistribution to income group 0. This also applies to 2015. The social welfare weights for the income groups 1, 2, 4 and 5 have been increased in 2015 compared to 2014. The largest increase is shown in income groups 1 and 2, which is

in accordance with the earlier findings on the actual tax rates in Table 2. The government is more willing to redistribute to income groups 1 and 2 after the tax reform. However, the social welfare weight of income group 2 is still negative. This indicates that the Dutch government values a guaranteed income for the unemployed single parents more than stimulating labour participation.

The increase in social welfare weights of income groups 1 and 2 is on the expense of income groups 0 and 3. The reformed tax system has focused primarily on stimulating labour participation regarding the unemployed single parents in income group 0, which results in a large increase in the social welfare weight of income group 1 in 2015. Income group 3 has changed from a positive social welfare weight in 2014 into a negative social welfare weight in 2015. This is due to the big difference in net taxes between 2014 and 2015 of the income groups 2 and 3.

Despite the lower social welfare weight of income group 0 in 2015, this income group still shows the highest social welfare weight compared to other income groups. A high social welfare weight for income group 0 is indicative of Rawlsian preferences, where the government cares the most about the poorest individuals in the society. These findings are partially in line with the study of Zoutman et al. (2016). In their study, they have shown that the social welfare weights for the poor are always higher than for the rich in the Netherlands. However, in their study, the middle class receives the highest social welfare weights, which contradicts the findings in Table 9. This can be explained by the target group in their study. The study of Zoutman et al. (2016) focuses on the whole population, where the middle class plays an important role in elections, because they form the largest group in the population. Single parents are a small part of the population who are more responsive to financial incentives (CPB, 2015a). Therefore, the findings regarding the whole population cannot be applied to single parents.

The social welfare weights of Belgium differ significantly from the Netherlands in 2014 and 2015. The government of Belgium allocates an extremely high social welfare weight in income group 0 and an extremely low social welfare weight in income group 1. This implies that the government values an extra euro transferred to the unemployed single parents more than transferring the same euro to income group 1. The Belgian government prefers a social assistance income for the unemployed single parents more than it wants to

stimulate labour participation. The tax system of Belgium should lower the transfers in income group 0 when the government wants to stimulate labour participation of the unemployed single parents. Moreover, when labour supply responses are concentrated along the extensive margin, then it is optimal to introduce an EITC with negative marginal tax rates at the bottom and provide a smaller guaranteed income for the unemployed single parents (Saez, 2002). This is the case for all group A countries, because labour supply responses are more concentrated on the extensive margin than the intensive margin.

The government of Germany allocates the highest social welfare weight to income group 0. This indicates that the government of Germany also values the unemployed single parents the most. Moreover, the social welfare weights of income group 1 and 2 differ significantly from the Netherlands. Where, the social welfare weight of income group 2 is higher than income group 1. This implies that the German government values an extra euro transferred to income group 2 more than stimulating the labour participation in income group 1. Furthermore, the smallest social welfare weight is allocated to income group 3. This indicates that the government of Germany has the lowest desire for redistribution to the middle incomes.

The social welfare weights of Denmark<sup>5</sup> show a remarkable finding. The social welfare weight of income group 0 is negative, which indicates that the government values this income group less compared to other income groups. However, the net income of income group 0 is higher than in income groups 1 and 2. Logically, the social welfare weight of income group 0 has to be higher than income groups 1 and 2 because of the higher net income. As mentioned earlier in section 4.3, the additional assumption for the simulations requires that income group 1 can not have a lower net income than income group 0. When this occurs, it indicates that the current tax system is not maximizing welfare. It can also indicate that the Dutch income distribution and elasticities differ significantly from Denmark, which affects the results of Denmark as mentioned in section 6.3. Moreover, the average net tax in Denmark is significantly lower than in the other countries in group A. This is because the government of Denmark provides higher transfers to the single parents compared to other countries in group A. These findings are in line with the earlier study of Immervoll et al. (2007) where Denmark differs significantly from the group A countries in percentages of

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<sup>5</sup> The exchange rate of 1/1/14: 1 DKK= 0,13403748 EUR and 31/12/14: 1 DKK=0,134338 EUR. The average exchange rate is  $(0,13403748 + 0,134338)/2 = 0.13418774$

social benefits in disposable incomes, effective marginal tax rates, earning equalities and participation elasticities of single parents.

The results of the social welfare weights show a repetitive trend. Income group 5 always has social welfare weights in the range of 0.6 – 0.8 and the social welfare weights of income group 3 and 4 are always lower than for income group 5. This might be explained by the higher taxes that are paid by income group 5. Higher taxes result in an increase of the government's tax incomes. Therefore, the government values this income group more than income groups 3 and 4. Furthermore, all countries in group A show negative social welfare weights. According to the earlier study of Ahmad and Stern (1984), this indicates that Pareto improvements can be made in the current tax system. Furthermore, increasing marginal social welfare weights imply that the revealed social welfare function is non-Paretian (e.g. giving the negative marginal social weights to the richest class of tax payers).

**Table 9. Social welfare weights group A**

NL 2014								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.25	-338	338	3.26	
1	234	0.26	0.26	0.15	-168	402	0.80	
2	383	0.11	0.26	0.15	-32	415	-1.13	
3	498	0.08	0.21	0.15	27	471	0.39	-42
4	648	0.04	0.18	0.15	112	535	0.48	
5	1058	0.01	0.14	0.15	334	723	0.74	
NL 2015								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.18	-344	344	2.77	
1	234	0.26	0.26	0.18	-239	473	2.57	
2	383	0.11	0.26	0.17	-98	481	-0.93	
3	498	0.08	0.21	0.15	5	493	-0.15	-71
4	648	0.04	0.18	0.16	54	593	0.65	
5	1058	0.01	0.14	0.15	276	781	0.79	
Belgium								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.25	-347	347	7.48	
1	223	0.26	0.26	0.15	-138	361	-6.81	
2	357	0.11	0.26	0.15	-60	417	-0.12	
3	473	0.08	0.21	0.15	8	465	0.42	-45
4	616	0.04	0.18	0.15	123	493	0.18	
5	1000	0.01	0.14	0.15	341	659	0.68	
Germany								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.25	-376	376	3.05	
1	220	0.26	0.26	0.15	-223	442	0.03	
2	352	0.11	0.26	0.15	-134	486	1.20	
3	466	0.08	0.21	0.15	-28	494	-0.47	-90
4	606	0.04	0.18	0.15	83	524	0.21	
5	984	0.01	0.14	0.15	320	664	0.65	
Denmark								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.25	-605	605	-0.54	
1	257	0.26	0.26	0.15	-226	482	2.68	
2	410	0.11	0.26	0.15	-167	577	5.05	
3	544	0.08	0.21	0.15	-115	659	-0.91	-197
4	708	0.04	0.18	0.15	-33	741	0.11	
5	1149	0.01	0.14	0.15	227	922	0.62	

*Source:* OECD tax benefit calculator (OECD, 2015). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The gross earnings levels are obtained from the OECD tax benefit calculator. The Dutch intensive elasticity, extensive elasticity and shares of the population of 2014 are applied to all countries in this Table. The social welfare weights show how much the government values a particular income group in respect to other income groups. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.

### **6.5.2 The social welfare weights of the group B countries**

I use the country specified data of the UK to calculate the social welfare weights of the group B countries. The extensive elasticities of the group B countries are increasing with income. This indicates that higher income groups are more responsive to financial incentives than the lower income groups. Financial incentives for the lower income groups in the group B countries have less effect on the labour participation. This can be explained by the high amount of transfers from the government to all income groups and the small difference in income compared to the next income group. This finding is not in line with the findings of Jongen et al. (2015), where single mothers of lower income groups are responsive to financial incentives.

Moreover, the social welfare weight of the UK for income group 0 is larger than one, and increases in income group 1 and then drops with net incomes from income group 1 upwards. Furthermore, all social welfare weights are positive. The social welfare weights show that the government values the working poor more than the unemployed single parents in income group 0. This indicates that the tax system is stimulating labour participation. Labour supply responses are also concentrated along the extensive margin for the group B countries. According to the study of Saez (2002), it is then optimal to introduce an EITC with negative marginal tax rates at the bottom and provide a smaller guaranteed income to the unemployed single parents.

The social welfare weights of Ireland show a similar trend to the UK. However, the gross earnings levels are lower for the UK. Moreover, the government in the Ireland gives more transfers to all income groups compared to the UK. This results in a lower average net tax income of the government. The governments of the UK and Ireland are valuing income

group 1 the most compared to other income groups. This indicates that the tax system of both countries is more willing to stimulate labour participation than guarantying a minimum social assistance for unemployed single parents.

The social welfare weights for France are gradually declining with net incomes up to income group 4. Income group 5 has a higher social welfare weight than income group 4. Furthermore, income group 0 has a higher social welfare weight than income group 1. This trend differs from the UK and Ireland. As mentioned earlier in section 6.3, the classification of France is questionable according to different studies (Bargain et al., 2013; Immervoll et al., 2007). The tax system of France is influenced by the Anglo-Saxon countries as well as by the Continental-European countries (group A countries) due to the geographical location of France. Moreover, the government of France provides less transfers to single parents compared to the UK and Ireland. This also indicates the difference in tax system between these countries.

The group B countries do not show negative social welfare weights, this implies that Pareto improvements are not available in the current tax system. However, the group B countries show increasing marginal social welfare weights, which indicate that the government is not maximizing the social welfare function.

**Table 10. Social welfare weights group B**

UK								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.53	-437	437	1.19	
1	123	0.08	0.08	0.09	-424	547	1.31	
2	165	0.17	0.15	0.09	-396	561	1.23	-371
3	248	0.12	0.20	0.09	-327	575	1.04	
4	330	0.08	0.25	0.09	-252	582	0.31	
5	504	0.04	0.28	0.09	-95	599	0.04	
Ireland								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.53	-407	407	1.05	
1	98	0.08	0.08	0.09	-461	559	1.33	
2	131	0.17	0.15	0.09	-440	572	1.15	-389
3	197	0.12	0.20	0.09	-390	587	0.94	
4	263	0.08	0.25	0.09	-336	599	0.87	
5	401	0.04	0.28	0.09	-215	616	0.46	
France								
Income groups	Gross earnings	Intensive elasticity	Extensive elasticity	Share	Net tax	Net income	Social welfare weight	Average net tax
0	0			0.53	-288	288	1.27	
1	107	0.08	0.08	0.09	-233	340	1.02	
2	143	0.17	0.15	0.09	-214	357	0.96	-219
3	215	0.12	0.20	0.09	-162	377	0.74	
4	287	0.08	0.25	0.09	-104	391	0.33	
5	438	0.04	0.28	0.09	-9	447	0.45	

*Source:* OECD tax benefit calculator (OECD, 2015). *Notes:* single parents are divided into six income groups. Income group 0 represents the unemployed individuals and income groups 1-5 are the working single parents. The gross earnings levels are obtained from the OECD tax benefit calculator. The UK intensive elasticity, extensive elasticity and shares of the population are applied to all countries in this Table. The social welfare weights show how much the government values a particular income group in respect to other income groups. The negative average net taxes are the transfers from the government to the single parents. All incomes are presented in euros per week and are based on the family type of a single parent with two children.



### 6.5.3 The group B countries compared to the Netherlands

The income distribution of the group B countries differs from those of the group A countries. This is mentioned earlier in section 5.3. Furthermore, intensive and extensive elasticities also show a deviating trend. The intensive margins of the group A countries decline with higher incomes and the intensive margin of the group B countries are more U-shaped. This reflects that the countries in group A are more responsive to financial incentives along the intensive margin. Contrary to the group B countries, the extensive margins of the group A countries are declining with higher incomes. The working poor in the group B countries are less responsive to financial incentives, because of the higher guaranteed income in these countries. This also explains the large share of single parents in income group 0 in the group B countries. The larger shares of the population in the working groups of the Netherlands are in line with the findings of Jongen et al. (2015). In their study, they have shown that single parents with young children are more responsive to financial incentives than singles and couples with children. Due to the tax reform, the net incomes of single parents have been increased. This results in a lower share of the unemployed single parents in 2015.

When I compare the social welfare weights of the UK to those of the Netherlands, I find that the social welfare weights differ significantly from the Netherlands. The government of the UK values income group 1 the most and the government of the Netherlands values income group 0 the most. After the tax reform in the Netherlands, the social welfare weights of income group 1 have increased significantly. The tax reform of the Netherlands moves the government's valuation more in the direction of the UK for single parents in income group 1. Since Ireland has comparable social welfare weights to the UK, the comparison between the UK and the Netherlands also applies to Ireland.

The shape of the social welfare weights of the Netherlands is comparable to France. Only the social welfare weights of the middle incomes differ from the Netherlands. Both countries show a U-shaped pattern in the social welfare weights. This indicates that the government values the single parents on the bottom and the top of the income distribution more, at the expense of the single parents with middle incomes. However, the size of the social welfare weights of the Netherlands after the reform is still not comparable with any country in groups A and B. The governments in the most European countries value the

unemployed single parents the most. This indicates that the governments in these countries are more willing to provide a guaranteed income for the unemployed single parents than optimally stimulating the labour participation of single parents.

## **6.6 Relating the social welfare weights to the aims of the tax reform**

This section relates the findings on social welfare weights for the Netherlands to the aims that are described in chapter 3. The government wants to achieve three aims with the tax reform in 2015:

- 1) simplify the tax system for single parents,
- 2) stimulate single parents to participate in the labour market,
- 3) maintain income support for the ones who need it the most.

The first aim has been achieved by reducing the number of regulations regarding child support. This is mentioned earlier in chapter 3. This aim does not relate to the results of the social welfare weights. Therefore, this will not be discussed in any further detail in this chapter.

### **6.6.1. Stimulate single parents to participate in the labour market**

The second aim is to stimulate single parents to participate in the labour market. The government has increased the net incomes of the single parents in the working groups by changing the child support regulations and the EITC, which make labour participation more financially attractive. According to the results in section 6.5, the social welfare weights of income groups 1 and 2 have increased the most after the tax reform. This indicates that the government values an extra euro redistributed to these income groups more than before the tax reform. However, the social welfare weight of income group 0 is still higher than for income group 1. This implies that the government still values a minimum social assistance for the unemployed single parents more than stimulating the labour participation.

Furthermore, the study of Jongen et al. (2015) shows that the labour participation in the Netherlands has increased substantially for all individuals in the last decade. Therefore, it is difficult to further increase the labour participation. However, the tax reform shows that the share of the population in income group 0 has declined. This is in line with the findings of the paper of Jongen et al. (2015). Therefore, I can conclude that the government succeeded in achieving the second aim of the tax reform.

### **6.6.2 Maintain income support for the ones who need it the most**

The last aim is to maintain income support for single parents who need it the most. The findings that support the second aim of the tax reform can also be applied to the third aim. The tax reform has increased the net incomes for all income groups. According to the results of the actual tax schedule of the Netherlands in section 5.1, the largest increase takes place in income groups 1 and 2. These income groups are the single parents who have the lowest net incomes. The increased income support from the government in 2015 to these income groups will increase the incentive for single parents to participate in the labour market. Therefore, the third aim of the tax reform has also been achieved.

## **6.7 Summary**

This chapter has introduced the inverted optimal tax model developed by Bourguignon and Spadaro (2012) to calculate the social welfare weights of seven European countries (Belgium, Denmark, France, Germany, Ireland, Netherlands and the UK). Since the country specified data is not available for all seven European countries in this thesis, I have introduced the Gini-indices to overcome this lack of information. The countries are divided in two groups with comparable Gini-indices. An assumption for this thesis is: when countries have comparable Gini-indices, they also have similar income distributions. Following this assumption, the income distribution of the Netherlands and the UK are applied to the five other European countries.

However, applying the country specified income data of the Netherlands and the UK to the five other European ((Belgium, Denmark, France, Germany and Ireland) countries might affect the outcomes of the simulations. Therefore, the results of this thesis are not able to precisely represent the government's preferences for redistribution in these countries. Nevertheless, the results do provide an indication of the government's valuation on single parents in each income group, because the actual net taxes and net incomes of these countries are used in the simulations. The net taxes and net incomes of the seven European countries are obtained from the OECD tax benefit calculator and Microtax.

The social welfare weights of the Netherlands in 2014 and 2015 are the highest for income group 0. After the tax reform, the social welfare weights of income groups 1 and 2 have increased the most. However, the social welfare weight of income group 0 is still higher than other income groups. This indicates that the Dutch government values a guaranteed income for the poor more than optimally stimulating labour participation. This also applies to the governments of Belgium and Germany.

The social welfare weight of Denmark for income group 0 is negative, which deviates from all other countries in group A. This can be explained by not satisfying the assumption that the net income of the next income group has to be higher than the net income of the previous income group. It implies that a tax system is not maximizing welfare. Moreover, according to the results of Immervoll et al. (2007), Denmark shows deviating percentages of social benefits in disposable incomes, effective marginal tax rates, earning equalities and participation elasticities compared to the group A countries. The income distribution of Denmark differs probably from the Dutch income distribution.

The social welfare weights of the group B countries differ significantly from the social welfare weights of the Netherlands. Only the social welfare weights of France show a similar U-shaped trend. This indicates that the government values the single parents on the bottom and the top of the income distribution more, at the expense of the single parents with middle incomes. Contrary to the group B countries, some social welfare weights in the group A countries are negative. This implies that the tax system can make Pareto improvements (Ahmad and Stern, 1984). Furthermore, all countries show increasing marginal social welfare weights in particular income groups. This implies that the respective governments are not maximizing the welfare function.

Moreover, the labour supply elasticities are concentrated along the intensive margin for the group A countries as well as for the group B countries. According to the study of Saez (2002), it is then optimal to introduce an EITC with negative marginal tax rates at the bottom and provide a smaller guaranteed income for the unemployed single parents. The tax reform of the Netherlands has moved the government's valuation of single parents of income group 1 more in the direction of the UK. However, the social welfare weights of the Netherlands after the reform are still not comparable with any country in groups A and B. The governments in the most European countries value the unemployed single parents the most. This indicates that the governments in these countries value a guaranteed income for unemployed single parents more than optimally stimulating the labour participation of single parents.

Finally, the findings on the social welfare weights show that the aims of the tax reform (to stimulate the labour participation of single parents and maintain income support for the ones who need it the most) have been achieved by providing more transfers to the working poor and changing some specific tax regulations on child support and the EITC. Moreover, the findings on the social welfare weights of the Netherlands pre- and post reform can be used as reference for other governments to improve the labour participation of single parents in their own country.

## 7. Conclusion

The main reason for this thesis is the tax reform in 2015 regarding child support regulations in the Netherlands. This tax reform has a great impact on the income and labour participation of single parents. The aims of this tax reform are: 1) to simplify the regulations regarding child support, 2) to stimulate labour participation and 3) to maintain income support for the ones who need it the most. This tax reform has a great impact on the income and labour participation of single parents.

The research objectives of this thesis are finding the social welfare weights for single parents pre-reform (2014) and post-reform (2015) in the Netherlands and to compare these to the social welfare weights of Belgium, Denmark, France, Germany, Ireland and the UK. Furthermore, I carry out robustness analyses on the optimal tax rates in the Netherlands and the UK. In order to do this, I apply the optimal taxation model of Saez (2002) and the inverted tax model introduced by Bourguignon and Spadaro (2012) to the country specified data of these countries. The findings of this thesis answer the following research question:

***How do the social welfare weights for single parents of the Dutch government in 2014 and 2015 compare to the social welfare weights of six other governments in the EU?***

The findings on the social welfare weights show that the tax reform in 2015 increases the net incomes of the single parents in the lowest income group. This leads to an increase in labour participation of single parents because a higher net income makes work financially more attractive compared to the pre-tax reform situation in 2014. Furthermore, the Dutch government has achieved the three aims of the tax reform by reducing and simplifying the regulations regarding child support and providing more income support to the working poor.

The level of social welfare weights in the Netherlands pre- and post-reform differ significantly from the social welfare weights in Belgium, Denmark, France, Germany, Ireland and the UK. However, the results show that the governments of most European countries allocate the highest social welfare weight to the unemployed single parents. The governments in these countries probably value a guaranteed social assistance income more than optimally stimulating the labour participation of single parents.

This thesis applies the country specified income data of the Netherlands and the UK to Belgium, Denmark, France, Germany and Ireland. This may affect the outcomes of the simulations and thus the governments' valuation of each income group. Therefore, the results of this thesis are not able to precisely represent the government's preference for redistribution in these countries. Nevertheless, the results of this thesis provide an indication of the government's valuation of single parents in these countries, because the actual net taxes and net incomes of these countries are used in the simulations. The findings show that the tax reform of the Netherlands affects the labour participation of single parents in the positive way. Hence, the findings on the tax reform can be used as reference for other governments to improve the labour participation on single parents in their own country.

Furthermore, I carry out robustness analyses on the optimal tax rates of the UK and the Netherlands to explain the differences in the optimal tax schedule. In order to do this, I apply the optimal taxation model of Saez (2002) to find the optimal tax rates in the UK and the Netherlands. In the robustness analyses I test the income distribution, the intensive elasticity, the extensive elasticity and the government's budget constraint to find which of these parameters affect the optimal tax rates the most. The results show that the government's budget constraint and the income distribution have the largest impact on the level of the optimal tax rates and that they are the main cause of the large differences between the optimal tax schedules. Therefore, it is of great importance to take the income distribution and the budget constraint into account when governments structure a welfare program.

## **8. Recommendations**

The recommendations for further research are also the shortcomings of this thesis. In this thesis, I use the country specific data of the Netherlands and the UK. If the country specified data (income distribution, intensive elasticity, extensive elasticity, shares of the population and the government's budget constraint) for other European countries are available, the results of the government's preferences for redistribution will be more accurate.

The methods I use in this thesis can easily be repeated on new data of other countries. I recommend further research specified on the age of the children and the gender of single parents, since these elements have the largest impact on the labour supply elasticities of single parents (Jongen et al., 2015). Furthermore, future studies may include more countries and investigate the impact of specific tax reforms. Moreover, long-term effects of tax reforms are also interesting for welfare improving tax policy.



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## Appendix

**Table 1 updated data of Microtax**

Name of the regulation	2015	2014
kindgebonden budget	€ 4082	€ 1017
inkomensgrens ink.afh.aanv.combinatiekorting	€ 4857	€ 4814
kindgebonden budget kind 1	€ 4082	€ 1017
factor jan voor AHK in netto WML	1,8625	1,8875
opbouwperc. arbeidskorting	0,0400	0,0400
verh. 2e bovengrens arb.korting	0	0
Kinderbijslag for two children	€ 1862	€ 1752
ouderenkorting	abolished	€ 1032
grens ouderenkorting	abolished	€ 35450
aanvullende comb.kort as mk en tv	€ 1033	€ 1024
heffingskorting as zk	€ 2203	€ 2103
alleenstaande ouderkorting	abolished	€ 947
max. aanv. alleenst. ouderkorting	abolished	€1319
perc. aanv. alleenst. ouderkorting	abolished	0,0430
heffingskorting av	€ 4002	€ 4002
arbeidskorting laag	€ 184	€ 367
arbeidskorting hoog	€ 2220	€ 2097
hulp grens arbeidskorting	0,5000	0,5000
grens arbeidskorting	€ 9010	€ 8913
grens eic als pct WML 3	2,25	2,25
verh. 3e bovengrens arb.korting	€ 5977	€ 5977
kindg. budget ink.grens afbouw	€ 19463	€ 26147
opbouw. ink.afh. aanv. comb.kort. voor <65	0,0400	0,0400
kindgebonden budget kind 2	€ 791	€ 536
schijf 1	€ 19822	€ 19645
schijf 2	€ 13767	€ 13718
schijf 3	€ 23996	€ 23168
tarief 1	0,3650	0,3625
tarief 2	0,4200	0,4200
tarief 3	0,4200	0,4200
tarief 4	0,5200	0,5200
bruto minimumloon 2014/2015	€ 19316	€ 19137
bruto minimumloon 2013/2014	€ 19522	€ 19316
netto minimumloon bijstand	€ 16469	€ 16284,2
netto minimumloon	€ 16813	€ 16534
premieplichtig ink.	€ 18022	€ 17827
grens 1 arbeidskorting:	€ 18022	€ 17827
premieplichtig ink.	€ 19463	€ 19253
grens 2 arbeidskorting:	€ 19463	€ 19253
grens 3 EITC:	€ 49770	€ 40721
grens 4 EITC:	€ 100670	€ 83971
kindg. budget afb.percentage	0,0675	0,076
max. ink.afh. aanv. comb.kort. voor <65 jaar	€ 1119	€ 1109
arb.korting bij ink.grens 4	€ 184	€ 367
factor jul voor AHK in netto WML	1,86	1,89

*Source:* Belastingdienst (2016), Rijksoverheid (2016), Nibud (2016), CPB (2015). *Notes:* this table show the inputs of Microtax for the Netherlands in 2014 and 2015 to calculate the actual net taxes and incomes. Specified regulations for single parents are based on the household type of single parents with two children of the age of seven. The numbers are presented in euros per year, unless otherwise stated.