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the Polish experience 2005-2011***

***Michał Myck
Adrian Domitrz
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Michał Myck, Adrian Domitrz, Leszek Morawski, Aneta Semeniuk *

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Keywords: work incentives, tax and benefit reforms, microsimulation.

JEL Classification: J21, J38.

*Michał Myck (corresponding author) is Director of CenEA - the Centre for Economic Analysis in Szczecin and Research Associate at DIW-Berlin; Leszek Morawski is Assistant Professor at the Department of Economics, University of Warsaw and Research Associate at CenEA; Adrian Domitrz and Aneta Semeniuk worked as Project Support staff at CenEA. We are grateful for comments on earlier versions of this paper to participants at the Warsaw International Economic Meeting - 2011 and at the EUROMOD Research Workshop in Riga (13.10.2011). Financial support from the Polish National Science Centre (NCN) under project grant number 6752/B/H03/2011/40 is gratefully acknowledged.

1 Introduction

In the process of adjustment of tax and benefit policies governments continuously face the trade-off between equity and efficiency with attempts to balance out the incentive effects of redistribution and poverty alleviation (see: Blundell, 2001; Adam and Browne, 2010). Since reforms in different segments of the tax and benefit system are generally implemented separately and often without much coordination between the segments, very frequently changes in taxes are assessed in separation from benefit reforms. In the first case attention focuses on the consequences of tax policies for labor market incentives, while in the latter on the implications of benefit reforms for incomes of poorest households. The issues are further blurred if substantial reforms in different parts of the system accumulate over a number of years. Understanding the consequences of a sequence of reforms then requires a more complex approach to the entire reform package (see, for example: Clark and Leicester, 2004; or Clark et al., 2000)

In this paper we consider the labor market consequences of the entire reform package introduced in Poland during the two terms of parliament from 2005 to 2011 and present its effects on tax rates and replacement rates. The analyzed package of reforms significantly changed the structure of taxes on labor and means-tested benefits with the combined effect of the reforms on household incomes in the range of 1.7-2.2% of the GDP (Domitrz et al., 2012). Among the principal reforms were the introduction of a very generous child tax credit in 2007, reduction of the disability rate in social security insurance contributions (2007 and 2008), reduction of the number of tax rates in personal income tax (2009), and a number of changes implemented to the system of family and safety net benefits. The latter generally implied that more generous benefits have been targeted to a much smaller number of families and increasingly focused on those on lowest incomes.

The reforms took place at the time of rapid economic growth which was reflected in growing levels of employment and real wages. This provides for an interesting context for the analysis of the role of reforms and the broader economic environment on changes in financial incentives on the labor market. Poland, as one of few countries in the European Union managed to avoid falling into a recession in the years we analyze. The cumulative GDP growth since the first quarter of 2005 has been as high as 29.2% (up to Q1.2011). Even during the crisis years, between 2008 and 2011 (first quarters), the GDP grew by 4.4%. This has been associated with strong dynamics of internal consumption, resulting from growing levels of disposable incomes associated with higher employment (see Figure 1), wages as well as changes in the tax and

benefit system.¹ While dynamics of wages slowed down at the end of the period, wages continued growing in real terms. Employment levels among those aged 25-34 suffered after 2008, but among other groups either remained stable or increased further. In particular, employment rates of both men and women aged 45-54 and 55-59 grew after 2008.²

What is striking is that the dynamics of employment rates after 2008 do not match the observed increases in unemployment (see Table 1). The combination of employment and unemployment rates suggest a virtually uninterrupted growth in participation among men and women of all age groups, a finding that points to the important role of the supply side on the labor market. In this context it is important to understand the role of both wages and the tax and benefit policies.³ Between the beginning of 2005 and 2011 the mean wage increased in real terms by 17.8%, while the statutory minimum wage grew by 36.5%. At the same time reductions in the level of taxation of earnings significantly affected the relationship between gross and net wages. As we show in this paper marginal tax rates and participation tax rates fell for almost all types of families and earnings ranges. However, replacement rates computed for the same scenarios often suggest a different pattern of changes to labor market incentives. If individuals react to the level of disposable income in and out of work in making their labor market decisions, this suggests weakening of incentives at the extensive margin for the a substantial number of households despite falling tax rates. Only if we add real wage growth on top of the implemented reforms does the pattern reflected in changes to the replacement rate becomes consistent with the observed changes in participation. Our analysis thus points to the decisive role of the demand factors as determinants of the observed participation patterns in the analyzed time frame.

The context of the Polish reforms and the changing economic environment provides an interesting case for the comparison of conclusions concerning financial attractiveness of work using different approaches to the measurement of financial incentives, i.e. tax rates and replacement rates. As Adam and Browne (2010) point out “the RR measures the strength of work incentives whereas the PTR measures the effect of the tax and benefit system on work incentives”. The two measures thus differ by concept and construction. What we demonstrate in the paper is that they may suggest conflicting conclusions as far as the effect of policy is concerned and thus should not be treated interchangeably.

The rest of the paper is organized as follows. We first present a description of

¹Household consumption grew by 19.6% from Q1.2005 - Q1.2011 in real terms, and by 11.25% from Q1.2008 to Q1.2011.

²Changes in employment rates of those aged 55+ most likely reflect the reforms to early retirement regulations which came into force in May 2008 and significantly reduced early retirement options.

³For excellent overviews of labor supply analysis including the role of fiscal policy see: Blundell and Macurdy, 1999 and Meghir and Phillips, 2010

changes in social security contributions, personal income tax and benefits regulations that were implemented in Poland between 2005 and 2011 (Section 2). This is followed by the description of the consequences of these reforms on family incomes and the approach taken to measuring labor market financial incentives (Section 3). In Section 4 we evaluate the effect of the reforms on the magnitude of changes in financial incentives to work on the intensive and extensive margins, and compare them to the changes in financial attractiveness of work resulting from real wage growth. Section 5 concludes the paper.

2 Main tax and benefit reforms in Poland: 2005-2011

2.1 The system and reforms: social insurance and income taxation

Employment income taxation in Poland consists of three components: social security contributions, personal income tax and health insurance contributions.

Nominally the contributions to social security are divided between the employee and the employer. Contributions to retirement pensions are paid at 19.52% split equally between the employee and the employer. Similarly, up to 2007 the rates of disability insurance used to be equally divided into employee and employer contributions and amounted to 13.0%. As we show in Table 2 these rates of contributions have been dramatically reduced in 2007 and 2008. On the employee side the disability contribution rate was lowered from 6.5% to 1.5%, while on the employer's side the rate was reduced from 6.5% to 4.5%. In total therefore the disability rate was reduced from 13% to 6%. Except for sickness insurance and accident (respectively at 2.45% and 1.93%) all contributions are paid only up to an upper threshold which is equivalent to thirty times the expected average monthly gross wage. The value of this threshold has been regularly increased in real terms reflecting the growth of earnings (see Table 2).

The gross wage net of social security contributions constitutes the tax base for the computation of personal income tax. Every employee is eligible to claim a revenue credit and each tax payer is granted a universal tax credit. Up to the 2009 reform the Polish system had three tax rates - 19%, 30% and 40%. This changed as of January 2009 with an introduction of a two rate system at 18% and 32% with the second rate applicable from annual taxable income of 85,526 PLN (21,435 euro).⁴ Over the period

⁴Throughout the paper we use the exchange rate between the euro and the Polish zloty (PLN)

from 2005 to 2011 both the income tax thresholds as well as revenue costs and the universal tax credit have remained unchanged in nominal terms (see Table 3). The Polish tax system operates as a joint system for married couples and lone parents, and as of 2007 includes a generous child tax credit for every dependent child which has become one of the major tax deductions in the Polish tax system (Morawski and Myck, 2010; Finance Ministry 2010) annually costing the government approximately 6 bn PLN (0.5% of the GDP). Finally the health insurance contribution in 2005 was 8.5% of gross earnings net of social security contributions, and was raised in two steps u to 9.0% in 2007. Of this 7.75pp is deductible from income tax.

2.2 The system and reforms: social transfers

The system of social transfers in Poland consists of three major types of financial means-tested transfers: family benefits, housing benefit and social assistance. Universal transfers are paid to disabled children (nursing allowance), to the elderly aged over 75 (nursing supplement or nursing allowance), and from January 2006 as child birth benefits.

In 2005 5.2 mln children received the family allowance - the main element of family benefits, which are by far the most significant means-tested benefit system in Poland. Family benefits are paid to families with children conditional on their net income being below a specified threshold, the value of which was frozen in nominal terms at 504.00 PLN (126.30 euro) per month per person since 2004 with a higher level applicable to families with disabled children (583.00 PLN, 146.10 euro). Family benefits consist of the family allowance on top of which there exist several supplements for such groups of families as lone parents or large families. Up until September 2006 the value of the family allowance was differentiated on the basis of the number of children in the family. The system introduced in 2006 instead differentiates benefit values by the age of children. In September 2006, and again three years later the rates of benefits were substantially increased. As a result, the average family allowance increased in real terms by nearly 60% between 2005 and 2011. However, despite these increases the overall spending on family benefits was reduced due to the falling number of eligible families. This resulted from improved financial situation of many families, but was partly a consequence of freezing of the eligibility threshold the value of which fell in real terms by 20%. This element alone reduced the number of children eligible to family allowance by 820 thousand (Myck, et al. 2011), i.e. about 18% of the number of children receiving the benefits in 2005. The values of the family allowance and its main supplements in 2005 and 2011 are given in Table 4.

from 30.06.2011: 1 euro = 3.99 PLN.

The housing benefit and social assistance benefits are the principal means-tested safety net benefits in Poland. In 2005 about 0.76 mln households received housing benefits, and although there have been no major changes in the rules determining its payments, the number of recipients has been regularly falling (down to 0.40 mln in 2010, see Table 6). This may have been partly a result of improved economic situation of the households, although a stricter approach to recipients may be a more important reason behind this. As in the case of family benefits the eligibility thresholds determining receipt of housing benefits have also been kept at constant nominal level.

Social assistance in Poland consists of permanent and temporary assistance. Permanent benefits are granted to individuals incapable to work because of advanced age or disability (who are not eligible to social security pensions). Temporary social assistance is given in case of the combination of low income and such conditions as long-term illness, disability, unemployment, etc. Permanent social assistance is solely based on income and health or age conditions, while eligibility to temporary assistance includes an informal wealth-test in the form of a subjective assessment of the overall living standard by a representative of the local social assistance office. The amount of social assistance is computed as a difference between the net household income per person and a legislated minimum income, but only a fixed proportion of this difference is guaranteed by the central budget. This proportion was increased in October 2006 (from 30% to 35% for one-person households and from 20% to 25% for 2+ households), and then again in October 2008 (both up to 50%). The decision to supplement the guaranteed amount lies with the local authorities. On average only a small fraction of the remaining difference is supplemented. Between 2005 and 2011 the legislated minimum income levels were reduced in real terms by 7% for one-person households and by 13% for larger households (see Table 5), while at the same time the increased guaranteed proportion of payments implied real increases of guaranteed amounts. Thus while the values of temporary social assistance between 2005 and 2011 increased in real terms, the number of recipients fell by 32% (see Table 6).

3 Measuring the effects of policies and wage growth on financial incentives to work

Financial incentives to work in 2005 and 2011 are presented in this paper for a selected number of stylized households.⁵ In order for the parameters of the two systems to be comparable and to reflect the consequences of changes in prices over the period on

⁵Stylized households are often used in the analysis of tax systems and tax reforms. See for example: OECD, 2012; Brewer et al., 2010; Adam and Browne, 2010.

the real value of disposable incomes, the elements of the 2005 system expressed in nominal terms have been uprated to 2011 prices using the CPI index with cumulative inflation over the period at 19.6%. As noted among others by Sutherland et al. (2008) there may be different approaches to system indexation with different interpretation of system “neutrality” (see also Sutherland et al. (2008)). From the point of view of modeling of labor market incentives it seems appropriate, though, to index all elements of the system with CPI since we focus on changes in the real value of the resulting disposable incomes.

3.1 Family types used in the analysis

We consider four types of families in the analysis and model their disposable incomes under different assumptions concerning their labor market earnings:

1. single person without children, family (1+0),
2. lone parent with one child (aged 3), family (1+1),
3. married couple without children, family (2+0),
4. married couple with two children (aged 3 and 7), family (2+2).

In all of these cases we analyze family budget constraints conditional on overall labor earnings but also look at incentives conditional on the hourly wage level by the degree of work intensity. Given the specificity of the Polish benefit system in all four cases, we discuss the effects of reforms on labor market incentives assuming two benefit eligibility scenarios - in one, the families are never eligible to receive social assistance or housing benefit (regardless of their income), while in the other they are eligible to these benefits if their income levels are low enough in the analyzed circumstances.⁶ These family types constitute a significant proportion of families of working age in Poland. In the Polish Household Budgets’ Survey data from 2009 about 18.13% of working age families were couples with children, 36.77% were couples without children, and single adult families with and without children constituted respectively 7.42% and 37.67%. Interestingly, despite generally low employment rates in Poland, the employment rate among adults in couples with two children in 2009 was 78.6%. This points to the importance of looking at the changes in financial incentives for second earners in families with children which we consider in Subsection 4.4.

⁶This approach is justified first of all on the grounds that a large proportion of households are not eligible to housing benefit regardless of their income levels because of the size of their accommodation. Similarly since the asset test for temporary social assistance is based on an informal wealth assessment, a significant number of households would not receive assistance even if they satisfied the income criterion.

3.2 Measures of the financial incentives to work

The effect of changes in the tax and benefit rules on families' disposable incomes are analyzed from two perspectives. First, to highlight the key aspects of the reform package we present the direct effect of reforms on the values of households' disposable incomes. This is followed by the analysis of the changes in financial incentive to work on the intensive and extensive margins. The effective marginal tax rates (EMTR) are used for the first purpose and the participation tax rates (PTRs) as well as the replacement rates (RRs) for the second.⁷

The EMTR measures a fraction of any additional gross wage increase that is taxed away. Formally, this corresponds to the first derivative of the budget constraint at a given point, but given the non-linearities in the system our results are obtained numerically by comparing the difference in values of disposable incomes resulting from a small change in gross income from work. This takes the form:

$$EMTR(\omega, \lambda) = 1 - \frac{Y(\omega + \Delta\omega, \lambda) - Y(\omega, \lambda)}{\Delta\omega}, \text{ where} \quad (1)$$

$Y(\omega)$ and $Y(\omega + \Delta\omega)$ represent the value of disposable income when total labor cost is equal to (ω) and $(\omega + \Delta\omega)$ respectively.⁸ λ stands for the tax and benefit function.

The participation tax rate (PTR) takes into account the difference between net incomes in and out of work measured relative to gross earnings in work, and is defined as follows:

- for a single person:

$$PTR(w, h, \lambda) = 1 - \left(\frac{Y(\omega(w, h), \lambda) - Y(0, \lambda)}{\omega(w, h)} \right) \quad (2)$$

where $\omega(w, h)$ is total labor cost at h hours, and $Y(\omega(w, h), \lambda)$ and $Y(0, \lambda)$ are total net incomes in and out of work respectively given the tax and benefit function λ .

- for a one-earner couple:

$$PTR(w_1, h_1, 0, \lambda) = 1 - \left(\frac{Y(\omega(w_1, h_1), 0, \lambda) - Y(0, 0, \lambda)}{\omega(w_1, h_1)} \right) \quad (3)$$

where similarly $\omega(w_1, h_1)$ is the total labor cost of the first earner, and $Y(\omega(w_1, h_1), 0, \lambda)$ and $Y(0, 0, \lambda)$ are total net incomes in and out of work respectively, given the tax and benefit function λ .

⁷See for example: Brewer et al., 2010; Haan et al., 2008; Adam et al., 2006; Adam and Browne, 2010; Immervoll et al. (2007).

⁸We consider here the gross wage as the full labor cost to reflect the marginal tax rate on the entire cost of labor.

- for the second earner in couples keeping the earnings of the first earner constant ($\omega(\overline{w_1, h_1})$), the PTR may be calculated as:

$$PTR(\overline{w_1, h_1}, w_2, h_2, \lambda) = 1 - \left(\frac{Y(\omega_1(\overline{w_1, h_1}), \omega_2(w_2, h_2), \lambda) - Y(\omega_1(\overline{w_1, h_1}), 0, \lambda)}{\omega_2(w_2, h_2)} \right) \quad (4)$$

where $\omega_2(w_2, h_2)$ are total gross earnings of the second earner, and $Y(\omega_1(\overline{w_1, h_1}), \omega_2(w_2, h_2))$ are total net incomes if both partners work.

Replacement rates are computed as ratios of net incomes in and out of work:

- for a single person:

$$RR(w, h, \lambda) = \frac{Y(0, \lambda)}{Y(\omega(w, h), \lambda)} \quad (5)$$

- for the first-earner in couple:

$$RR(h_1, w_1, 0, \lambda) = \frac{Y(0, 0, \lambda)}{Y(\omega(w_1, h_1), 0, \lambda)} \quad (6)$$

- for the second-earner in a couple:

$$RR(w_1, h_1, w_2, h_2, \lambda) = \frac{Y(\omega_1(\overline{w_1, h_1}), \omega_2(w_2, h_2), \lambda)}{Y(\omega_1(\overline{w_1, h_1}), 0, \lambda)} \quad (7)$$

In all of the above cases the definition of income out of work covers only social benefit incomes, such as family benefits, housing benefit and social assistance. We assume that families do not have any other sources of income, except for lone parents who receive alimony payments at the median value observed in the data. It is also important to note that we assume in all of the analyzed cases that there are no disabled people in the households, in which case the families could be eligible for specific types of benefits or for higher amounts.

While often changes in the PTRs and RRs show similar patterns of work incentives as noted by Adam et al. (2006) *"both these measures (e.g. RR and PTR) attempt to capture the incentive to work at all, but they are different, and as a result of this, these measures behave differently following different sorts of changes in income"*. One of the intuitive features of the PTR is that for a given change in net incomes in and out of work the measure increases in the value of gross earnings, which implies that if one has to work longer hours to gain the same income over and above that received out of work, then work is less attractive. The PTR also allows meaningful analysis of changes in the rates of tax in cases when income out of work is zero. By construction of the RRs this always results in the ratio being zero, regardless of the level of income in work. On the other hand the PTRs have the rather counterintuitive feature that they are constant if for a given level of gross earnings, disposable incomes in and out

of work grow by the same amount. However, in particular given the focus of this paper, the disadvantage of the PTR is that it cannot be used to compare the tax and benefit system for different wage distributions as the rates cannot distinguish between higher gross wages resulting from higher work intensity (i.e. longer hours) or higher productivity.

On the other hand RRs remain constant if incomes in and out of work grow by the same proportion, and they are useful in interpreting changes in work incentives at different hourly wage rates for a given level of work intensity. Generally speaking, for a given level of earnings, the PTR will fall if the absolute change in disposable income in work, $Y(\omega)$, is higher than the absolute change in the disposable income out of work, $Y(0)$. The RR in turn will fall if the proportional change in $Y(\omega)$ is greater than the proportional change in $Y(0)$.

3.3 Reforms and their effects on components of income

The reforms implemented between 2005 and 2011 affected all major elements of the tax and benefit system. Since these elements are strongly interrelated the changes in social security had their implications for income tax, and all reforms to the taxation of earnings affected benefit eligibility. In Figure 2 we present the combined set of consequences of the reforms for two of the four family types - a lone parent with one child and a couple with two kids. The figures, conditional on an hourly wage corresponding to the minimum wage (Figure 2 A and C) or the mean wage (Figure 2 B and D), show how four elements of the tax and benefit system affected incomes. In the figures we distinguish three elements of the implications to changes in the taxation of earnings and changes to family benefits. With respect to earnings taxation three elements are presented separately:

- changes in “net earnings” related to reforms of employee social security contributions, health insurance and income tax thresholds and rates;
- the effect of the Child Tax Credit (“CTC”) - identified separately out of the income tax reforms;
- changes to the employer side of social security contributions (“SSC - employer”);

Changes to family benefits (“FB”) reflect on the one hand the increases in the value of payments for the families who continue to receive them, but on the other the loss of benefits resulting from the reduction in the real value of eligibility thresholds and increases in net earnings following the SSC and income tax reforms.

Several important conclusions follow from the analysis of these changes. First of all it is notable that single earner families working at the minimum wage do not earn

enough to take full advantage of the CTC even at full time or more than full time hours. In the case of a married single-earner couple with two children only full time work at the mean or higher wage generates enough taxable income for the family to take full advantage of the CTC. In the case of this family type we can also see the significant implications of the eligibility criteria for family benefits. This affects the family in the range of hours between 31 and 42 per week, and since the entire benefits are withdrawn once the family crosses the eligibility threshold the implied loss is as high as 111.79 PLN per month. For higher income families this loss was (partly or fully) compensated by the CTC. Overall Figure 2 demonstrates how significant the reforms were for family incomes. The actual gains naturally depend on the assumptions concerning the incidence of social security and tax changes. If we take the short term assumption of legislated incidence (i.e. assume that employees gain the full extent of changes to employee social security and income taxes) then, families with a full time working adult gained from 52.19 PLN per month in the case of a lone parent receiving the minimum wage to 107.74 PLN in the case of a married couple with two children on mean earnings. If on top of that we include the potential gains from the cuts of employer social security contributions (as suggested for example in Gruber, 1997; see also Fulerton and Metcalf 2002), these grow respectively to 84.58 PLN and 140.13 PLN per month.

4 Reforms to taxes and benefits and changes in incentives to work

4.1 Reforms, earnings and budget constraints

The analysis of labor market incentives - both at the intensive and the extensive margin draws on the relationship between gross earnings and disposable incomes, i.e. on the family budget constraints. Before turning to the analysis of labor market incentives in Section 4, below we focus on the implications of the reforms on the entire budget constraints of the selected stylized families. What we show is on the one hand the degree of changes in disposable income conditional on the intensity of work resulting from the reforms. On the other hand, to put the reforms in a broader perspective, we analyze the effect of changes in real gross earnings identified separately from policy changes. As we demonstrate, overall dynamics of wages between 2005 and 2011 have implied a significant shift in the level of financial incentives to work, which was generally stronger than the effect of the reforms. When combined, however, these two parallel developments very significantly changed the attractiveness of work. In

the analysis below we assume the legislated incidence of social security contributions, which means that changes in employer part of the contributions are not reflected in the budget constraint. The justification of this is to avoid double counting in the analysis of wage effects on disposable incomes, since any shift of the reduced tax burden towards wages will already be reflected in wage growth. One has to remember though, that part of the observed dynamics of wages after 2008 may reflect a policy change with regard to the disability insurance contributions (see: Section 2).

Figure 3 demonstrates the role of tax and benefit reforms for the four stylized families assuming that the earner in the family receives the minimum wage. The budget constraints are drafted conditional on the number of hours worked per week for the updated 2005 system and the system from 2011. The first outcome that stands out in Figure 3 is the fact that nearly in all cases along the entire distribution of hours worked, the 2011 budget line is above that from 2005. The only exception is the case of lone parents working at the minimum wage who due to the withdrawal of family benefits at about 20 hours of work in the 2011 system have lower incomes up to about 30 hours of work per week. As we noted earlier, minimum wage parents cannot take advantage of the Child Tax Credit even if they work full time, so the loss of family benefits is not compensated through the new element of the tax system. In the scenario in which families receive neither the Housing Benefit nor Social Assistance, at full time hours singles without children who earn the minimum wage have gained about 52.12 PLN per month (5.30%), lone parents gain 52.19 PLN (3.68%), couples without children 42.00 PLN (4.02%) and couples with two children 107.74 PLN (9.32%). Important changes can be seen in the level of income for families who do receive the safety net benefits, in particular in the case of couples. Those without children could see their incomes rise by 2.46% (32.34 PLN), while income of those with two kids grows by 7.13% (107.74 PLN). Because of the family structure couples with two children in which the earner receives the minimum wage have not been affected by the restrictions in the access to family benefits. Among those who receive safety net benefits, couples with children where one of the parents works at the minimum wage have seen their full time incomes rise by 107.74 PLN (9.32%), compared to an increase among couples without children by only 32.34 PLN (2.46%) per month. As we shall see below eligibility for safety net benefits has significant implications on the resulting changes in the incentives to work for all of the families considered.

The budget lines presented in Figure 4 show the constraints for two of the four family types under the assumption of the mean wage. Apart from reflecting the exercise presented for the minimum wage in Figure 3 in this case we demonstrate also the effect of changes in the real value of the wage from 2005 to 2011. This is done by drafting the the levels of disposable incomes corresponding to:

- the mean wage assuming the real value of the 2005 mean wage (1015 PLN in 2011 prices) and the uprated 2005 tax and benefit system: “2005(wage’05)”,

and comparing it with the levels of income conditional on the number of hours worked per week for someone with:

- the 2011 mean wage (1386 PLN per month) under the 2011 system: “2011(wage’11)”.

On top of this we demonstrate how incomes would have changed had:

- real mean wage remained at the 2005 level, but the governments implemented all the reforms that have been introduced (“2005(wage’11)”);
- real mean wages grew to the 2011 level and tax and benefit policies had the same implications in real terms as they did in 2005 (“2005(wage’11)”).

Such approach to the issue of work incentives reflects on the one hand the importance of changes in systemic factors represented by the difference between “2005(wage’11)” and “2011(wage’11)”. At the same time, however, we can assess the total difference in labor market incentives over these years (difference between “2005(wage’05)” and “2011(wage’11)”) and also separate out the pure effect of gross wage increases (difference between “2011(wage’05)” and “2011(wage’11)”). Looking at full time work we can see that the total real difference in the disposable income between 2005 and 2011 amounts to 544.12 PLN for a single adult without children (Figure 4A) and to 541.78 PLN for a couple with two children (Figure 4B). Of these amounts a significant proportion relates to the changes in the tax and benefit system introduced over the period (difference between “2005(wage’11)” and “2011(wage’11)”) - in the case of the two family types these proportions are 25.67% (139.67 PLN) and 36.51% (197.80 PLN) respectively. However, a much greater effect - 79.40% for the single adult and 78.01% for the couple with two children - is the effect of growing real wages (“2011(wage’11)” and “2011(wage’05)”). This means that at the level of full time average wages the tempo of real earnings growth has contributed about twice as much to the growth of real disposable incomes compared to the implemented reductions in the level of taxation. This is an important context within which one has to consider the implications of the reforms which we discuss below, and it demonstrates that despite a slow-down in the rate of growth of real earnings at the end of the period, real earnings growth led to substantial increases in the financial gain from work. At this point it is important to note though that, as we mentioned above, depending on the incidence of employer’s social security contributions, some of the real earnings growth could have been driven by the reduction in these contributions implemented in 2008, however even if the entire reduction of two percentage points were translated into higher gross earnings, this

would still correspond to a small fraction of the total real earnings growth between 2005 and 2011.

The discussion in the sections below focuses on the most important aspects of the policy effects in terms of labor market incentives, both on the intensive and the extensive margin. We discuss the implications of the reforms and of changes in gross wages for labor market incentives of first earners in families. The analysis draws on the budget constraints computed for all of the family types under different wage and system scenarios. In Section 4.2 we discuss the consequences of reforms on incentives on the intensive margin, following which we look at changes in financial gains to work on the extensive margin for first earners (Section 4.3) in the considered families and for second earners in the couple with children (Section 4.4).

4.2 Reforms and incentives on the intensive margin

The reforms to social security and labor taxation have had a very significant effect on the level of the labor tax wedge in Poland (e.g. Morawski and Myck, 2010). As a result of the entire package of reforms introduced between 2005 and 2011 the effective marginal rate of taxes on earnings has been reduced on almost the entire range of earnings. Two examples of the MTR schedule under the two systems are presented in Figure 5. Figure 5A shows the EMTR schedule for a single person without children, i.e. family (1+0), while in Figure 5B we demonstrate the schedule for one-earner families with two children (family (2+2)).⁹ As we can see the only range of earnings over which the marginal rate is higher in the 2011 system is from 7250 PLN to 8895 PLN for family (1+0) and from 7245 PLN to 8400 PLN for the family with two children. This increase in the marginal rate results from the fact of real increases in the upper earnings limit for social security over which contributions to retirement and disability pensions stop being paid. This threshold increased regularly with the government's expected growth of nominal earnings and grew in real terms by 16% between 2005 and 2011.

The figures show several other interesting features of the reform package. The schedule for family (1+0) reflects very strongly the effect of the changes in the personal income tax schedule, in particular the effect of abolishing the 30% rate and setting the threshold for the new higher rate (32%) at the old higher rate level. This significantly reduces the overall EMTR on the range of earnings between 4695 PLN and 7240 PLN from 53.39% to 41.18%. On the other hand families with children saw their EMTR fall substantially as a result of the Child Tax Credit. In our example the EMTR for

⁹The same schedule applies to lone parents and couples with children because of the option of joint taxation available to both of these family types.

family (2+2) falls further to 33.71% over the range from 1460 PLN to 3370 PLN, which roughly covers the range between the minimum and mean earnings.

The full EMTR schedule including the implications of benefit withdrawal looks significantly more complicated (see Figure 7 in the Appendix) with a number of rates over 100% due to benefit thresholds beyond which benefits stop being paid. These figures show also the consequences of benefit increases for those receiving Social Assistance and the Housing Benefit. As a result of an increase in the generosity of payments in Social Assistance and due to its withdrawal as work income grows, the full EMTR increases for lowest levels of earnings from 61.37% to 70.13% for family (1+0) and from 55.85% to 70.13% for family (2+2).

4.3 Extensive margin: reforms and incentives for the first earner

Results concerning financial incentives to work on the extensive margin for the first earner in the family are presented in Tables 7, 8, and for the second earner in a couple with two children in Table 9. For illustration we also present examples of PTR and RR schedules for single adults without children and for couples with two children in Figure 6. These schedules reflect important differences in how labor market incentives are captured by the two measures, and in particular how their sensitivity to the level of out of work income differs. Replacement rates are generally much more sensitive to the level of income at zero hours of work. This is natural, given the definition of the two measures and their first derivatives with respect to $Y(0)$, namely: $PTR' = 1/\omega(w, h)$, while $RR' = 1/Y(\omega(w, h))$. Since generally gross incomes will be higher than disposable incomes in work, the slope of the RR with respect to income out of work will be higher¹⁰. In Figure 6 this is reflected in the schedules representing incentives for first earners in the (2+2) family (Figures 6B and 6D). The fact that in these cases out of work income has been significantly increased as a result of changes in the value of family and safety net benefits (see Figure 3), the replacement rates suggest weakening of labor market incentives at the extensive margin even for high levels of earnings. Both in the case when the (2+2) family is assumed to receive the Housing Benefit and Social Assistance and in the alternative scenario of no eligibility, replacement rates are higher for the 2011 system compared to the uprated system from 2005. For the family which is eligible to safety net benefits the replacement rate at full time minimum wage earnings grows from 0.550 to 0.648, and at mean earnings from 0.317 to 0.373 (for details see Table 8). The change in the value of benefits also

¹⁰Note that there may be cases when $\omega(w, h) < Y(\omega(w, h))$, for example if families receive refundable tax credits (see e.g. Blundell et al., 2000 or Brewer et al. (2010)).

dominates changes in net labor incomes in the PTR measure for low and medium paid families eligible to safety net benefits (see Table 7). For these families, more or less up to the level of mean wage the participation tax rates are higher in the 2011 system compared to the 2005 system. At full time minimum wage the PTR grows from 0.594 to 0.654 between the two systems, while at full time mean wage the tax rates are almost identical (0.560 in 2005 and 0.557 in 2011). On the other hand, the PTRs are significantly lower for the (2+2) family which does not receive safety net benefits. In this scenario the PTR at full time minimum wage falls from 0.378 to 0.334, and for mean wage earners from 0.428 to 0.379.

4.4 Extensive margin: reforms and incentives for the second earner

In the analysis of financial incentives to work on the extensive margin for the second earner we present results for different combinations of earnings focusing only on the couple with two kids (family 2+2). Within this family type we distinguish couples on low-, medium-, and high wage combinations. We assume that the earnings of the first person are fixed at full time minimum, median or 75th percentile earnings, and examine PTRs and RRs for the minimum and mean earnings of the second partner assuming half-time and full-time work. Results of PTR and RR calculations for this family type are presented in Table 9.

As one could expect second earner RRs under all system/wage combinations grow with the earnings of the first earner confirming the negative effect of first earner's income on the financial incentives to work for the second earner. For example in the case of second earner's full time work at the mean wage under the 2011 system RRs grow from 0.360 through 0.505, to 0.597 depending on whether the first earner receives the minimum, median or 75th percentile wage. It is notable that if we look at changes in the system between 2005 and 2011 in all except two combinations of first and second earner scenarios RRs suggest weakening of financial incentives to work for the second earner. In some cases these changes in incentives are substantial. If the first earner receives median earnings, for example, and the second earner is on the minimum wage, the RR grows from 0.793 to 0.843. The only exceptions are for the combination of earnings at the minimum wage of both partners when the second earner works part time (RR is reduced from 0.701 to 0.689 between the 2005 and 2011 systems), and the full time earnings on the mean wage of the second earner when the first earner receives the minimum wage.

These negative effects of the 2005-2011 package on work incentives measured by the RRs suggest a different pattern of changes compared to that reflected in the PTRs,

where in the majority of earnings combinations the rates are reduced in the consequence of the reforms (Table 9). The reductions in the PTRs range from 0.102 pp for part time work of the second earner when both partners receive the minimum wage, to 0.017pp when the first earner works full time at the minimum wage and the second earner works half time at the mean wage. The only exception when the PTR grows between the 2005 and 2011 systems (from 0.427 to 0.525), is for the minimum wage part time work of the second earner if the first earner works at the median wage. This combination of earnings captures the change in the withdrawal threshold of Family Benefits between 2005 and 2011.

The results indicate that while generally the rates of tax on participation have fallen for second earners, the RRs suggest that the relative value of income out of work and in work has increased, reducing financial attractiveness of work for second earners with children. These effects are consistent with the introduction of the CTC which affects mainly the net incomes of the first earner, and changes in the value of the withdrawal threshold of Family Benefits in particular at relatively low earnings. Looking at the two different measures of financial incentives, especially in the case of the second earner, leads to different conclusions concerning the effect of the reform package.

4.5 Extensive margin: wages and incentives to work

The conclusions on the role of systemic changes in the period 2005-2011 concerning the financial incentives differ in many instances depending on whether we use the PTRs or RRs to measure the effects. In this section we consider the role of changes in earnings on the financial attractiveness of work using the full and part time RRs of first earners. In this case the relevant comparison is between RRs computed under the 2011 system for 2011 wages (Table 8) and for the indexed 2005 minimum and mean wages under the same system presented in Table 10. In interpreting the results we need to remember that if the 2pp reduction in employer social security contributions affected gross wages, part of the wage effect is driven by policy.

As one could expect for cases where the comparison can be meaningfully conducted (i.e. where out of work income is not zero) RRs are higher when we use the lower 2005 wages, regardless of whether we apply them to the 2011 or the uprated 2005 system. In some cases, e.g. for family (1+0) at part time work and receiving safety net benefits the wage effects on replacement rates are low, but in most analyzed examples the wage effects are substantial and either dominate the negative effects of system changes or significantly reduce them. For example, taking the (2+2) family where the first earner works full time (last columns of Tables 8 and 10) at the mean wage, we can see that the

system change from the uprated 2005 to 2011 increases the RR from 0.317 to 0.373. In 2005 (or rather with the 2005 wage) this family faced an RR of 0.366. Had the system changed without real wage growth the RR would increase to as much as 0.439. For lone parents at full time mean earnings the effect of the system is much lower, and is dominated by changes in wages - under the 2005 system the RR with 2005 wages is 0.371, while under the 2011 system and 2005 wages it falls to 0.318.

5 Conclusion

Between 2005 and 2011 the Polish system of taxes and benefits saw a series of significant reforms. The rates of social security contributions and the income tax were reduced and a generous child tax credit was introduced to further lower the level of income tax. At the same time the government raised the health insurance contributions and froze income tax thresholds which worked against the tax cuts. On balance, though, taxes on labor have been substantially reduced. This resulted in significant reductions of the effective marginal tax rates, in particular for higher earners. At the same time values of family benefits and social assistance were raised, though availability of these benefits to families on low labor incomes was reduced through freezing of eligibility criteria.

The analyzed period was also a time of rapid growth of real earnings, which provides for an interesting setting to analyze changes in labor market incentives resulting on the one hand, from policy reforms and on the other, from wage developments. This context has been used in this paper, to identify the consequences of the reforms and wage growth for labor market incentives and to compare the way how two main measures of financial incentives to work on the extensive margin, namely participation tax rates and replacement rates, reflect these changes.

We demonstrated that very often conclusions concerning changes in the financial incentives to work on the extensive margin differ when we refer to the PTRs or RRs. This is particularly the case when we consider families which experienced significant changes to their out of work income, and in the case of second earners in couples. Given the different nature of the two measures, we should not expect that they would always indicate the same direction of change, yet the degree to which conclusions concerning the effect of policies and wages on work incentives differ is substantial. The PTRs usually suggests significant increases in the financial attractiveness of work as a result of the 2005-2011 Polish reform package, while the RRs in nearly all cases of households with children and those eligible to safety net benefits indicate worsening of financial incentives to work. This demonstrates that depending on the nature of the reforms the two measures may imply conflicting conclusions concerning changes in the

financial incentives to work, and suggest that one ought to be cautious in interpreting their implications - in particular when complex policy packages are compared. Falling PTRs may often not be reflected in lower values of RRs.

During the analyzed period there was a substantial increase in labor force participation of men and women among all age groups. The higher labor supply levels were reflected in growing levels of employment and - at the time of the economic slowdown - in higher numbers of registered unemployed. As we showed in this paper growing wages and not tax and benefit reforms were the most likely cause behind these changes in labor supply. For many families - in particular for families with children and for those who continued receiving safety net benefits - the introduced policy package implied significant increases in income out of work which dominated any policy related gains from work resulting from tax reductions.

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6 Appendix

Table 1: Unemployment rates in Poland 2005–2011

	2005	2006	2007	2008	2009	2010	2011
men							
25–34	19.5	14.8	10.5	7.4	7.4	11.1	9.7
35–44	12.3	11.8	7.6	5.2	5.3	7.7	6.9
45+	14.5	12.5	8.7	6.4	6.4	7.7	7.9
women							
25–34	21.6	17.8	12.3	7.8	9.0	11.6	11.1
35–44	16.9	14.5	9.7	6.5	6.9	8.3	7.2
45+	14.9	11.5	8.7	7.3	7.0	7.8	7.3

Notes: Second quarter values for all years.

Source: Labour Force Survey in Poland, II Quarter 2011.
Central Statistical Office, Warsaw 2011.

Table 2: Social Security Contributions

	Base limit	Retirement EE/ER	Disability EE/ER	Illness EE	Accident* ER	Labour Fund ER	GEBF** ER
2005	72690.0	0.0976/0.0976	0.065/0.065	0.0245	0.0193	0.0245	0.0015
2005upr	86905.3	0.0976/0.0976	0.065/0.065	0.0245	0.0193	0.0245	0.0015
2011	100770.0	0.0976/0.0976	0.015/0.045	0.0245	0.0165	0.0245	0.0010
2011/2005	1.39	-	-	-	-	-	-
2011/2005upr.	1.16	-	-	-	-	-	-

Notes: EE stands for employee’s side contribution, ER stands for employer’s side contribution; * - uniform accident contribution concerns the self-employed and companies employing at most 9 workers; ** - GEBF stands for Guaranteed Employee Benefits Fund

Source: Documentation of Social Insurance Institution, www.zus.pl. Authors’ calculations.

Table 3: Personal Income Tax (PIT) and Health Insurance (HI) contributions

	PIT								HI	
	UTC	Rev. costs	I thresh.	II thresh.	I rate	II rate	III rate	CTC	Total	Deductible
2005	530.10	1227.0	37 024.0	74 048.0	0.19	0.30	0.40	n.a.	0.085	0.0775
2005upr.	633.80	1467.0	44 264.4	88 528.8	0.19	0.30	0.40	n.a.	0.085	0.0775
2011	556.40	1335.0	85 528.0	85 528.0	0.18	0.32	0.32	1112.0	0.09	0.0775
2011/2005	1.05	1.09	2.31	1.16	-	-	-	-	-	-
2011/2005upr.	0.88	0.91	1.93	0.97	-	-	-	-	-	-

Source: Documentation of Ministry of Finance, www.mf.gov.pl. Authors’ calculations.

Notes: “UTC” - universal tax credit; “Rev. costs” - revenue costs; “CTC” - child tax credit; values of tax thresholds presented as: “I thresh”, etc.

Table 4: Family Allowances

	Family benefit*				Supplements for family benefit				
	Inc. test**	1st child /0-4	2nd child /5-17	3rd+ /18-24	PLA	SLF	SCB	SLP**	SEDC
2005	504.0/583.0	43.0	53.0	66.0	400.0	50.0	500.0	170.0/250.0	50.0
2005upr.	602.6/697.0	51.4	63.4	78.9	478.2	59.8	597.8	203.2/298.9	59.8
2011	504.0/583.0	68.0	91.0	98.0	400.0	80.0	1 000.0	170.0/250.0	60.0
2011/2005	1.00/1.00	1.58	1.72	1.48	1.00	1.60	2.00	1.00	1.20
2011/2005upr.	0.84/0.84	1.32	1.44	1.24	0.84	1.34	1.67	0.84/0.84	1.00

Note: * until September 2006 values dependent on the number of children; later on - on their age;

** Inc. test - income eligibility threshold value (per person); second number relates to the situation when there is a disabled child in a family

Source: Documentation of Ministry of Labour and Social Policy, www.mpips.gov.pl. Authors' calculations.

Table 5: Nursing Allowances and Social Assistance

	Nursing allowances		Social Assistance			
	NursBen	NursAll	Inc. test in multiple hh	Inc. test in single hh	Guaranteed % in multiple hh	Guaranteed % in single hh
2005	144.0	420.0	316.0	461.0	0.20	0.30
2005upr.	172.2	502.1	377.8	551.2	0.20	0.30
2011	153.0	520.0	351.0	477.0	0.50	0.50
2011/2005	1.06	1.24	1.11	1.03	-	-
2011/2005upr.	0.89	1.04	0.93	0.87	-	-

Note: Inc. test - income eligibility threshold value (per person); Guaranteed % - refers o the proportion between actual and legislated minimum income guaranteed by the central budget.

Source: Documentation of Ministry of Labour and Social Policy, www.mpips.gov.pl. Authors' calculations.

Table 6: Changes in benefit recipients: 2005 and 2011

	Family allowance*	Housing benefit	Permanent SA - 1**	Permanent SA - 2***	Temporary SA
2005	5192.8	764.6	111.3	60.8	669.5
2011	2767.7	404.0	151.7	42.6	455.6
2011/2005	0.53	0.53	1.36	0.70	0.68

Note: Average number of recipients during the year in thousands; * - number of children receiving Family allowance; ** - number of recipients living alone; *** - number of recipients living in a family;

Source: Documentation of Ministry of Labour and Social Policy (www.mpips.gov.pl) and Polish Statistical Office (www.stat.gov.pl).

Table 7: Participation tax rates under 2005 and 2011 systems

	Part time work				Full time work			
Family type:	(1+0)	(1+1)	(2+0)	(2+2)	(1+0)	(1+1)	(2+0)	(2+2)
PTRs with HB/SA								
- min. wage: 2005 system	0.529	0.503	0.524	0.559	0.529	0.498	0.479	0.594
- min. wage: 2011 system	0.501	0.528	0.578	0.701	0.511	0.511	0.501	0.654
- mean wage: 2005 system	0.567	0.510	0.494	0.580	0.531	0.545	0.537	0.560
- mean wage: 2011 system	0.567	0.499	0.504	0.615	0.489	0.500	0.516	0.557
PTRs without HB/SA								
- min. wage: 2005 system	0.364	0.327	0.327	0.327	0.414	0.409	0.378	0.378
- min. wage: 2011 system	0.322	0.272	0.272	0.272	0.371	0.375	0.340	0.334
- mean wage: 2005 system	0.422	0.426	0.396	0.396	0.441	0.441	0.428	0.428
- mean wage: 2011 system	0.378	0.371	0.355	0.337	0.395	0.377	0.383	0.379

Notes: Participation tax rates computed according to equations 2 and 3. The 2005 system uprated by CPI to 2011, mean and minimum wages from 2011.

Source: Authors' calculations using the SIMPL microsimulation model.

Table 8: Replacement ratios under 2005 and 2011 systems: using 2011 wage levels

	Part time work				Full time work			
Family type:	(1+0)	(1+1)	(2+0)	(2+2)	(1+0)	(1+1)	(2+0)	(2+2)
RRs with HB/SA								
- min. wage: 2005 system	0.480	0.670	0.524	0.691	0.317	0.503	0.335	0.550
- min. wage: 2011 system	0.477	0.705	0.603	0.810	0.318	0.537	0.392	0.648
- mean wage: 2005 system	0.294	0.461	0.300	0.493	0.161	0.315	0.189	0.317
- mean wage: 2011 system	0.303	0.482	0.348	0.578	0.155	0.318	0.215	0.373
RRs without HB/SA								
- min. wage: 2005 system	0.000	0.430	0.000	0.165	0.000	0.301	0.000	0.097
- min. wage: 2011 system	0.000	0.425	0.000	0.218	0.000	0.302	0.000	0.133
- mean wage: 2005 system	0.000	0.266	0.000	0.084	0.000	0.158	0.000	0.046
- mean wage: 2011 system	0.000	0.261	0.000	0.113	0.000	0.152	0.000	0.063

Notes: Replacement ratios computed according to equations 5 and 6. The 2005 system uprated by CPI to 2011, mean and minimum wages from 2011.

Source: Authors' calculations using the SIMPL microsimulation model.

Table 9: Replacement ratios and participation tax rates under 2005 and 2011 systems in case of two earners

Earnings of first partner:	Part time work of second earner			Full time work of second earner		
	FT min.	FT median	FT 75 perc.	FT min.	FT median	FT 75 perc.
Participation tax rates:						
- min. wage : system 2005	0.437	0.427	0.427	0.451	0.513	0.446
- min. wage: system 2011	0.335	0.525	0.378	0.445	0.452	0.400
- mean wage: system 2005	0.452	0.508	0.447	0.486	0.484	0.454
- mean wage: system 2011	0.435	0.449	0.401	0.405	0.430	0.406
Replacement ratios:						
- min. wage : system 2005	0.701	0.793	0.855	0.546	0.693	0.752
- min. wage: system 2011	0.689	0.843	0.861	0.570	0.700	0.763
- mean wage: system 2005	0.522	0.670	0.734	0.369	0.492	0.584
- mean wage: system 2011	0.542	0.678	0.745	0.360	0.505	0.597

Notes: All calculations using 2011 wage levels for a "2+2" family, excluding housing benefit and social assistance. Participation tax rates computed according to equation 4. Replacement ratios computed according to equations 7 and. The 2005 system uprated by CPI to 2011, mean and minimum wages from 2011.

Source: Authors' calculations using the SIMPL microsimulation model.

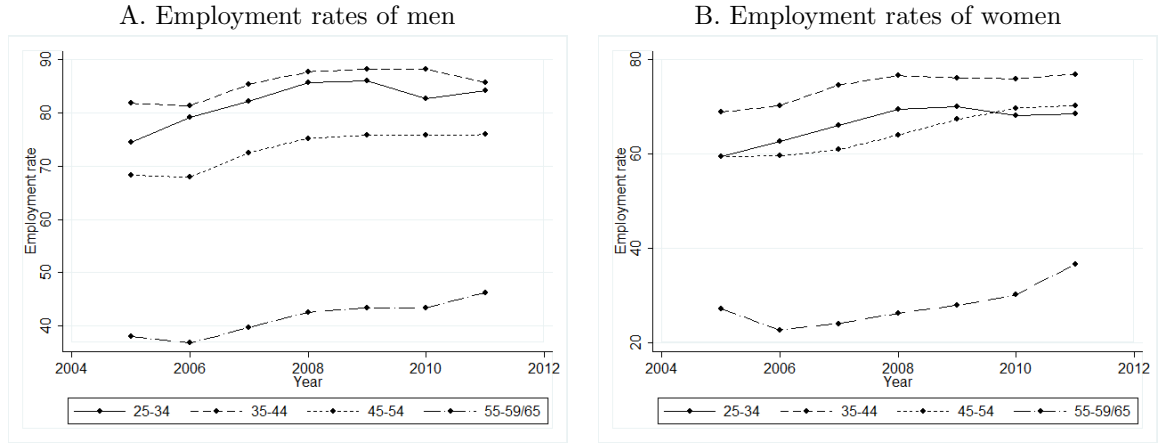
Table 10: Replacement ratios under 2005 and 2011 systems: using 2005 wage levels

Family type:	Part time work				Full time work			
	(1+0)	(1+1)	(2+0)	(2+2)	(1+0)	(1+1)	(2+0)	(2+2)
RRs with HB SA								
- min. wage: 2005 system	0.573	0.759	0.618	0.754	0.381	0.567	0.410	0.613
- min. wage: 2011 system	0.574	0.804	0.740	0.854	0.381	0.628	0.477	0.755
- mean wage: 2005 system	0.319	0.506	0.338	0.550	0.196	0.371	0.230	0.366
- mean wage: 2011 system	0.319	0.540	0.394	0.653	0.190	0.374	0.261	0.439
RRs without HB/SA								
- min. wage: 2005 system	0.000	0.508	0.000	0.213	0.000	0.348	0.000	0.123
- min. wage: 2011 system	0.000	0.503	0.000	0.277	0.000	0.367	0.000	0.168
- mean wage: 2005 system	0.000	0.304	0.000	0.098	0.000	0.186	0.000	0.055
- mean wage: 2011 system	0.000	0.304	0.000	0.134	0.000	0.178	0.000	0.078

Notes: Replacement ratios computed according to equations 5 and 6. The 2005 system and 2005 wage levels uprated by CPI to 2011.

Source: Authors' calculations using the SIMPL microsimulation model.

Figure 1: Employment rates in Poland 2005-2011

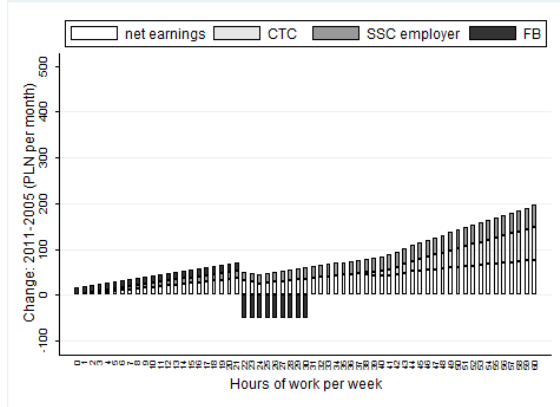


Notes: All values are II quarter rates

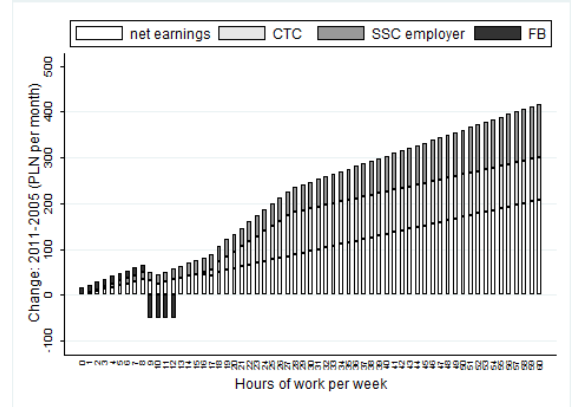
Source: GUS(2011). Labour Force Survey in Poland, II quarter 2011

Figure 2: Policy reforms and budget components

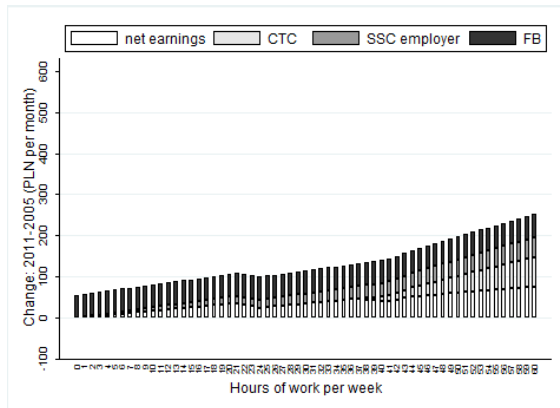
A. Lone parent with one child at minimum wage



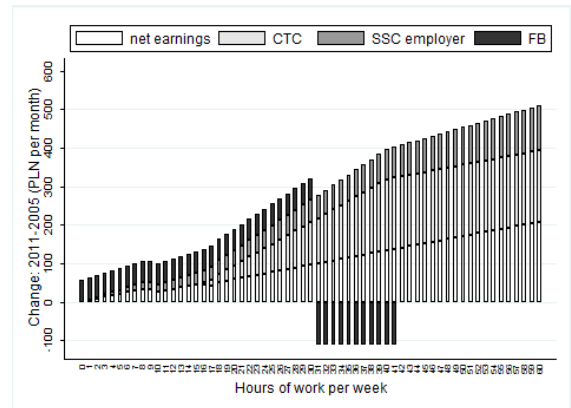
B. Lone parent with one child at mean wage



C. One-earner couple with two children at minimum wage



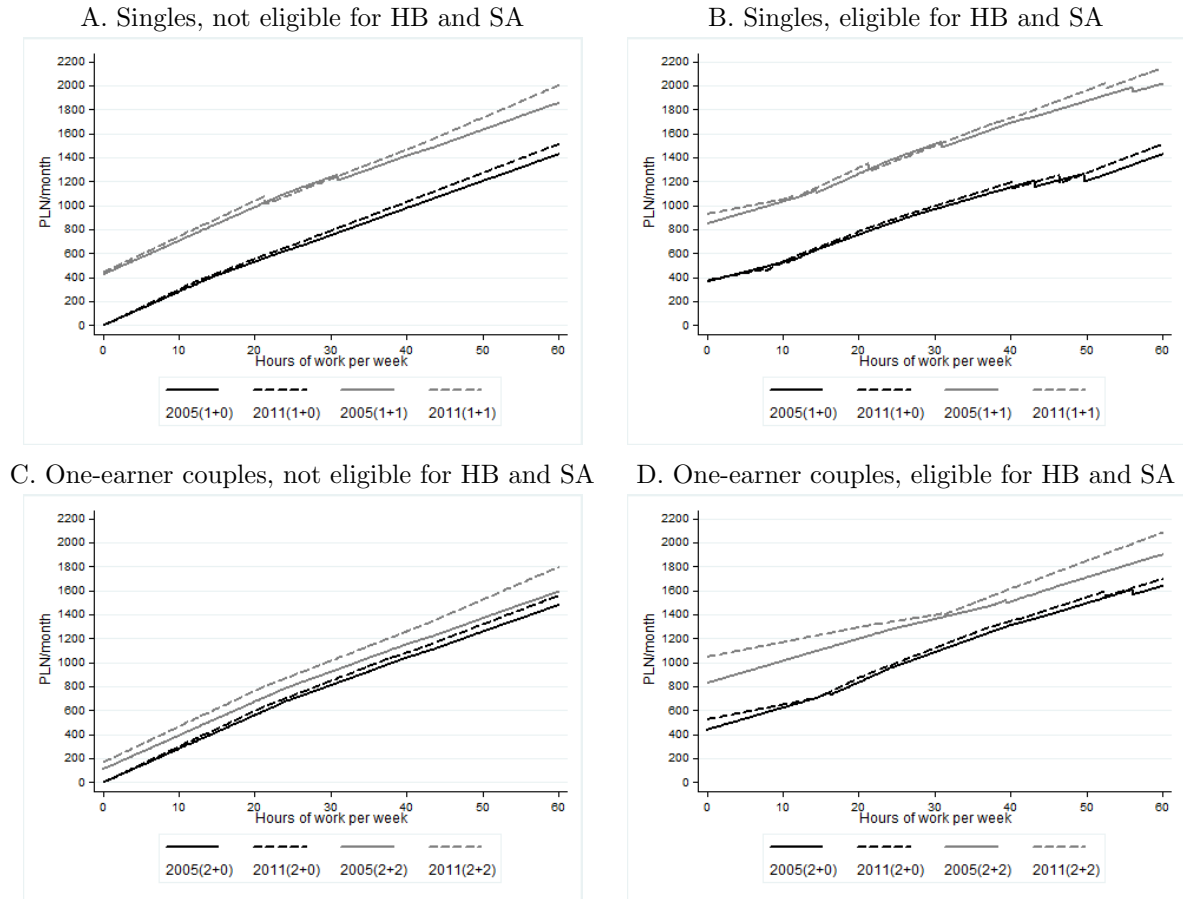
D. One-earner couple with two children at mean wage



Note: Figures exclude changes to Housing Benefit and Social Assistance.

Source: Authors' calculations using the SIMPL microsimulation model.

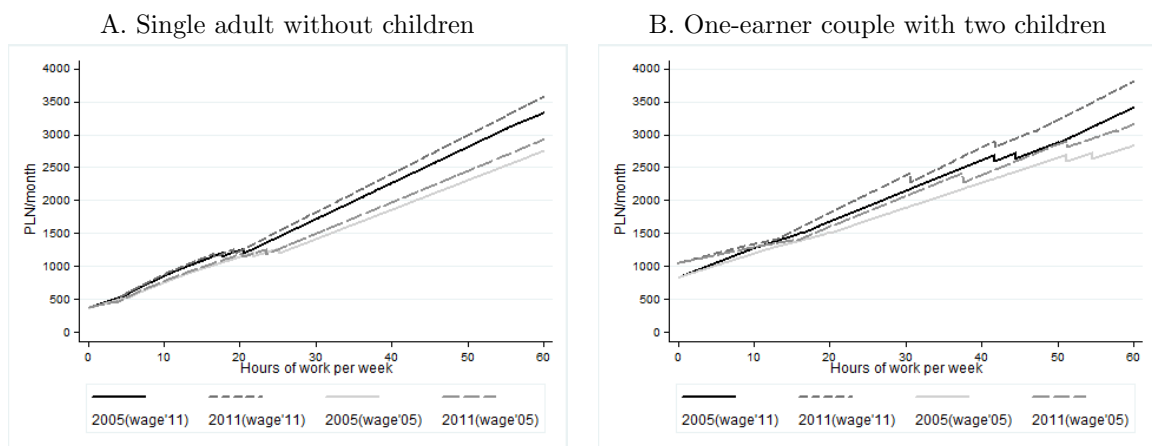
Figure 3: Family budget constraints at the minimum wage.



Note: Lone parents assumed to receive median private maintenance payments (of 370 PLN/month); family types defined as: (1+0) - single adult without children; (1+1) - lone parent with one child; (2+0) - couple without children; (2+2) - couple with two children.

Source: Authors' calculations using the SIMPL microsimulation model.

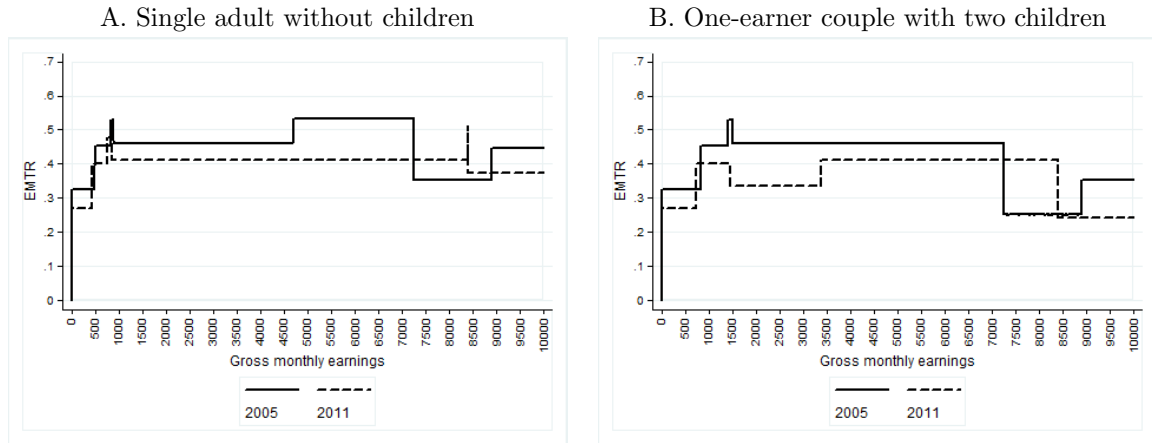
Figure 4: Family budget constraints at the mean wage - reforms and wage dynamics.



Note: Computations assume eligibility for Housing Benefit and Social Assistance. 2005(wage'11) - 2005 system assuming the 2011 mean wage; 2011(wage'11) - 2011 system assuming 2011 mean wage; 2005(wage'05) - uprated 2005 system assuming the 2005 mean wage (in 2011 prices); 2011(wage'05) - 2011 system assuming the 2005 mean wage (in 2011 prices). The 2005 system and mean wage uprated to 2011 values using the CPI index.

Source: Authors' calculations using the SIMPL microsimulation model.

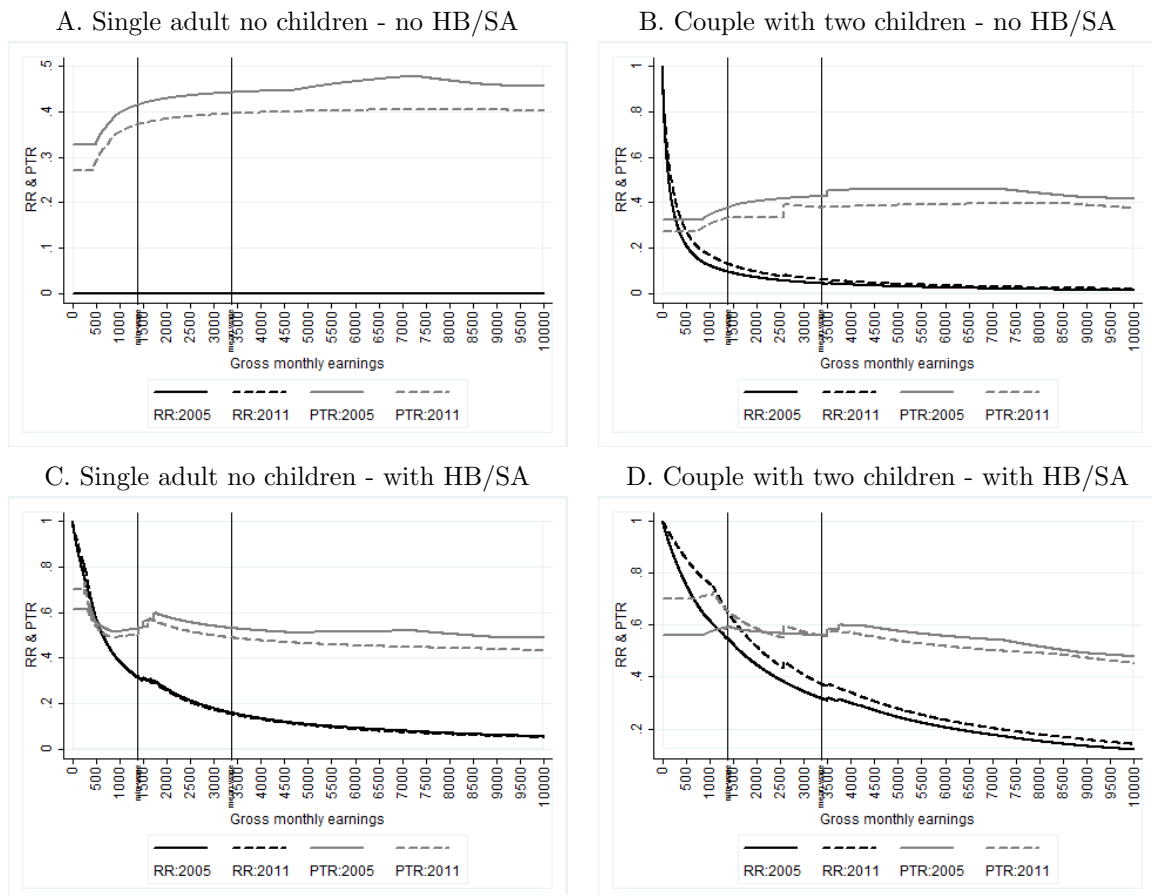
Figure 5: Effective marginal tax rates in one-earner families



Note: Effective Marginal Tax Rates on earnings computed using equation 1. The full EMTR on disposable income including withdrawal of the Housing Benefit and Social Assistance is presented in Figure 7 in the Appendix.

Source: Authors' calculations using the SIMPL microsimulation model.

Figure 6: Participation tax rates in one-earner families



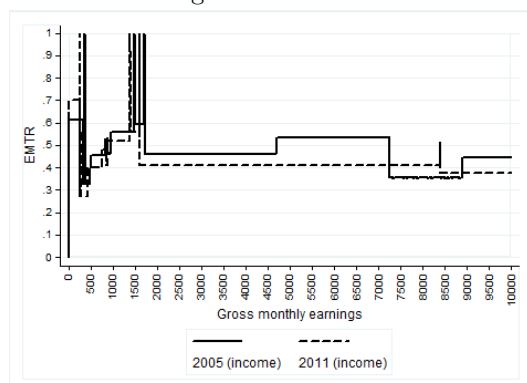
Note: Figures A and C assume lack of eligibility to Housing Benefit and Social Assistance; Figures B and D assume that families are eligible to both of these benefits.

Source: Authors' calculations using the SIMPL microsimulation model.

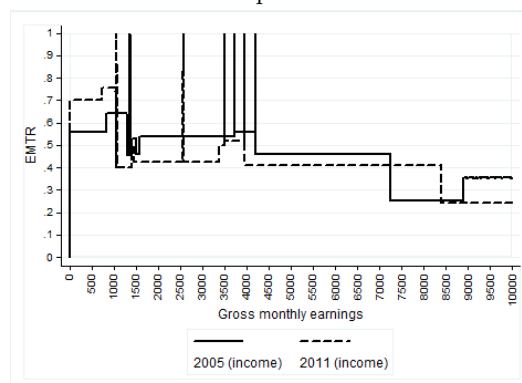
Appendix

Figure 7: Full effective marginal tax rates in one-earner families

A. Single without children



B. One earner couple with two children



Note: The full EMTRs computed on disposable income including withdrawal of the Housing Benefit and Social Assistance.

Source: Authors' calculations using the SIMPL microsimulation model.